

Gregory S. Biging



Professor of Forest Biometrics and Remote Sensing
University of California

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Education

BS.	Mathematics	1973	Department of Mathematics University of Wisconsin, Madison
MS.	Forest Biometrics	1975	Department of Forestry University of Wisconsin, Madison
Ph.D.	Forest Biometrics	1978	Department of Forestry
Ph.D.	Statistics Minor	1978	Department of Statistics University of Wisconsin, Madison

Faculty Appointments

- Professor of Biometrics at UC Berkeley 1998–present
- Associate Professor at UC Berkeley 1986–1997
- Assistant Professor at UC Berkeley 1978–1985
- Associate Dean of Forestry and Extension 2005–2008
- Co-Director of Environmental Science major 2004–2006
This is an interdisciplinary major administered by two Colleges
- Vice Chair of Instruction for ESPM 2002–2005
- Director *CAMFER* 1996–1998
Center for Assessment and Monitoring of Forest and Environ. Resources
- Associate Director *CAMFER* 1995–1995
- Founding Director *CAMFER* 1994–1994

Academic and Professional Interests

Remote Sensing and Image Processing

- Forest measurement using high-resolution airborne, Lidar and satellite imagery
- Statistical accuracy assessment of thematic resource maps
- Fuzzy applications in classification and accuracy assessment

Modeling

- Forest growth dynamics
- Tree crown architecture

Advanced Sampling Systems

- Integrating satellite and ground based inventory for monitoring of large landscapes
- Methods for reducing the cost for ground based field sampling

Climate Change Research

- Climate change impact on forest growth
- Effect of sea level rise and extreme storm events on the transportation and gas pipeline infrastructure of the greater San Francisco Bay Area

Teaching Assignments and Course Development

Current Courses

Natural resource sampling	ESPM 102b	upper division: lecture and lab
Advanced Natural resource sampling	ESPM 202	graduate seminar
Spatial data analysis for natural resources	ESPM 210	graduate course: lecture and lab
Senior Seminar in Conservation and Res. Studies	CRS 194	senior seminar course

Past Courses

Computer programming and applications	ESPM 70	lower division: lecture and lab
Forest measurements, aerial photography & surveying	ESPM 101c	upper division field course
Photogrammetry and remote sensing	ESPM 172	upper division: lecture and lab
Forest growth modeling and simulation	ESPM 272	graduate course: lecture and lab

Awards

- Received the 1st Annual ESPM Award for Undergraduate Teaching Excellence for ESPM 102b - Natural Resource Sampling. May 2004.
- Received the Society of American Foresters Award for Outstanding Service based on work as Associate Editor of *Forest Science* from 1989-1992.
- Received the Don Gasser Award. This award is given by forestry and natural resource students to a faculty member having the most interaction with students outside of class. May 2005.

Service

Professional

- Society of American Foresters (SAF)
Program Co-Chair for the 2008 National Convention in Reno, Nevada
Theme: Forestry in a Climate of Change with over 2000 participants 2007 – 2008
- Biometrics Editor for *Forest Science* 1989 – 1992
- Guest Biometrics Editor for *Forest Science* 1997 – 1998

Reviewer for 25 journals in ecology, forest science, remote sensing and statistics

<u>REMOTE SENSING</u>	5-year Impact Score
• Canadian Journal of Remote Sensing	1.075
• International Journal of Remote Sensing	1.617
• Journal of Digital Earth	1.460
• Photogrammetric Engineering and Remote Sensing	1.727
• Remote Sensing of Environment	5.276
• Remote Sensing	2.729
<u>ECOLOGICAL STATISTICS</u>	
• Environmental and Ecological Statistics	1.585
• Journal of Agricultural, Biological and Environmental Statistics	1.208
• Pattern Recognition	3.172
<u>ECOLOGY AND FORESTRY</u>	
• Annals of Forest Science	1.951
• Applied Vegetation Science	2.031
• Canadian Journal of Forest Research	1.952
• Computers and Electronics in Agriculture	1.998
• Ecology	6.007
• Environmental Research Letters	4.154
• Forests	1.141
• Forest Ecology and Management	2.744
• Forest Science	1.433
• International Journal of Forest Research	--
• Invasive Plant Science and Management	0.980
• Journal of Tropical Forest Science	0.680
• Journal of Wildland Fire	2.871
• PLOS ONE	4.240
• Scandinavian Journal of Forest Research	1.253
• Western Journal of Forestry	1.812

