



Models, methods and decision support systems available at USP

for public administrators, forest owners and
industry for forest management planning in a
context of global change

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25th best agricultural school in the world according to the QS ranking
5th best academic institution in agricultural sciences according to the U.S. News Ranking **



** Wageningen, UC-Davis, China Agric Univ, Cornell, USP



Tropical Forests Management & Conservation
Genetic Improvement of Tree Species
Industrial Planted Forests
Watershed Management
Forest Restoration
Wood Technology



- Forest decision support systems
- Forest mensuration new technologies
 - Forest restoration after harvesting in the Amazon
 - Forest restoration of overexploited areas
 - Border effect in forest stands adjacent to non-forests
- Enhancing economical viability and supporting public policies for forest restoration



Models to optimize the value of harvested species in a reduced impact logging concession system constrained by volume in the Brazilian Amazon

Private companies become concessioners of management rights after a bidding process. They bid on both technical quality (60%) and price (40%). The proposals are technically evaluated according to quantitative indicators, grouped in four criteria: environmental impact; social benefits; efficiency; and locally added value.

When constrained by volume, the harvesting of a large number of tree species maintains the residual forest diverse and rich, and promotes the introduction of potentially good new tree species in the timber market.

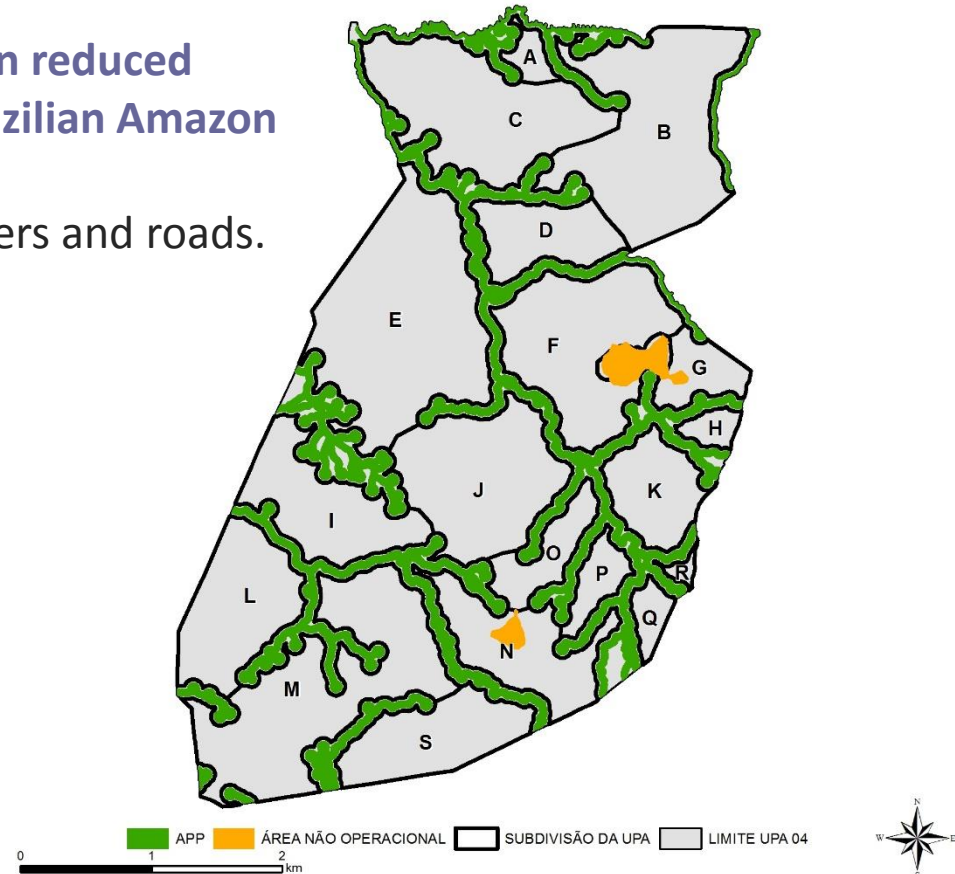
A two phase solution technique solves the problem: first, select the number of species and maximum volumes per species by means of a mixed integer linear programming model; and secondly, locate the best trees in the field using a specially developed GIS routine.



