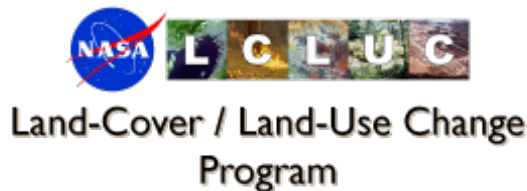
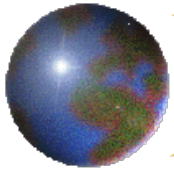


The South/Southeast Asia Research Initiative (SARI) Priorities and Progress

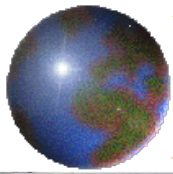
Krishna Prasad Vadrevu
NASA Marshall Space Flight Center





Presentation topics

- **Background to the SARI initiative**
- **Meeting Objectives**



How it started - strong interest in a SARI from local scientists



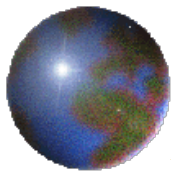
Jan-10-13th, 2013-Regional Science Meeting, Coimbatore

Total participants =120

US – 18 researchers

**Nepal-3; Srilanka-2; Myanmar-1; Afghanistan, Myanmar, Bangladesh-1 each
Pakistan, China invited but could not attend – Visa issues**

India – University Researchers, Government, Non-Government, NGO's



Meeting Summary-Need for SARI NASA The Earth Observer

24

The Earth Observer

March - April 2013

Volume 25, Issue 2

meeting/workshop summaries

Summary of the 2013 NASA Land Cover/Land Use Change Regional Science Meeting, South India

Krishna Prasad Vadrevu, University of Maryland, College Park, krishna@hermes.geog.umd.edu
Chris Justice, University of Maryland, College Park, justice@hermes.geog.umd.edu
Prasad Thenkabail, United States Geological Survey, pthenkabail@usgs.gov
Garik Guttman, NASA Headquarters, gguttman@nasa.gov

Introduction

The 2013 NASA Land Cover/Land Use Change (LCLUC) Regional Science Meeting was held in South India and had three components:

- a focused workshop on water resources at the Centre for Water Resources Development and Management (CWRDM), held in Kozhikode, Kerala in India, from January 7-8; and a Land Use (LU) Transect Study from Kozhikode, Kerala, to Coimbatore, Tamil Nadu, in India¹, on January 9;
- a NASA international regional meeting, held January 10-13, at Karunya University in Coimbatore, Tamil Nadu; and
- a training workshop titled *Remote Sensing and Geospatial Technologies for Land Cover and Land Use Change Studies and Applications*, held January 14 at Karunya University.

The goal of the meeting was to discuss land cover/land use change (LCLUC) issues and impacts in the South Asia region. The meeting was organized around eight technical sessions:

1. Agricultural land-use change;
2. LCLUC-related Earth observations (missions, data, and products);
3. Atmosphere/land-use interactions (aerosols, greenhouse gases);

¹ Kerala and Tamil Nadu are two of the 28 states in India.



Water resource-focused workshop participants. Images Credit All photos in this article were taken by author or other members of the LCLUC team.

4. LCLUC and the carbon cycle;
 5. Forests and LCLUC in mountainous areas;
 6. Coastal zones and water resources;
 7. Urban LCLUC; and
 8. Working towards a Regional Global Observation for Forest and Land Cover Dynamics (GOF-GOLD) South Asia Regional Information Network (SARIN) (including prospects, opportunities, and challenges).
- The meeting was a joint effort of the NASA LCLUC Program; GOF-GOLD Program; International System for Analysis Research and Training (START) Program; Monsoon Asia Integrated Regional Studies Program (MAIRS); University of Maryland College Park (UMD); Centre for Water Resources Development and Management (CWRDM) in Kozhikode, Kerala; and Karunya University, in Coimbatore, Tamil Nadu.

NASA LCLUC Workshop on Water Resources and Land Use Transect

Thirty top-level delegates from different institutes and universities in India attended the meeting in addition to twelve researchers from the U.S. **Narasimha Prasad** [CWRDM], welcomed the participants and highlighted the CWRDM water research activities.

After the welcome, **Garik Guttman** [NASA Headquarters] addressed the workshop's participants, presenting an overview of LCLUC issues in South Asia, with focus on agricultural land-cover conversion.

The Earth Observer

March - April 2013

Volume 25, Issue 2

25

meeting/workshop summaries



Rhizophora mangle, known as the "red mangrove," near Kadalundi bird sanctuary in Kerala.

forest-cover loss, increasing urbanization, and air pollution. **Chris Justice** [UMD] stressed that much needs to be done in terms of the underpinning science of LCLUC and the linkages with global climate change in South Asia.

Some highlights from the workshop are summarized here:

- The most important LCLUC issue impacting agriculture in south India is *paddy fields* (wetlands) being converted to urban areas and/or left abandoned, with the attendant deficit in rice production.
- This *paddy conversion* is complex, and crosses economic, ecological, sociocultural, structural, and class dimensions.
- Economic return from paddy cultivation does not tend to encourage conservation—due to labor costs.
- At present, land is seen only as real estate needed for residence status, and is the safest and best investment to maximize profits.
- Coconut farming is shrinking due to the unavailability of skilled labor.
- Pollution and sedimentation from *anthropogenic* activities seriously affects aquatic systems/wetlands in South India. This requires more-stringent regulations and greater wetland protection.
- The roles of coastal vegetation and mangroves in protecting lives and property require more research to address contamination—possibly due to saline water intrusion, likely from inadequate drainage systems and poor maintenance of the well surroundings.

The CWRDM arranged several field visits to highlight local LCLUC issues and responses, including urban green park and wetlands conservation, mangrove conservation, and coastal and riparian land use management.

On January 9, participants departed for a Land Use Transect Study from Kozhikode, Kerala, to Coimbatore, Tamil Nadu, involving local scientists. The processes of urban expansion and forest degradation were quite evident during the transect study. During the transect, the participants observed forest fires in the mountains, 50 km (~31 mi) away from Coimbatore.



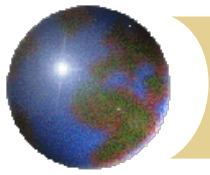
Coconut, arecanut, banana, and yam plantations, Kozhikode, Kerala.



Smoke from forest fires, Palakkad, Western Ghats, Kerala.