Current University Service

- Chancellor's and Regent's Scholar Mentor to exceptional undergraduates
- Forestry Centennial Steering Committee
- Endowed Chairs committee for the College of Natural Resources

Examples Past University Service

- Campus Distinguished Teaching Award Committee
- Director, CAMFER (a Research Center using remote sensing, GIS and modeling for monitoring landscape level terrestrial ecosystems)
- Advisory committee for the Space Sciences Laboratory
- Space Sciences Laboratory Building Expansion Committee (a new \$11M building)
- Chair, Technical Advisory Committee for the Forest Products Laboratory (A multi-campus organized research unit)
- Advisory Committee for the Center for Environmental Design Research
- Member of the Executive Committee of the College of Natural Resources,
- Chair, Search Committee for Extension Position in Resource Assessment and Monitoring
- Vice Chair of Instruction for ESPM
- Member of the Graduate Programs Committee for ESPM
- Chair of the Undergraduate Programs Committee for ESPM

International Cooperation

- Korea University Eco-Leader Education Committee member of for their BK21 program. BK21 is a Korean nationally-funded project focused on making graduate research and education programs globally competitive. In addition to my role as External Advisor to this program, I serve as an outside reader of PhD theses funded through this program. Feb. 2014 - Feb. 2015
- Organized conference on sustainability of Mediterranean Forests. Berkeley forestry faculty and researchers from the European Forest Institute Mediterranean Regional Office (EFIMED). March 2011.
- Core participant in establishing student and faculty exchange program between the University of Lisbon and Technical University of Lisbon and UC Berkeley. July 2006 - 2010.
- Faculty exchange with UC Berkeley's Education Abroad Program at the University of Padua, Italy. 2006.
- Conducted joint field research for NASA's EO-1 Satellite Validation with forest researchers in Argentina. 2001.
- Conducted joint field research with researchers in Spain for validation of fuzzy classifier. 2001.
- Ongoing NATO research project on image processing using fuzzy logic and neural networks with researchers in Spain, Italy and the U.S.
- Conducted joint biometrics research at the Niedersächsische Forstliche Versuchsanstalt (Forest Research Station of Lower Saxony) in Göttingen, Germany. 1995 - 1996.
- Advisor for six German, one Italian, and one Brazilian graduate exchange students since 1990.

Taskforce, Panel and Review Committee Membership

- Science Peer Review Team for the Umpqua Land Exchange Project 1998
Member of Independent Science Peer Review Team to provide a scientific evaluation of the methodology developed to assess the feasibility and implications of land exchange within the Umpqua Basin in relation to improving ecological health and maintaining timber supply.
- Oregon Forest Industries Council 1997
Chair of an outside technical review committee providing an independent scientific appraisal of the procedures for accuracy assessment used in the Western Oregon Mapping Project. This forest mapping project covered the entire industrial forest landholdings in the Cascade, Coast and Klamath Provinces.
- NOAA Coastal Change Detection National Panel 1992 – 1996
Member of a national panel for NOAA on designing remote sensing and field sampling procedures for detecting land use change for shoreline terrestrial and aquatic systems throughout the coastal US.
- State of California Accuracy Assessment Taskforce 1992 - 1994
Member of a State of California taskforce to design, test, and recommend remote sensing and field data procedures for testing the accuracy of vegetation maps (wildlife habitat) derived from satellite classification.

