

Issues for Consideration

Chris Justice
LCLUC Program Scientist

LCLUC Research Funding Areas

- **Detection and Monitoring** (Regional > Global Mapping, Monitoring, Characterization (and the associated method development) - often linked to GOFD-GOLD goals or Regional Initiatives – strong data set generation and distribution component
- **Regional Case Studies** (Processes/Drivers)
- **Impacts of LCLUC** (Regional - often linked to Regional Programs or Thematic areas (e.g. Urban), often partnered with other NASA or Interagency Programs – (e.g. Hydrology, Carbon)
- **Impacts of Climate and Global Change on LCLUC** (Regional, Thematic – linked to other programs often including modeling component)
- **Projections and Modeling** of future changes – hindcasting/intercomparisons
- LCLUC Land Use, Social System **Vulnerability and Adaptation**
- **LCLUC Synthesis Studies**
 - Case Studies/Process Studies (developing some general rules or new concepts)
 - Data Synthesis (assessing patterns or trends – Assessments)
- **International Partnering** – US Collaborating PI on large internal projects

with an emphasis in integrating physical and social science

Where did this come from ?

- IGBP/IHDP – international science program
 - strategy documents LUCC, IGBP DIS (1990's still relevant)
- USGCRP > US CCSP > USGCRP (interagency global and climate change)
 - Strategic Plan
 - LULCC goals and implementation Plan
 - Coordination for US contributions to IPCC
 - Recent Adaptation and Climate Services focus
- International Observations Requirements
 - GOFD/GOLD - Global Observing Systems
 - GEOSS - Applications > Science (evolving)
 - CEOS – response to GCOS – response to UN FCCC
- NASA Earth Science Strategic Plan – Carbon.... Focus area
- NAS Studies - USGCRP/NASA supported
- Feedback from the LCLUC Science Community

Areas Needing Attention

- **LCLUC Funding**

- Increasing demand – flat funding
- Continued program leverage needed (ROSES)
- Improving the process of proposing / reviewing
- Narrower calls as a means to reduce number of submitted proposals?

- **Links to the NASA Applications Program ?**

- Societal relevance > research to operations?

- **Expectations from LCLUC PI's**

- Publications
- Help strengthen the NASA program and the community
 - Review Presentations - Review articles
 - Information / Outreach - Web site / Brochure
 - Help Program Management in program promotion
 - Education – mentoring NIPS, ESSF



THE NASA LCLUC PROGRAM

An Interdisciplinary Approach to Studying Land-Cover and Land-Use Change



Copies Available on Request



Areas Needing Attention

- **Observations**

- Moderate Resolution Data

- Opening the other archives
- Landsat Data Gap > Real Constellation
- LSI and all the others
- LDCM / Sentinel 2 - synergy
- Beyond Landsat 8 !
- Higher order products requirements

- VIIRS / Sentinel 3 – synergy

- Decadal Survey and LCLUC

- Fine Resolution Data Buys ?

- GCOS >UNFCCC ECVs Landcover/Change, Fire

Areas Needing Attention

- **USGCRP** - Land use in the next phase
 - Increasing importance of Land Use
- **International Dimension**
 - GLP participation
 - Land Use, Deforestation and Carbon Cycle
 - GEO Forest carbon tracking – national demonstrators
 - UN REDD+ MRV methodologies
 - Money, Confusion, Grandstanding, Quality Control

**LCLUC Website Redevelopment
&
Program Information Outreach**

New LCLUC Website Homepage



Science Themes

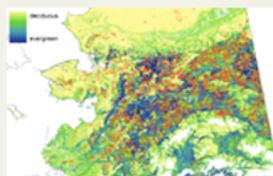
- [Detection and Monitoring of LCLUC](#)
- [Carbon and Biogeochemical Cycle Impacts](#)
- [Water and Energy Cycle Impacts](#)
- [Predictive Land Use Modeling](#)
- [Climate Variability and Change](#)
- [Ecosystems and Biodiversity Impacts](#)
- [Synthesis Studies](#)
- [Vulnerability, Adaptation](#)
- [Observations and Data](#)
- [Drivers of Change](#)

Program Highlights

Quantifying Changes in Northern High Latitude Ecosystems and Associated Feedbacks to the Climate System

Scott Goetz - Woods Hole Research Center & University of Maryland

[Read the full report](#)



Welcome to LCLUC (DRAFT SITE)

Welcome to the NASA Land-Cover and Land-Use Change (LCLUC) Program website. LCLUC is an interdisciplinary science program in the Earth Science Division of the Science Mission Directorate. LCLUC is part of the Carbon Cycle and Ecosystems Focus Area with links to the some programs in other Focus Areas.