March/April 2013

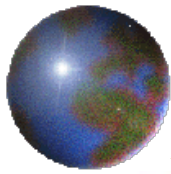
http://eosps0.gsfc.nasa.gov/eos_homepage/for_scientists/earth_observer.php



SARI - Goal

To develop an innovative research, education, and capacity building program involving state-of-the-art remote sensing, natural sciences, engineering and social sciences to enrich LCLUC science in South/Southeast Asia.

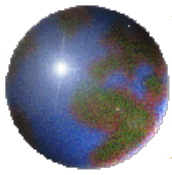
Thanks to the Vision of Garik, Chris and SARI core team members.



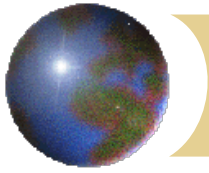
NASA ROSES Ongoing SARI Projects - 2016-Current

- Assessing the Impacts of Dams on the Dynamic Interactions Among Distant Wetlands, Land Use, and Rural Communities in the Lower Mekong River Basin
- Land Use Status, Change and Impacts in Vietnam, Cambodia and Laos
- Land-Cover/Land-Use Change in Southern Vietnam Through the Lenses of Conflict, Religion, and Politics, 1980s to Present
- A Cobra in the Forest? Quantifying the Impact of Perverse Incentives from Indonesia's Deforestation Moratorium, 2011 to 2016
- The Agrarian Transition in Mainland Southeast Asia: Changes in Rice Farming - 1995 to 2018
- Agricultural Land Use Change in Central and Northeast Thailand: Effects on Biomass Emissions, Soil Quality, and Rural Livelihoods
- Spatiotemporal Drivers of Fine-Scale Forest Plantation Establishment in Village-Based Economies of Andhra Pradesh
- Consequences of Changing Mangrove Forests in South Asia on the Provision of Global Ecosystem Goods and Services
- Landscapes In Flux: The Influence of Demographic Change and Institutional Mechanisms on Land Cover Change, Climate Adaptability and Food Security in Rural India
- Urban Growth, Land-Use Change, and Growing Vulnerability in the Greater Himalaya Mountain Range Across India, Nepal, and Bhutan
- Understanding the Role of Land Cover/Land Use Nexus in Malaria Transmission Under Changing Socio-Economic Climate in Myanmar
- Complex Forest Landscapes and Sociopolitical Drivers of Deforestation - The Interplay of Land-use Policies, Armed Conflict, and Human Displacement in Myanmar
- The Future of Food Security in India: Can Farmers Adapt to Environmental Change?
- Impacts of Afforestation on Sustainable Livelihoods in Rural Communities in India
- Understanding Changes in Agricultural Land Use and Land Cover in the Breadbasket Area of the Ganges Basin 2000-2015: A Socioeconomic-Ecological Analysis
- Tropical Deciduous Forests of South Asia: Monitoring Degradation and Assessing Impacts of Urbanization
- The Global Land Rush: A Socio-Environmental Synthesis

No projects yet over the Philippines as collaborations are being developed

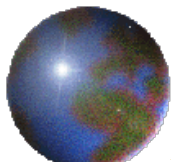


Background to LCLUC in the Region

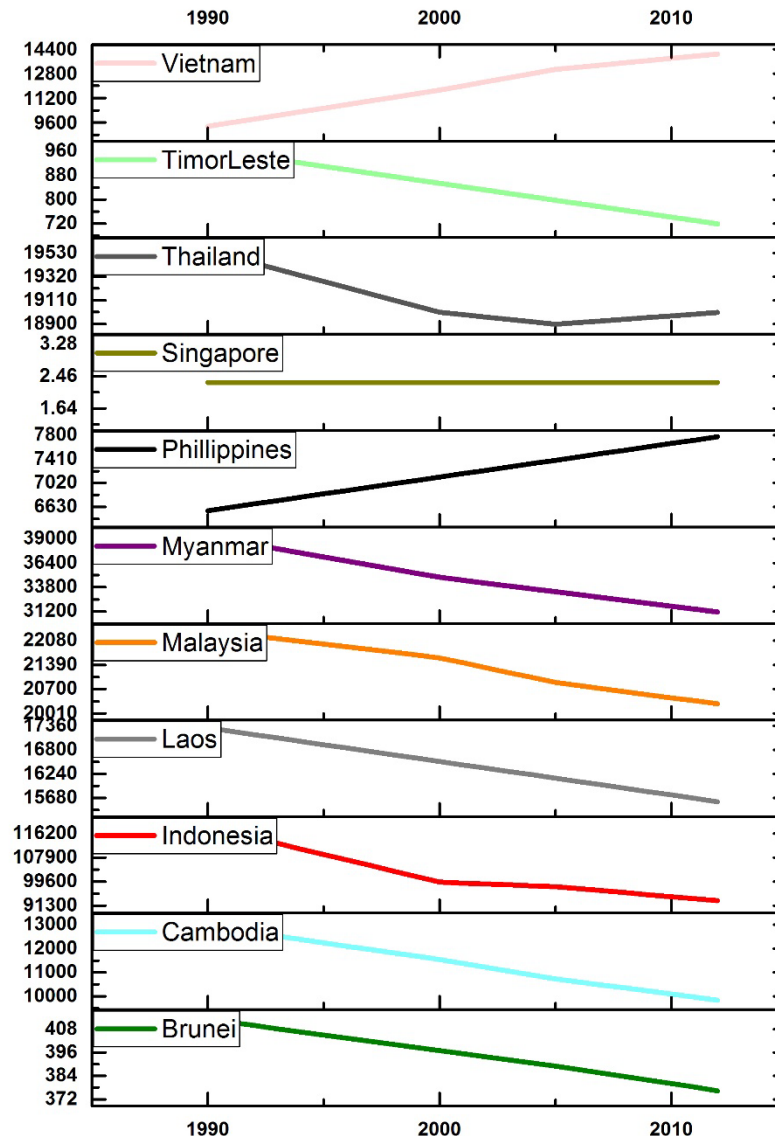
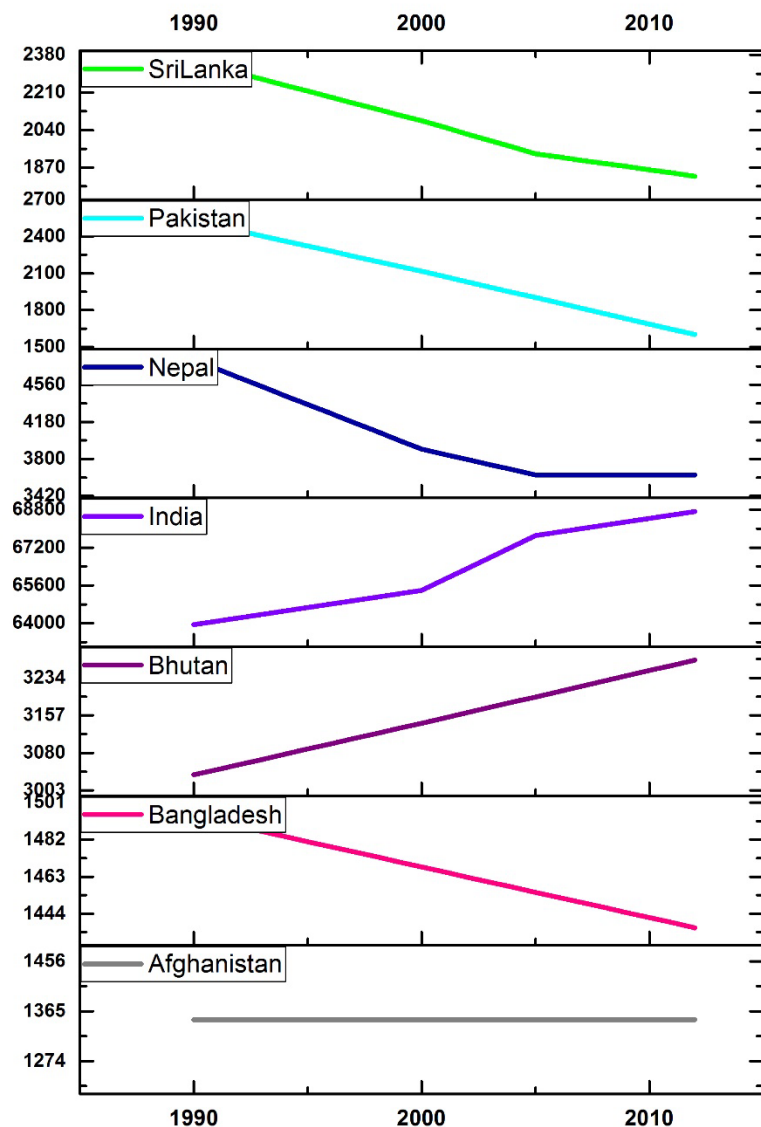