Consulting (last 10 years)

- Mendocino Redwood Company 2013
Provide technical expertise for forest carbon sampling design
- Gates Foundation 2011
Provide technical expertise in sample survey design. Review and analyze the sampling design used to measure agricultural productivity in Africa using remote sensing and field sampling
- Fred's Fire 2008 – 2011
Provide technical expertise in forest yield projection to assess the value of timber lost to fire
- California Office of Environmental Health Hazard Assessment 2004 - 2005
Provide spatial statistics expertise for epidemiology health hazard studies
- California Air Resource Board 2003 - 2005
Provide spatial statistics expertise in their studies of the correlation of Health and Air Pollution Data

Research Support (last 10 years)

<u>Agency</u>	<u>Role</u>	<u>Title</u>	<u>Dates</u>	<u>Amount</u>	
NASA	Co-PI	Development of New Geospatial Tools for Wildland Fire Management & Risk Reduction	10/12-09/14	\$ 143,000	current
EBRP	Co-I	Impacts of Sudden Oak Death in Five East Bay Parks	01/14-01/15	\$ 30,250	current
CEC	Co-PI	Assessment of Bay Area Gas Pipeline Vulnerability to Climate Change	09/12-07/15	\$ 425,000	current
				\$ 598,250	subtot.
NASA	Co-PI	Development of New Geospatial Tools for Wildland Fire Management & Risk Reduction phase II	10/14-06/17	\$ 198,500	pending
SC	Co-PI	Building & testing a cost-effective above ground biomass system in northern Thailand utilizing extensive ground lots coupled with new remote sensing & verification techniques (Pre-proposal)	01/15-04/16	\$1,140,000	pending
USAID	Co-I	SERVIR-Mekong Consortium. UCB's Thematic Area: "Application of Geospatial Technology for Improved Landscape Monitoring, Planning and Management"	FY 2014-2017	\$1,813,000	pending
CARB	PI	Technical Assessment and Review of CARB's Forest Project Biomass Estimation Procedures	10/14-01/16	\$ 214,250	pending
				\$3,365,750	subtot.
EBRP	Co-I	Impacts of Sudden Oak Death in Five East Bay Parks	04/13-01/14	\$ 24,500	finished
EBRP	Co-I	Mapping the Sudden Oak Death Infestation in East Bay Regional Parks	07/09-07/10	\$ 50,000	finished
CEC	PI	Climate Vulnerability and Adaption Study for the San Francisco Bay Area	06/10-06/12	\$ 376,400	finished
NASA	PI	Feasibility of Airborne Data Processing	05/10-06/11	\$ 69,100	finished
NASA	PI	Quantifying Evapotranspiration in California Forest Ecosystems: Remote Sensing vs. Flux meas.	09/02-08/06	\$ 72,000	finished
NASA	Co-I	Using Remote Sensing to Monitor Impacts of Flood Irrigation of Meadows in East Walker River	08/99-11/03	\$ 175,400	finished
NASA	Co-I	EO-1 and Landsat Imagery for Monitoring California's Conifer Forest and Hardwood Rangeland	04/00-09/01	\$ 179,100	finished
NATRC	Co-PI	Effects of exposure to PAH's from traffic in asthmatic children.	01/06-03/10	\$ 749,700	finished
KEI	PI	Environ. Database Generation and Application: Case Studies for Land Use Planning in Korea	08/05-12/05	\$ 20,000	finished
NPS	Co-I	Object Oriented Vegetation Classification at Peninsular National Parks in California	09/02-05/05	\$ 116,225	finished
USDA	PI	A Test of Digital Photoecometrics as a Forest Inventory Tool	04/99-01/04	\$ 267,400	finished
MS	PI	Developing a fuzzy classification system for accurate land cover classification	07/01-07/04	\$ 60,000	finished
				\$2,160,000	subtot.