What's New

- A new global land parameter database derived from AMSR-E multi-frequency microwave remote sensing released
- The Global Geo-Referenced Field Photo Library released
- New Global Land/Water Mask Released
- NASA and USGS complete the Global Land Survey 2005 dataset
- NSF enhanced support for interdisciplinary research using multi-scale modeling
- NASA Cooperative Agreement Notice (CAN): Global Climate Change Education: Research Experiences, Modeling & Data
- The Earth Observer
- 2010 NASA Terrestrial Ecology Science Team Meeting

Science Highlights

Scientists Uncover Ecological Impacts of Invasive Species

Recent Publications

Article on Arctic Research of the Composition of the Troposphere from Aircraft and Satellites (ARCTAS)

Amber Soja - NASA Langley Research Center

Links To Our Partners

Land Measurements Portal	ESA Sentinel-2
MODIS Land Program	CBERS
USGS	Indian Space Research Program
ScanEx	Global Land Cover Facility

LCLUC Science Team Meeting Schedule

Date	Location
08/28/2010	Tartu, Estonia
04/20/2010	Bethesda North Marriott, Bethesda, MD
09/15/2009	Almaty, Kazakhstan
03/31/2009	Bethesda North Marriott, Bethesda, MD
01/12/2009	Khon Kaen, Thailand

[Newest](#) | [Prev](#) | [Next](#) | [Oldest](#)

[Related Program Meeting Calendar](#)

Job Opportunities

The Land Environment and Atmospheric Dynamics (LEAD) Program Postdoctoral Position

Fellowships

Graduate teaching and research fellowships in Environmental Science, U of Toledo

Ph.D. Research Assistantship in Land Use and Water Resources, Montana State

Post Doctoral Research Associate in Hydroecology of Desert Streams, University of Washington

Call for proposals: Global Climate Change Education: Research Experiences, Modeling & Data

Solicitations

International Global Programs



International Regional Programs



Landsat Program Updates



Temporary link:
<http://webster2.iluci.org>

LCLUC People

What we have...

- Role in current & past projects
- LCLUC Presentations

What we need...

- Complete/updated contact info?
- Publications?
- Awards?

http://webster2.lcluc.org/people.php

NASA LCLUC

Land-Cover / Land-Use Change Program

Home Program Information Meetings People Projects Data & Information Education

LCLUC Contacts

Filter by Last Name:

Name Contains:

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Name
Arun Agrawal
Vladimir Aizen
Martha Anderson
Steven Archer
Kathleen Bergen
Kathleen Bergen
Uma Bhatt
Richard Bilsborrow
Michael Binford
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Nancy Bockstael
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United States



Projects

Role	Time Period	Project
Program Manager	01/1999 : 01/2050	LCLUC

Meeting Presentations

Type	Meeting / Date	Title
Programmatic Presentation	UMUC Inn and Conference Center, Adelphi, MD 04/2007	NASA's Land-Cover/Land Use Change Program
Programmatic Presentation	UMUC Inn and Conference Center, Adelphi, MD 04/2007	Summary, Impressions, Requests, Recommendations, Plans
Programmatic Presentation	Urumqi, Xinjiang, China 09/2007	The NASA land-cover/land use change (LCLUC) program: Linkages to NEESPI drylands component
NASA LCLUC Science Team Presentation	Bethesda North Marriott, Bethesda, MD 03/2009	Welcome to the LCLUC cherry blossom ST meeting
NASA LCLUC Science Team Presentation	Bethesda North Marriott, Bethesda, MD 03/2009	Summary, Impressions, Requests, Recommendations, Plans

Other Papers and Presentations

Type	Date	Title
Programmatic Presentation	2000	NASA LCLUC Program and Objectives of the Meeting
Programmatic Presentation	2002	Roadmaps to Answering LCLUC Key Science Questions
Programmatic Presentation	2004	NASA's Land Cover Land Use Change Program
Programmatic Presentation	2005	State of the LCLUC Program and the CCSP LULCC
NASA LCLUC Science Team Presentation	2005	Carbon Cycle & Ecosystems Roadmap - NACP
Programmatic Presentation	2009	The NASA Land-Cover/ Land-Use Change (LCLUC) Program: Focus on Central Asia

Privacy Security Disclaimer Accessibility

LCLUC is a NASA program.
Responsible official: Garik Gutman.
Website manager: Mary LeeAnn King.

This site is hosted by the University of Maryland.
UNIVERSITY OF MARYLAND

LCLUC Projects

What we have...

- PI, Co-I & collaborator contact information
- Annual progress reports

What we need...