Background to the LCLUC

- ✦ In Asia, there is an increasing concern that Land Cover/Land Use Changes (LC/LUC) have been increasing due to population growth, urbanization, deforestation, agricultural intensification, etc.
- ✦ Recent LCLUC suggests significant decrease in Agricultural lands raising questions on Food Security.
- ✦ Agricultural LCLUC are closely tied to Water and Energy related issues including Greenhouse gas (GHG) emissions.

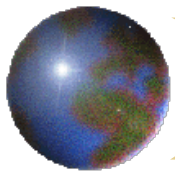


Forest Area in South/SE Asia

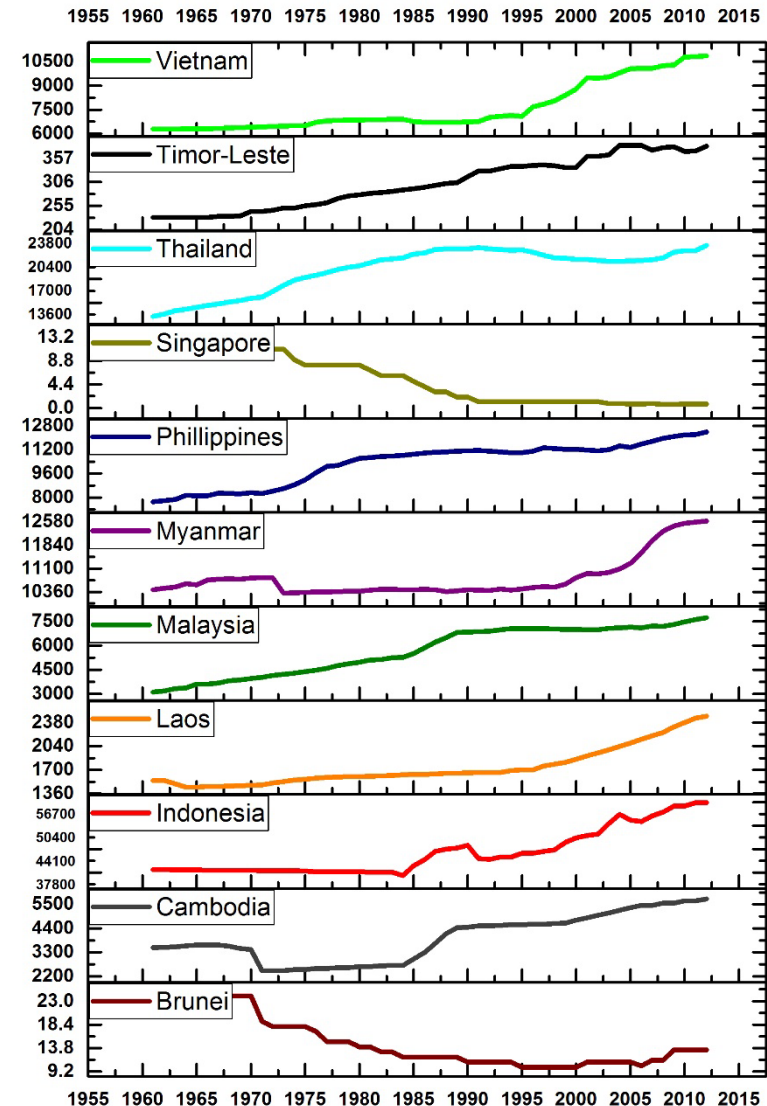
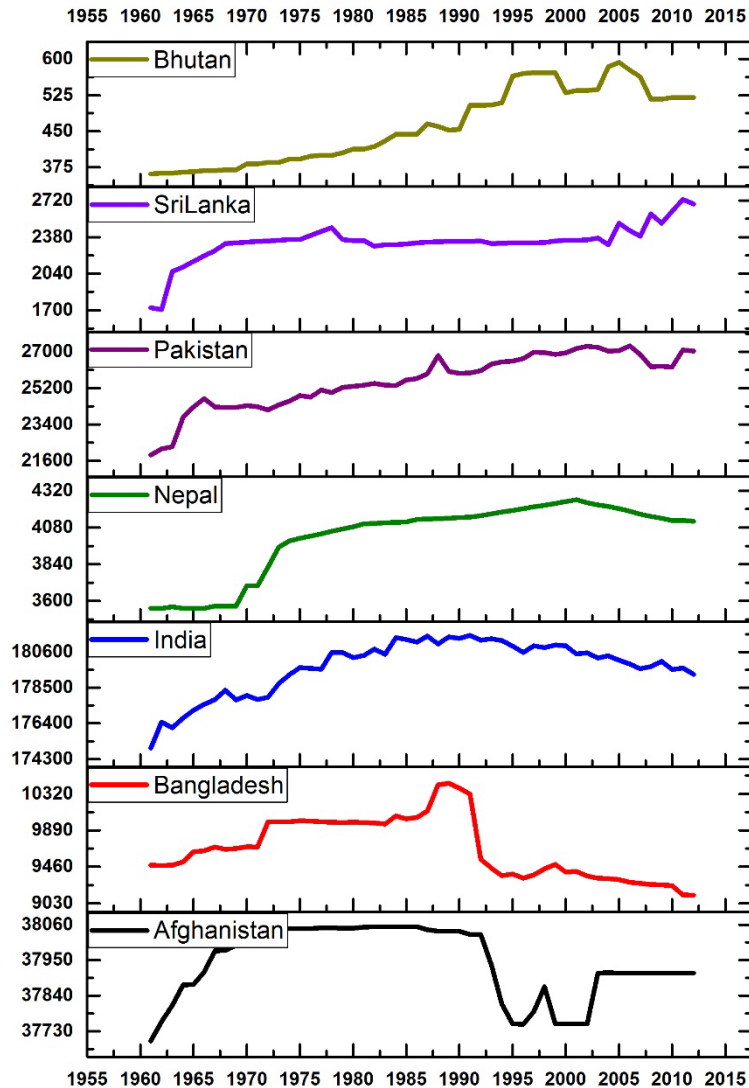


