South Asia LCLUC Overview, Trends and Ongoing Issues

R. DeFries, Columbia University
Land use/cover in South Asia is distinctive: small fields, high population, land use change.
SARI projects on AGRICULTURE AND FOOD SECURITY

- New Transitions in Smallholder Agricultural Systems that Promote Increased Tree Cover Outside of Forests (Skole)
- Sowtime: Climate Adaptive Agriculture in the Eastern Gangetic Plains (Gray)
- Landscape in Flux: The Influence of Demographic Change and Institutional Mechanisms on Land Cover Change, Climate Adaptability and Food Security in Rural India (Singh)
- The Future of Food Security in India: Can Farmers Adapt to Environmental Change? (Jain)
We linked evapotranspiration data that we produced across India with climate and groundwater data to examine the impact of climate change on crop water stress and groundwater depletion. We find that warming temperatures will more than triple groundwater depletion rates as farmers irrigate more to reduce crop water stress.

Bhattarai et al. (2019). Remote Sensing of Environment

Bhattarai et al. (in review)

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New Transitions in Smallholder Agricultural Systems that Promote Increased Tree Cover Outside of Forests (Skole)
SARI projects on URBANIZATION

- Urban Growth, Land-Use Change, and Growing Vulnerability in the Greater Himalaya Mountain Range Across India, Nepal, and Bhutan (Seto)
• Consequences of Changing Mangrove Forests in South Asia on the Provision of Global Ecosystem Goods and Services (Vincent)

• Spatiotemporal Drivers of Fine-Scale Forest Plantation Establishment in Village-Based Economies of Andhra Pradesh (Wynn)

• Tropical Deciduous Forests of South Asia: Monitoring Degradation and Assessing Impacts of Urbanization (DeFries)

• Impacts of Afforestation on Sustainable Livelihoods in Rural Communities in India (Fleischman)

• Twenty-five years of community forestry: Mapping forest dynamics in Nepal (Jeff Fox)
Figure 3. Sample of forest plantation plot (2 ha). First row: Google Earth images from February 2016 (left) with little vegetation and January 2018 (right) with a plantation. Second row: Landsat (30m, left) and Sentinel-2 (10m, right) from June 2018 showing the advantages of the higher-resolution Sentinel-2 for the detection of smallholder plantations. Scaled to 1:2,500.
Tropical Deciduous Forests of South Asia: Monitoring Degradation and Assessing Impacts of Urbanization (DeFries)

HOW TO MEASURE FOREST DEGRADATION?
Future needs for land use/land cover research in South Asia

EMERGING LAND USE ISSUES:
Infrastructure and landscape connectivity
Competition for land for restoration/climate mitigation
Urban-rural interactions
Climate resilient /low emission agriculture

NEW OBSERVATIONS:
High resolution data
GEDI
...

SARI PARTNERSHIPS AND COLLABORATIONS
South Asia: the first line of defense for climate change impacts

1.5°C

3.0°C

(Byers et al, 2018)
THANKS