Forest decision support systems

Models to optimize the location of log piles in reduced impact logging concession systems in the Brazilian Amazon

Focus on mitigating the impacts of skidders and roads.



An Optimization Model to Integrate Forest Plantations and Connecting Corridors

Spatial and environmental constraints in forest management optimization are a challenge because of the combinatorial nature of these problems. Forest managers in Brazil are often faced with the need to connect native forest fragments through the management of the landscape that surrounds them. A mixed-integer linear programming model was developed to guarantee minimal connectivity among fragmented natural areas while maximizing the profit or the production of the managed industrial forest plantations.

The corridors are formed by industrial forest stands with specific characteristics defined by the forest manager. Connectivity among fragments is inserted as a Steiner net in a type I harvest-scheduling model. The resulting net formulation has an integer number of origins, destinations, and arc capacities, which allows for the basic variables to produce integer values, even when variables defining flows in each arc are defined as continuous.

Forest Science, Volume 59, Number 6, 6 December 2013, pp. 661-669(9)



Recent capacity building initiatives

Training and Workshop -
“LAStools with Martin Isenburg”



Current research interests

- Forest restoration after harvesting in the Amazon
- Forest restoration of overexploited areas
- Border effect in forest stands adjacent to non-forests
- Monitoring of forest fires and climate changes



September 19-22, 2017

- Unsupervised segmentation of trees in terrestrial laser scanning assessments - applications in planted forests in Brazil
- A multi temporal ALS assessment to monitor the growth of above ground forest carbon in restored corridors connecting natural reserves in Brazil
- Consistency of ALS vertical profile metrics for different LiDAR pulse angles
- Forest restoration with a native species Paricá in Amazon: a generalizable model to support forest management

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- Shifting from conventional forest mensuration to terrestrial laser scanning in Brazil

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XVIII SBSR

Brazilian Symposium on Remote Sensing

May 28 – 31, 2017

- Dominant tree height, ALS and stand volume in clonal eucalyptus plantations.
- Does high LiDAR shooting angle improve assessments of below canopy forest parameters in the Amazon?
- Use of ALS for monitoring low impact harvesting operations in forest management concessions in the Amazon
- Unsupervised tree detection in TLS point clouds generated from Eucalyptus clonal plantations
- Accuracy of the DART model to simulate very high spatial resolution satellite images on different genotypes of Eucalyptus stands



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In accordance with pledges signed during the 2016 UNFCCC convention in Paris, and defined in its intended Nationally Determined Contribution (iNDC), Brazil will reduce greenhouse gas emissions by 37% below 2005 levels in 2025. Among the pledged actions, the Brazilian government is set to promote the restoration and reforestation of 12 million hectares of forests for multiple purposes by 2030.

Sao Paulo state initiative to contribute to the intentions declared in the Brazilian iNDC

Public registration and licensing web system

Forest species mix simulator

Importance of mobility and capacity building

International Seminar and Summer School, Joensuu, Finland, 15-22 June **1995**

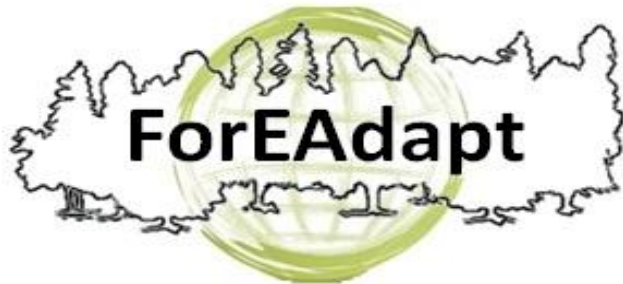
Large-Scale Forestry Scenario Models: Experiences and Requirements
Risto Päivinen, Leena Roihuvuo and Markku Siitonen (editors)

Systems demonstrations of:

SPECTRUM/FORPLAN & FVS, US Forest Service (Dan Camerson – USDA FS)

MELA & JLP, Finnish Forest Research Institute (Markku Siitonen)

DTRAN & RxWRITE, University of Minnesota (Howard Hoganson)



Feb 2011 - Feb 2015



Feb 2016 - Feb 2020



USP welcomes
SuFoRun
secondments
Thank you!

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