- Other funded team members?
 - Contact info
 - Publications/ awards
 - Role/ academic status
- Impact explanation
- No cost extension?
- Publications?
- Awards?

You can find the LCLUC information form here:

<ftp://ftp.iluci.org/LCLUC/LCLUCMeetings>

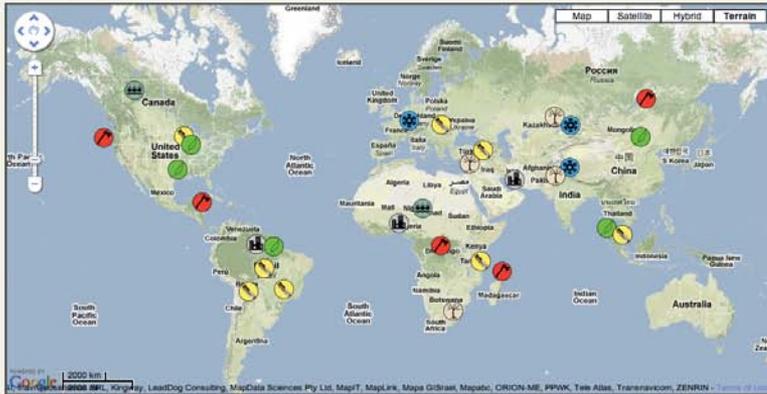
A New LCLUC Outreach Initiative

- **Hotspots of LCLUC** (areas of rapid LC/LU change) – beyond Lepers et al.
 - Identifying areas of rapid land cover change
- Started as a UMD class project – Map / Poster
 - Highlighted areas (not global systematic)
 - Web site
- LCLUC Projects often include hotspot topics and areas

Purpose: The goal of this project is to present examples of current hot spots of land cover and land use change around the globe, through an interactive online map. This project was a collaboration between graduate students in the Department of Geography at the University of Maryland, College Park, and was completed in late 2009. The site is periodically updated as new hotspots are identified by scientists from NASA's Land-Use Land-Cover Change Program.

Hotspot Definition: For the purposes of this project, a "hotspot" is defined as existent or potential change to a region or area through land cover and land use change that has regional to global implications. The hotspots were also considered within the context of pressing environmental and social issues such as climate change, biodiversity, human health, and sustainability. Primary considerations were to identify areas of change within the last five years and areas of continued or potential future change.

Hotspot Categories: Seven broad categories of land-cover land-use change were identified for this project. In some cases the categories are related to one another, and other hotspots can be added as needed.



Disclaimer: The icons on the map represent broad areas, not specific locations or geographic features.

Hotspot Categories Recenter Map

- Afforestation / Reforestation
- Deforestation
- Glacial Retreat
- Urbanization
- Agricultural Expansion / Abandonment
- Dryland Degradation
- Wetlands Loss