Significant decrease in Forest Area (x 1000ha) in Several South and Southeast Asian Countries

Drivers and impacts poorly understood ! Vadrevu et al., ERL, (12) 120201 Data Source: FAO, 2015

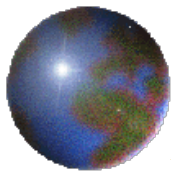


Agricultural land use in South/SE Asia

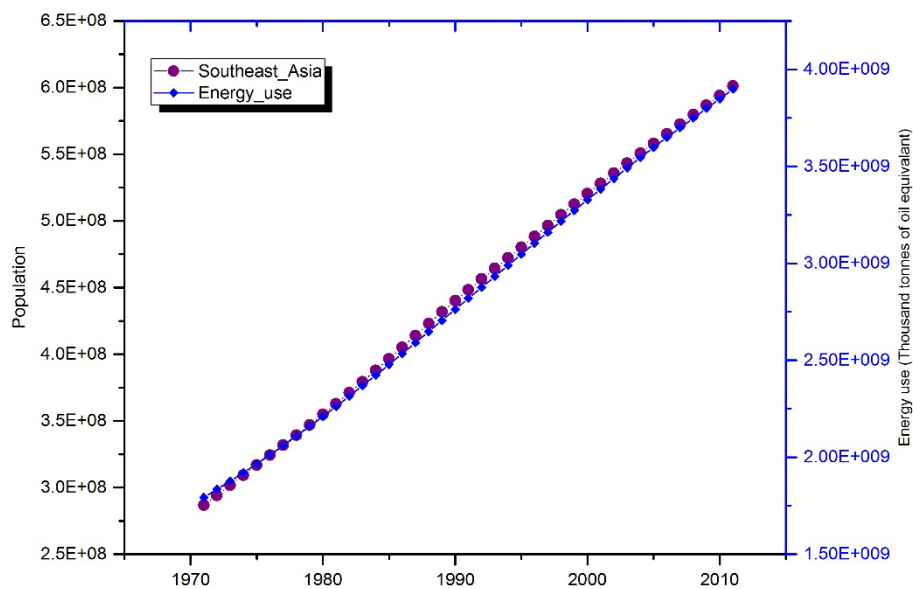
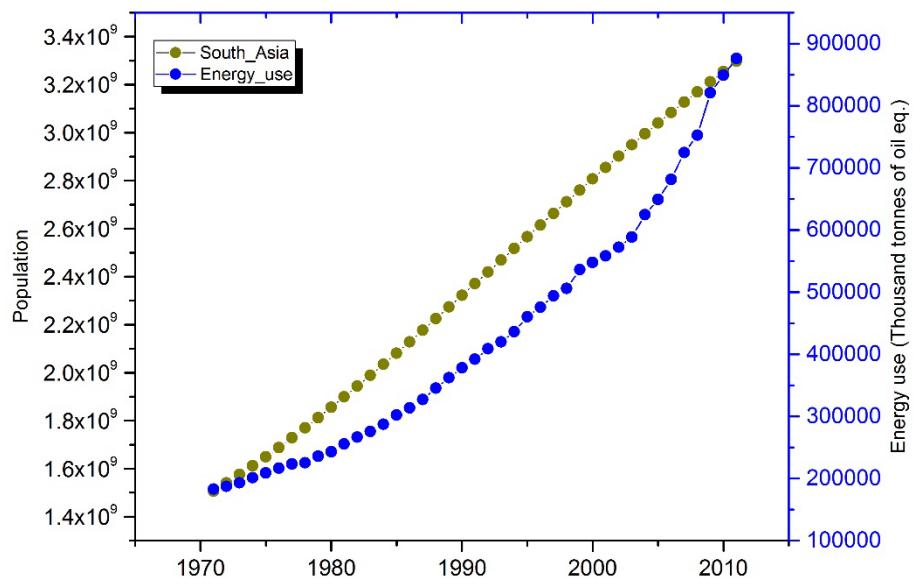


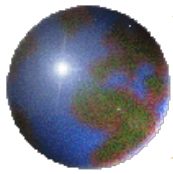
Significant increase in Agricultural Land Area (x 1000ha) in Several South and Southeast Asian Countries

Drivers and impacts poorly understood ! Vadrevu et al., ERL, (12)120201 Data Source: FAO, 2015