PI Principal Investigator
 Co-PI Co-Principal Investigator
 Co-I Co-Investigator

CARB California Air Resources Board
 CEC California Energy Commission
 EBRP East Bay Regional Parks district in California
 KEI Korean Environment Institute
 MS McIntire-Stennis Forest Research Program
 NATRC National Air Toxics Research Center
 NPS National Park Service
 SC Silva Carbon (a consortium of US Agencies contributing to Forest Carbon Monitoring)

Graduate Student Mentoring: Biging's PhD students (last 10 years)

Name	completed	Current Position / Thesis title
Kyle Holland	Dec. 2013	<u>Founder, ecoPartners Carbon</u> Statistical methods in photogrammetry and image-Lidar fusion
Liheng Zhong	Dec. 2012	<u>Researcher, California Water Resources Board</u> Efficient crop type mapping based on remote sensing in the Central Valley, CA
Luis Maria Ibanez	Dec. 2011	<u>Consultant, forestry and certification</u> Extensions to Metadata Languages for Environ. Primary Data: the Forest Cloud
Jun Hak Lee	Dec. 2010	<u>Post-Doctoral Researcher, UC Davis</u> Automated approaches for extracting individual tree level forest information using high spatial resolution remotely sensed data
Tim Robards	May 2009	<u>Carbon Analyst, New Forests</u> Empirical forest growth model evaluations and development of climate-sensitive hybrid models
Alan Di Vittorio	May 2008	Research Scientist, <u>Lawrence Berkeley National Lab, Earth Sci. Div.</u> A biochemical-spectral leaf model and method for characterizing ozone-damaged pine trees
Joshua Fisher	May 2006	<u>Research Scientist, NASA JPL, Water & Carbon Cycles</u> The land-atmosphere water flux across plant, ecosystem, global and social scales
Le Wang	May 2003	<u>Associate Professor, Geography, SUNY Buffalo</u> Object-based methods for individual tree identification and tree species classification from high-spatial resolution imagery

Post Doctoral Scholars in Biging lab (last 10 years)

Name	year	Topic
Patrick Fonti	2003	Dendrochronology and competition of European Chestnut
Matthias Dobbertin	2004-2005	Forest health monitoring and modeling
Daniel Gomez	2005-2006	Fuzzy mathematics in remote sensing
Seong-Woo Jeon	2005-2006	Environmental remote sensing
Doo-Ahn Kwak	2006-2007	Use of Lidar to characterize forest biomass
Chong-Soo Lee	2007	Photogrammetric mapping and GIS
Jun Hak Lee	2010-2012	Lidar topo mapping & sea level rise effect in S.F. Bay Area
Esteban Gomez	2014	Biomass estimation of <i>Eucalyptus globulus</i> plantations

Graduate Student Mentoring: Dissertation Committees (last 10 years)

Role	Year	Name	Ph.D. Dissertation Title
Member	2004	<u>Wei Li</u>	Phenoloxidase of <i>Sacrophaga neobelliaria</i>
Member	2007	<u>Christa Dagley</u>	Old redwood forest restoration: Quantifying forest characteristics and develop. of initial restoration treatments
Member	2007	<u>Qi Chen</u>	Measuring vegetation structure and modeling ecological functions for a heterogeneous savanna ecosystem in Cal.
Member	2008	<u>Fernando Sedano</u>	Estimation of forest structure parameters in tropical dry forest ecosystems integrating MISR and MODIS image
Member	2008	<u>Pascal Berrill</u>	Coast redwood stand growth and leaf area index: The influence of site quality
Member	2008	<u>Nicholas Clinton</u>	Remote sensing of species invasion
Member	2009	<u>Victoria Wojcik</u>	Bees in urban landscapes: An investigation of habitat utilization
Member	2009	<u>Gretchen Miller</u>	Measuring & modeling interactions between groundwater, soil moisture & plant transpiration in natural ecosystems
Member	2013	<u>Sarah Lewis</u>	Geospatial strategies to optimize placement of advanced bioenergy crops in marginal landscapes
Member	2014	<u>Yanlei Chen</u>	Mapping forest changes using multi-temporal remote sensing images: BITE for accurate trajectory extraction and CBEST for efficient clustering
Outside	2005	<u>Bridgette Lery</u>	Neighborhood Structure and Foster Care Entry Risk: The Role of Spatial Scale in Defining Neighborhoods
Outside	2009	<u>Elizabeth Noth</u>	Novel approaches to spatio-temporal modeling of air contaminants in Fresno, California
Outside	2010	<u>Lunyu Xie</u>	Three Essays on Environmental Economics
Member	ongoing	<u>Lu Liang</u>	Remote Sensing Monitoring and Ecological Modeling of Mtn. Pine Beetle Outbreak for Forest Carbon Assessment
Member	ongoing	<u>Kathleen Navarro</u>	Using Environmental Biomonitoring for the Assessment of Ambient and Occupational Exposure to Air Contaminants