<p>Afforestation / Reforestation</p> <p>Hotspots of Afforestation / Reforestation</p> <p>Afforestation in Aceh, Indonesia</p> <p>Afforestation Along the Gobi Desert's Margin, Northern China</p> <p>Afforestation in the Midwestern United States</p> <p>Afforestation in Para, Brazil</p> <p>Afforestation in Southeast Texas, United States</p>	<p>Afforestation / Reforestation</p> <p>In the present era, where the vast majority of instances of LCLUC are negative in nature, afforestation and reforestation stand as important exceptions with positive impacts on the environment. Afforestation/reforestation can improve soil quality, reduce run off and minimize erosion, and enhance biodiversity (Allen and Chapman 2001). While rates of deforestation far outpace afforestation/reforestation efforts, these two mechanisms do serve to mitigate the negative impacts for example through carbon sequestration (Levy and Milne 2004). Large scale afforestation/reforestation projects include the Green Wall of China, which will eventually lead to nine million new acres of forest cover, or the Brazilian plan to plant one billion trees in the Amazonian state of Para (Malagonoux, Sene, and Atzman 2007; Xinhua 2009).</p> <p>While often treated in the same manner, afforestation and reforestation differ subtly. Afforestation is defined as the planting of new trees in areas which were previously not forested, or at least within the last 50 years (Verchot et al 2007). By contrast reforestation is the replacement of trees in locations where they have traditionally been found in the past 50 years, but have been removed by human or natural forces (Zomer et al 2008). It is also important to note that neither tree plantations nor monocultures are regarded here as either afforestation or reforestation as they have minimal species composition, simple structure, a high degree to disturbance vulnerability, and a specified economic purpose (Lugo 1997).</p> <p>Large-scale afforestation/reforestation requires a directed and concerted effort. Initiatives to afforest and reforest areas typically have backing from both national and local government, as well as the support of international NGOs and local community organizations. The rationale for these programs typically stem from desires to control storm surges, limit desert encroachment or improve the aesthetic value of a given landscape. While there has been some limited success in afforestation/reforestation projects to-date, there is considerable opportunity for larger scale projects in the context of carbon offsets.</p> <p>Afforestation References:</p> <p>Allen, Alistar, and Chapman, Deborah. 2001. Impacts of afforestation on groundwater resources and quality. <i>Hydrogeology Journal</i> 9 (4): 390-400.</p> <p>"Brazil Launches Program to Plant 1 Billion Trees in the Amazon." 2008. Xinhua News Agency, CEIS. 30 May. http://www.redorbit.com/news/science/1400361/brazil_launches_program_to_plant_1_billion_trees_in_the/index.html (last accessed 20 October 2009)</p> <p>Levy, P.E., and R. Milne. 2004. Estimation of deforestation rates in Great Britain. <i>Forestry</i> 77(1): 9-16.</p> <p>Lugo, Ariel E. 1997. The apparent paradox of reestablishing species richness on degraded lands with tree monocultures. <i>Forestry Ecology and Management</i> 99:9-19.</p> <p>Malagonoux M., Sene E.H., and Atzman N. 2007. "Forests, trees and water in arid lands: a delicate balance." Food and Agriculture Organization of the United Nations. http://www.fao.org/docrep/010/a1598e/a1598e06.htm (last accessed 20 October 2009).</p> <p>Verchot, Louis V., R. Zomer, O.V Straalen, and B. Muys. 2007. Implications of country-level decisions on the specification of crown cover in the definition of forests for land area eligible for afforestation and reforestation activities in the CDM. <i>Climate Change</i> 81:415-430.</p> <p>Zomer, Robert J., A. Trabucco, L.V. Verchot, and B. Muys. 2008. Land area eligible for afforestation and reforestation within the Clean Development Mechanism: a global analysis of the impact of forest definition. <i>Mitigation and Adaptation Strategies for Global Change</i> 13:219-239.</p>
<p>Agricultural Expansion / Abandonment</p>	
<p>Deforestation</p>	
<p>Dryland Degradation</p>	
<p>Glacial Retreat</p>	
<p>Urbanization</p>	
<p>Wetlands Loss</p>	

Acknowledgments

The project would like to acknowledge the generous work of Edina Lorenz in identifying hotspots; the various sources of information used to summarize the hotspots;

UMD GEOG615 Class Project: LCLUC Hotspots

Temporary link: <http://webster2.iluci.org/hotspots>

Permanent link: <http://lcluc.umd.edu/hotspots>

The primary hotspot page is map-based providing a visual sense of where change is occurring.

Summaries of the categories, along with a list of identified sites are provided below the map

Detail for individual Hotspots

A detailed map of the affected region is accompanied by photos illustrating some of the issues.

Details for each site are presented in categories including: 1) Critical Statistics; 2) Causes and Drivers; 3) Impacts; and 4) Future Directions along with relevant citations.

Return to Hotspots

Deforestation / Reforestation
Azah, Indonesia
Northern China
Midwestern United States
Pira, Brazil
Southeast Texas, United States
Agricultural Expansion / Abandonment
Esaio do Sao Paulo, southeast Brazil
Indonesia and Malaysia
Post-Socialist Nations - Romania and Albania
Cape Studies
Mato Grosso, Brazil
Mid-West USA
Coastal East Africa
Chaco Forest, Northwest Argentina
Syria

Deforestation
Far Eastern Siberia, Russia
North Korea
Honduras
Madagascar
Congo Basin, Central Africa

Dryland Degradation
Kazakhstan
Middle East
South Africa
Rajasthan, India

Glacial Retreat
Himalayas
Southern Alps, Switzerland
Tianshan Mountains

Urbanization
Lagos, Nigeria
Manaus, Brazil
Dubai, UAE

Wetlands Loss
Alberta, Canada
Arctic Lakes, Siberia
Lake Chad, Africa

Topic: Deforestation
Location: Far Eastern Siberia, Russia

In Focus: Boreal deforestation of Far Eastern Siberia



Far East Siberia, Russia/China - Deforestation

Click Map to Enlarge

Disclaimer

Summary

Russian boreal forests, known as the 'taiga', comprise the largest forest area (about 806.6 million ha) in the world (FAO 2006, WWF 2007). Although these forests have relatively few tree species, they are crucial to terrestrial ecosystem, climate change, as well as local social and economic activities. Recently, large areas of forests are under threat from different factors (both human and natural), and significant deforestation occurred.