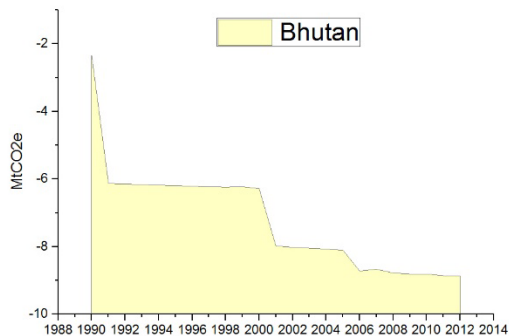
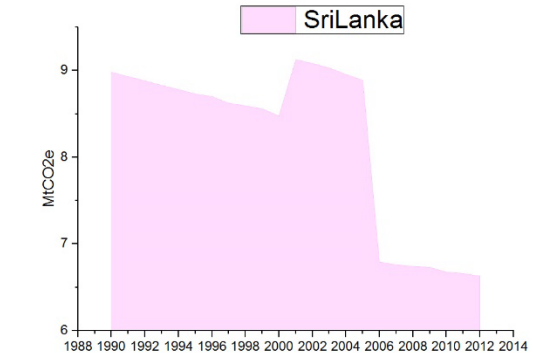
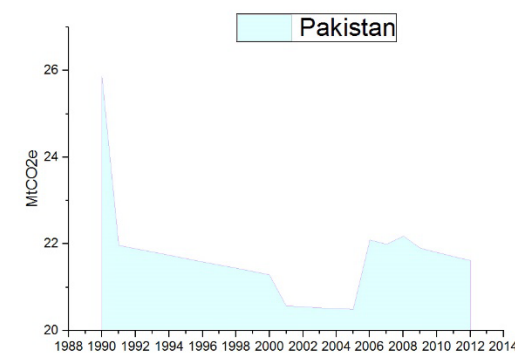
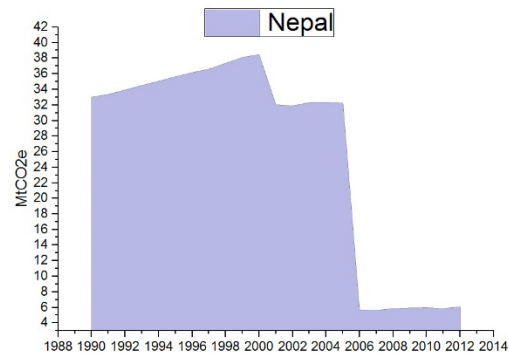
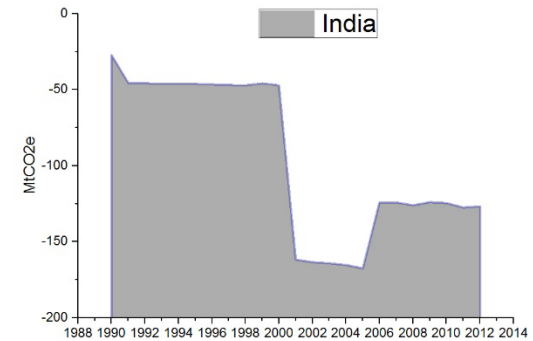
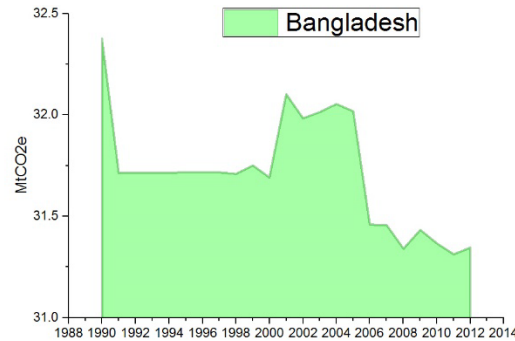
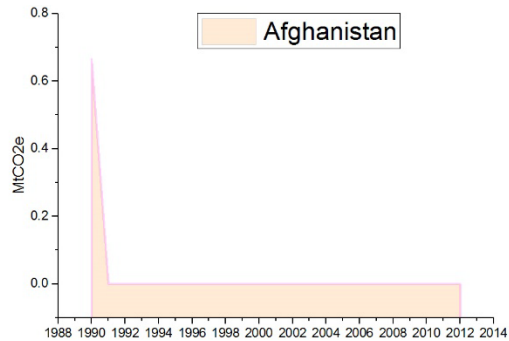