Role	Year	Name	M.S. Dissertation Title
Chair	2014	<u>Joshua O'Neill</u>	Modeling Sudden Oak Death with Remote Sensing and GIS
Member	2014	<u>Andrea Hardlund</u>	Silv. Prescriptions and Opportunities for Forest Mgmt. of Sierra Nevada Mixed Conifers for Timber, Water & Fire Obj.
Member	2014	<u>Katherine Cahill</u>	Rock Haven Forest Management Plan

Outside –refers to being a member from outside of the student’s Department or College
 Member - refers to being a member of a dissertation committee within the student’s Dept.

Graduate Student Mentoring: Ph.D. qualifying exams (last 10 years)

Role	Year	Name	Department
Chair	2004	Mariah Hopkins	ESPM
Chair	2004	Adrian Dos	ESPM
Chair	2005	Karin Tuxen	ESPM
Chair	2005	Fernando Sedano	ESPM
Chair	2005	Victoria Wojcik	ESPM
Chair	2006	Nicholas Clinton	ESPM
Chair	2010	Yu-Ting Huang	ESPM
Chair	2010	Yanlei Chen	ESPM
Chair	2010	Sarah Lewis	ESPM
Chair	2013	Lu Liang	ESPM
Chair	2014	Kelly Easterday	ESPM
Inside member	2006	Timothy De Chant	ESPM
Inside member	2008	Katherine Scranton	ESPM
Inside member	2010	Joshua Harmsen	ESPM
Inside member	2011	Zev Balsen	ESPM
Inside member	2011	Ellen Kersten	ESPM
Outside member	2004	Elizabeth Noth	Env. Health Sciences
Outside member	2007	Gretchen Miller	Civil & Env. Eng.
Outside member	2010	Lunyu Xie	Agricultural & Resource Economics
Outside member	2012	Estela Almanza	Env. Health Sciences
Outside member	2014	Kathleen Navarro	Env. Health Sciences

Invited Talks and Papers (last 5 years)

“Fire burn severity mapping with advanced remote sensing using UAVSAR and AVIRIS in California” Feb 2014. Korea University, Environ. Science and Ecological Engineering.

“Advances in fuel and soil moisture estimation for monitoring forest fire risk”. Feb 2014. Korea Forest Research Institute, Division of Forest Disaster Management.

“One hundred year prediction of climate change impacts on infrastructure of the San Francisco region”. Jan 2014. University of Chile, Departments of Renewable Resource Engineering and Department of Forest Management and Environment.

“Climate change and storm events impact on the transportation network of the S.F. Bay Area – Preliminary Results”. Nov, 2011. Yeosu, South Korea. Keynote address to ISRS (Int’l. Symposium on Remote Sensing). ISRS is co-organized by the Rem. Sen. Society of Japan, the Korean Soc. of Rem. Sens., the Chinese Soc. of Photogrammetry and Rem. Sens., and the Standing Committee of Environ. Monitoring from Space of East Asia.

“Potential coastal flooding in the San Francisco Region: The need for improved analyses” at the conference: Vulnerability and Adaption to Extreme Events in California in the Context of a Changing Climate: New Scientific Findings. Sept, 2011 Scripps Institution of

Oceanography. This was part of California Governor Brown's Conference on Extreme Climate Risks and California's Future. [link to video of extreme climate talk](#)

"Analysis and measurement of individual trees with high resolution imagery and LiDAR".
June, 2009 Department of Land, Environment, Agriculture and Forestry at the University of Padua.