Expand/Close All

Critical Statistics

- Boreal forests, comprising up to 32% of world's forested area, are as important as tropical rainforest ecosystems in terms of global climate dynamics. [Read More...](#)
- Boreal forests in Russia play a crucial role in climate change because they are an important carbon sink, holding almost 50% of the northern hemisphere's terrestrial carbon. [Read More...](#)
- These forests serve as the most important resource for many indigenous people in some of less developed regions in Russia. [Read More...](#)
- Boreal forests in Siberia also play an important role as an ecosystem since it includes several important Global 200 ecoregions (East Siberian taiga, Far East temperate forests, Russian Far East rivers and wetlands, Lake Baikal et al.). A science-based global ranking of the Earth's most biologically outstanding habitats (Olson and Dinerstein 2002, WWF 2007).

Causes and Drivers

- Contributing to more than half of the total loss, forest fire is the primary threat to the boreal forest, with an average annual rate of approximately one to three million hectares (WWF 2007). [Read More...](#)
- Fueled by international pressures and commercial benefit, logging has become an important direct form of deforestation, which leads to both environmental and economic losses. [Read More...](#)
- Climate change is also a driver rather than solely a consequence of deforestation, as 'it is expected to cause an increase in fire, insect, and pathogen activity in the high latitude north'. [Read More...](#)

Impacts

- The major impact of Siberian deforestation is climate change due to carbon emissions. [Read More...](#)
- Biodiversity, ecosystem services, indigenous people's livelihoods, and the economy are all affected by Siberian deforestation. [Read More...](#)

Citations

- Achard, F., D. Mollicone, H. Stibig, D. Aksekov, L. Laestadius, Z. Li, P. Popov and A. Yaroshenko. 2006. Areas of rapid forest cover change in boreal Eurasia. *Forest Ecology and Management* 237: 322-334.
- FAO 2006. *Global Forest Resources Assessment 2005: Progress towards sustainable forest management*. FAP Forestry Paper 147. Food and Agriculture Organization, Rome.
- Mollicone, D., H. D. E. Va, F. Achard. 2006. Human role in Russian wild fires. *Nature* 440: 435-437.
- Nelson, R., K. J. Ranson, G. Sun, D. S. Kimes, V. Khanuk and P. Montesano. 2008. Estimating Siberian timber volume using MODIS and ICESat/GLAS. *Remote Sensing of Environment* 113: 691-701.
- Olson, D. M. and E. Dinerstein. 2002. The Global 200: Priority Ecoregions for Global Conservation. *Annals of the Missouri Botanical Garden* 89: 199-224.
- Potapov, P., M. C. Hansen, S. V. Stehman, T. R. Loveland and K. Pittman. 2008. Combining MODIS and Landsat imagery to estimate and map boreal forest cover loss. *Remote Sensing of Environment* 112: 3709-3719.
- Woods Hole Research Center 2007. *Natural System of Russia, 2007*. http://whrc.org/russia/russias_importance/natural_system.htm (last accessed 3 November 2009).
- WWF 2007. *Russia's Boreal Forests*, November 13 2007. http://assets.panda.org/downloads/russia_forest_cc_final_13nov07.pdf (last accessed 3 November 2009).
- WWF 2009. *Amur tigers threatened by economic crisis*, April 24 2009. http://www.panda.org/wwf_news/?182901/Amur-tigers-threatened-by-economic-crisis (last accessed 3 November 2009).

Images



Russian oak, birch, and pine logs from just across the border across the railway in Suifenhe, China, where four football fields worth of logs, piled to the top of the 30-foot goal posts, enter China from Russia every day.

Source: Alexander Von Bismarck/Environmental Investigation Agency
License: Public License



An estimated 50% of logging is illegal in the Russian Far East. Pictured is an illegally felled tree near Dalnerechensk in the far eastern region of Primorsky.

Source: Alexander Von Bismarck/Environmental Investigation Agency
License: Public License

LCLUC Hot Spots

- Will be a New Component of the LCLUC Web Page
- Contributions will be requested from LCLUC PI's (supervised grad students can do this !)
- Template provided for each 'location'
 - Quantification of rates
 - Description of primary causes
 - Description of impacts

Potential Global LCLUC Hotspots for inclusion on the Web Site

- India Reforestation - Atul
- China's New Cities – Anne Marie – Peilei
- Rubber Southeast Asia – Jeff
- Peri-urban Southeast Asia (?)
- Aquaculture – Southeast Asia (?)
- E. Europe - Farmland abandonment – Radelov
/Prishchepov
- Others