Population and Energy Use

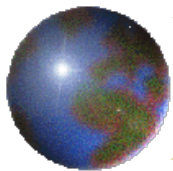




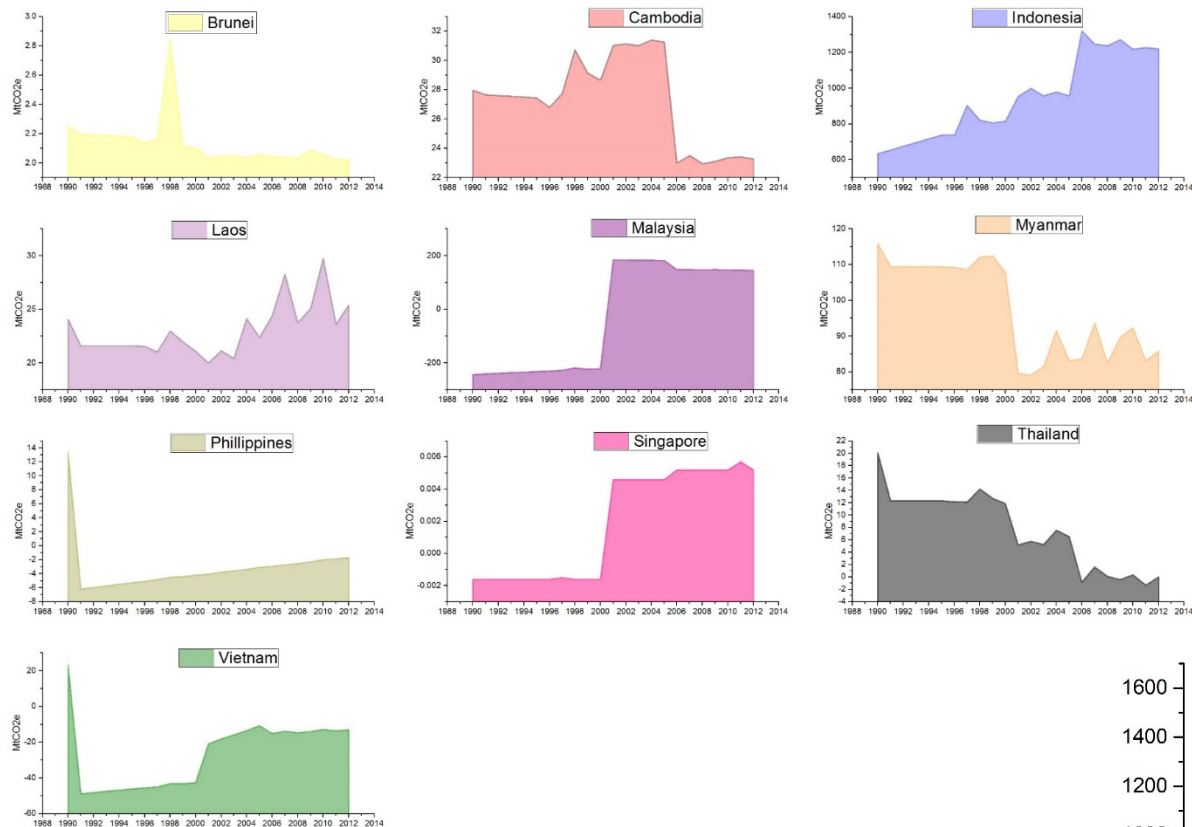
GHG emissions from LUCF in South Asia



**GHG emissions from LUCF sector
seems decreasing significantly in
South Asia**

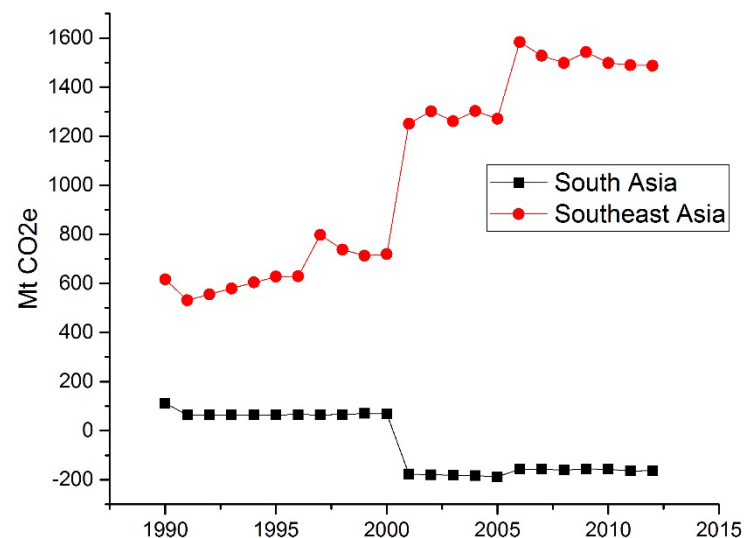


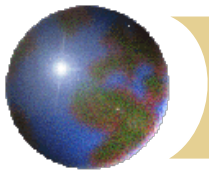
GHG emissions from LUCF in Southeast Asia



GHG emissions from LUCF sector seems decreasing in Southeast Asia too, however, not rapidly as in South Asia

Some of the drivers to be discussed in the workshop





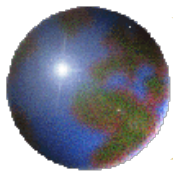
SARI Focus and Priorities

Agriculture and Water Resources are very important topics of SARI

SARI Focuses on building research collaborations between the US and regional scientists

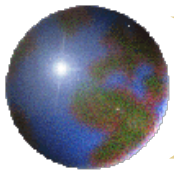
Meetings/Workshops help in identifying Needs and Priorities for the region (NASA LCLUC calls)

*Training events are integral to SARI
(eg: 3-day training after the meeting)*



SARI Research Needs and Priorities – Meetings/Workshops Funded by International/Regional partners

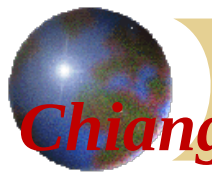




2017 LCLUC SARI Meeting – Chiang Mai, Thailand



165 participants – 22 countries representation
3-day meeting + 3-day training



Collaborations are the Key *Chiang Mai Meeting Facilitated by 20-Different Organizations*



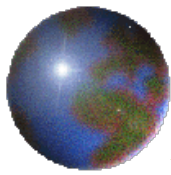
National Astronomical Research Institute of Thailand



Chiang Mai University

Sponsors and Partners





Philippines meeting

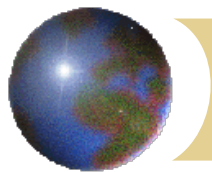


University of Philippines
Institute of Environmental Science and Meteorology



Sponsors and Partners

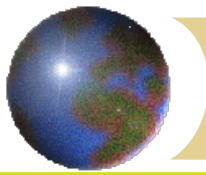




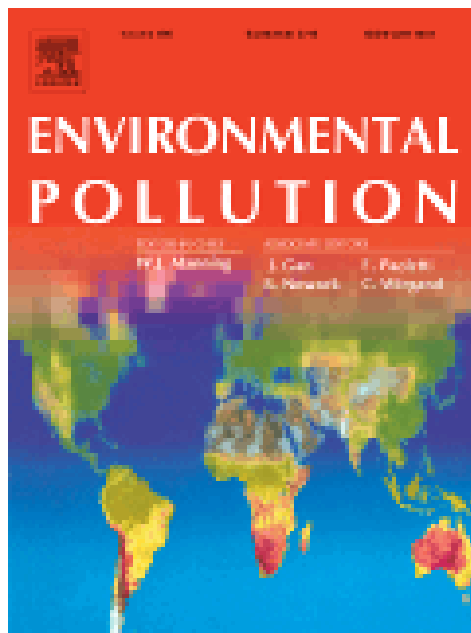
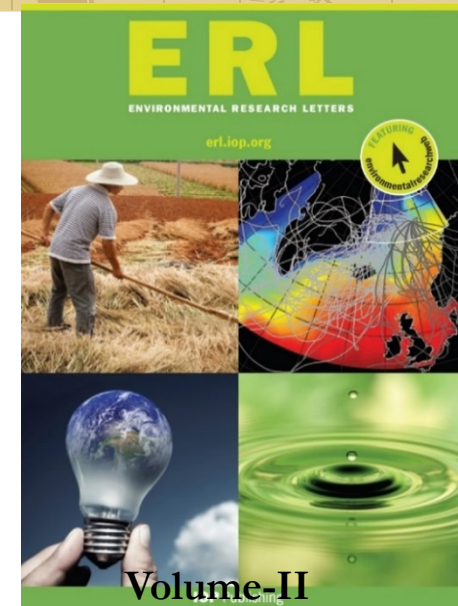
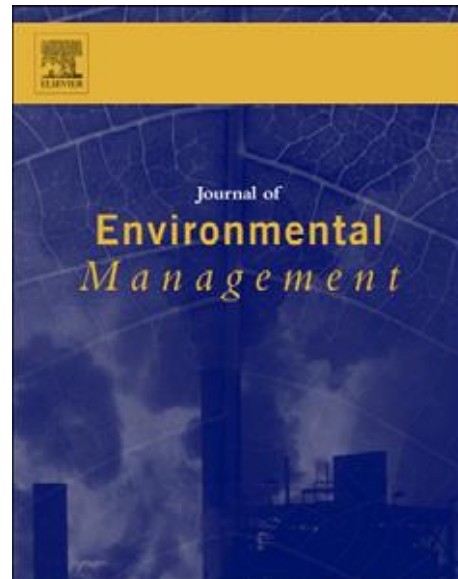
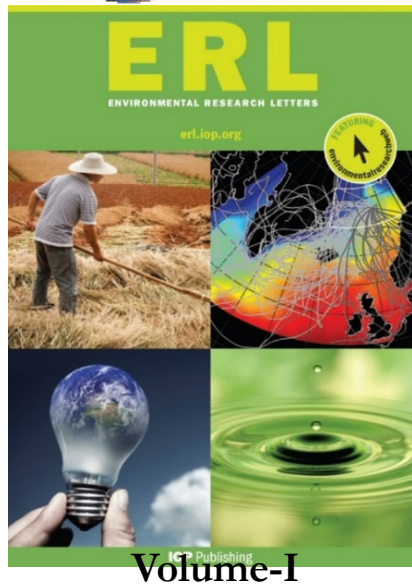
SARI Focused Thematic Meeting – Agriculture - New Delhi, India, May, 2017



- Total Meeting Participants = 84**
- Meeting Outputs – IJRS Special Issue**
- ISRO + Regional scientists involvement**



For SARI – Research Outputs are Priority!





Springer

springer.com

Land-Atmospheric Interactions in Asia
 Book Series: Springer Remote Sensing/Photogrammetry
 Editors: Krishna Prasad Vadrevu, Toshimasa Ohara, Chris Justice

Forthcoming, Summer 2016

- Maximizes reader insights into the quantification of land cover/land use changes (LC/LUC) and greenhouse gas emissions in Asia.
- Focuses on large spatial scales integrating satellite remote sensing and ground based approaches.
- Broadens understanding on integrated approaches combining top down and bottom up methodologies including modeling for characterizing LC/LUC and emissions.
- Explores the causative factors and impacts of LC/LUC and emissions due to population growth, industrial activities and energy demand in Asia.

In Asia, high population growth together with rapid economic development are causing immense pressure to convert land from natural and agricultural areas to residential and urban uses with significant impact on emissions and ecosystem services. This edited volume sheds new light on the causative factors and impacts of LC/LUC on the greenhouse gas (GHG) and aerosols in Asia. The volume will also focus on the use of remote sensing, geospatial technologies, and integrated approaches to characterize LC/LUC and emissions.

Articles are invited from international researchers working on remote sensing of LC/LUC, fires, GHG emission inventories, aerosols, and land-atmospheric interactions in Asia.

Submission Deadline: December 31st, 2015
 Email: kprasad@umd.edu

Dr. Krishna Prasad Vadrevu (kprasad@umd.edu), Associate Research Professor, Department of Geographical Sciences, University of Maryland, College Park, USA.

Dr. Toshimasa Ohara (tohara@nies.go.jp), Researcher, National Institute of Environmental Studies (NIES), Japan.

Dr. Chris Justice (cjustice@umd.edu), Head, Department of Geographical Sciences, University of Maryland, College Park, USA.




remote sensing

- Research Sensing Home
- About this Journal
- Journal Statistics
- Indexing & Abstracting
- Instructions for Authors
- Publication Fees
- SPRINGER ISSUES
- Editorial Board
- E-Mail Alert
- Add your e-mail address to receive forthcoming issues of this journal
- Subscribe
- Journal Overview

Special Issue "Mapping, Monitoring and Impact Assessment of Land Cover/Land Use Changes in South and South East Asia"

Quicklinks

- Special Issue Editors
- Special Issue Information
- Published Papers

A special issue of *Remote Sensing* (ISSN 2072-4292)

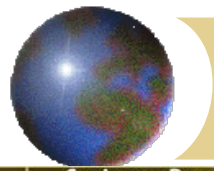
Deadline for manuscript submissions: 30 July 2016

Special Issue Editors

Guest Editor
Dr. Krishna Prasad Vadrevu
 Department of Geographical Sciences, University of Maryland, College Park, MD 20742, USA
 Website: <http://geog.umd.edu/faculty/kprasad/Vadrevu/Krishna>
 Interests: satellite remote sensing of land use/cover changes, land atmospheric interactions, remote sensing of fires, biogeochemical cycling, agroecosystems

Guest Editor
Dr. Rama Nemani
 Ecological Forecasting Laboratory, NASA Ames Research Center, Box 242-4, Moffett Field, CA 94035, USA
 Website: <http://hesocast.arc.nasa.gov/wordpress.php>
 Interests: ecological forecasting, collaborative computing, big data analysis

Guest Editor
Prof. Chris Justice
 Dept. of Geographical Sciences, University of Maryland, College Park, MD 20742, USA
 Website: <http://geog.umd.edu/faculty/cjustice/Christopher>
 Interests: digital change research, land use/cover changes, satellite based agriculture monitoring, satellite based fire monitoring, terrestrial observing



Book Published (2018)

Springer Remote Sensing/Photogrammetry

Krishna Prasad Vadrevu
Toshimasa Ohara
Chris Justice *Editors*

Land-Atmospheric Research Applications in South and Southeast Asia

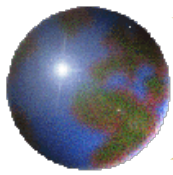
 Springer

- 30 Chapters
- 101 (authors + co-authors)
- 732 pages

2-other books in progress:

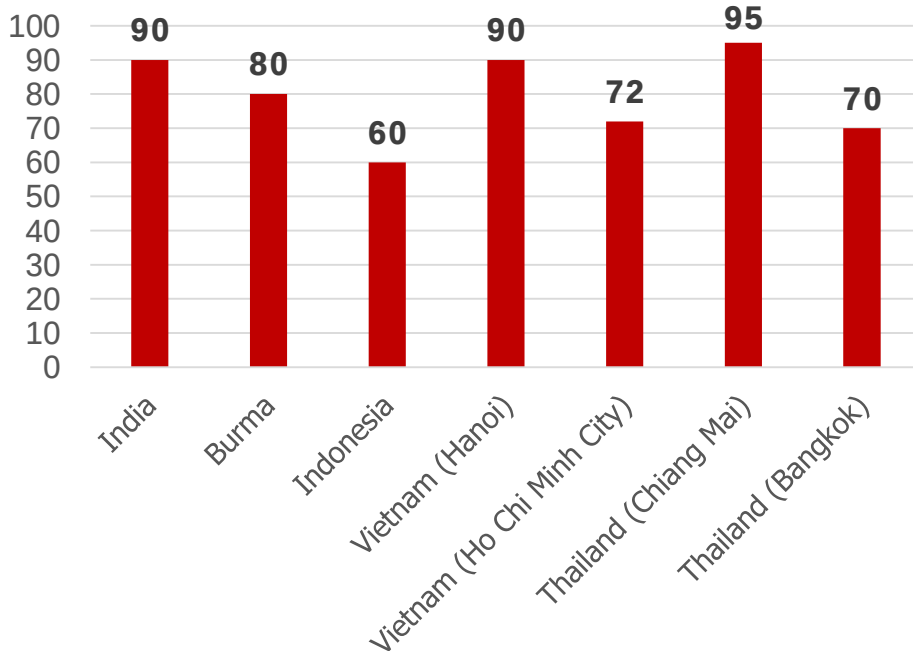
-Biomass burning in Asia (CRC Press – 2 Volumes, 2019)

-Remote sensing of Agriculture in Asia - Springer (2019)



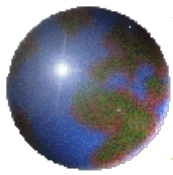
Training Events –Early Career Researchers

Total Participants = 557



Promoting Open Source Tools and Cloud Computing Platforms
(Ex: GEE)

Training participants for this meeting: 130



3-Different Outputs of the Recent Meeting

Journal Special Issue



Volume 236

May 2018

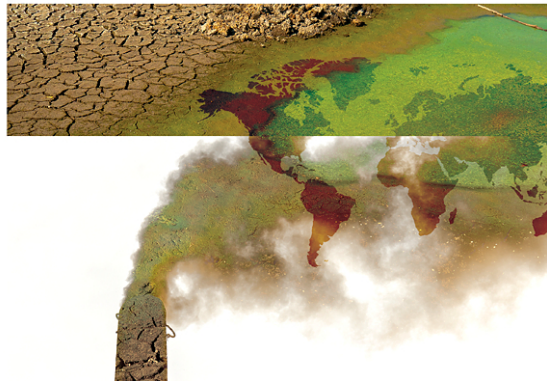
ISSN 0269-7491

ENVIRONMENTAL POLLUTION

EDITORS-IN-CHIEF

Eddy Y. Zeng

David O. Carpenter



Journal Special Issue



remote sensing

IMPACT
FACTOR
3.244

An Open Access Journal by MDPI

Land Cover/Land Use Change (LC/LUC) – Causes, Consequences and Environmental Impacts in South/Southeast Asia

Guest Editors:

Dr. Krishna Prasad Vadrevu

1. Remote Sensing Scientist,
NASA Marshall Space Flight
Center, Huntsville, AL 35758, USA
2. Adjunct Professor, Department
of Geographical Sciences,
University of Maryland, 4321
Hartwick Road, Suite 400, College
Park, MD 20740, USA
krishna.p.vadrevu@nasa.gov

Prof. Chris Justice

Dept. of Geographical Sciences,
University of Maryland, College
Park, MD 20742, USA
cjustice@umd.edu

Dr. Garik Gutman

NASA Headquarters, NASA Land-
Cover/Land-Use Change
Program, 300 E Street, SW
Washington, DC 20546, USA
garik.gutman@nasa.gov

Deadline for manuscript
submissions:

1 March 2019



Message from the Guest Editors

The current Special Issue invites articles on the use of remote sensing and geospatial technologies focusing on South/Southeast Asia in the in the following LUCC areas:

- Use of remote sensing data for LUCC mapping/monitoring, quantifying the causes/consequences including impact assessment studies integrating both biophysical and social datasets;
- Remote sensing of forest cover changes and impacts on biogeochemical cycling;
- Agricultural monitoring and land use change mapping including remote sensing of crop production, farming practices and impacts on water/energy balance, et al;
- LUCC, urbanization and associated impacts (urban climate, air and water pollution, etc.)
- LUCC, fires, biomass burning and pollution impacts;
- Integrating remote sensing data for emission inventories linking bottom-up and top-down approaches;
- Mapping and monitoring of land management practices, disturbances, and interactions;
- Detecting long-term trends in LUCC and impacts on hydrological variables, such as runoff, ET, and soil moisture;
- Spatio-temporal data mining, modeling, and analysis for LUCC data and impact assessment studies;
- New tools and methods for LUCC data generation and dissemination.

2-Volume Book



CRC Press
Taylor & Francis Group

Biomass Burning in South/Southeast Asia – Volume-1 Inventory, Mapping and Monitoring

Biomass Burning in South/Southeast Asia – Volume-2 Impacts on Biosphere

Guest Editors

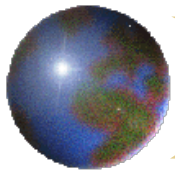
Dr. Krishna Vadrevu (NASA)
Dr. Toshimasa Ohara (NIES)

Guest Editors

Dr. Krishna Vadrevu (NASA)
Prof. Chris Justice (Umd)
Dr. Garik Gutman (NASA)

Book Editors

Dr. Krishna Vadrevu (NASA)
Dr. Toshimasa Ohara (NIES)
Prof. Chris Justice (Umd)



SARI forthcoming meetings (2018-2019)

- ✦ **2018 - Forest cover mapping and monitoring in South Asian Countries, Nepal**
 - ✦ Meeting: November, 2018
 - ✦ Training: TBD

- ✦ **2019 - Agriculture Focus – SARI + EOFSAC + India-Ministry of Agriculture collaboration, India**
 - ✦ Meeting: February, 2019
 - ✦ Training: TBD

- ✦ **2019 - SARI LCLUC all-hands, Bangkok, Thailand**
 - ✦ Meeting (TBD)
 - ✦ Training (TBD)