

MIGUEL LUÍS VILLARREAL

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CHRONOLOGY OF EDUCATION

University of Arizona, 2009

PhD. School of Geography and Development/Remote Sensing and Spatial Analysis

University of Arizona, 2003

M.A. Geography and Regional Development

University of California, Davis, 1994

B.A. in Fine Arts Photography

Doctoral Dissertation Title: Land Use and Disturbance Interactions in Dynamic Arid Systems: Multiscale Remote Sensing Approaches for Monitoring and Analyzing Riparian Vegetation Change

Master's Thesis Title: Landscape Pattern Across the U.S./Mexico Border: Analysis of Fire-Related Vegetation Patterns in the Huachuca Mountains, Arizona and Sierra los Ajos, Sonora, Mexico

RESEARCH, TEACHING AND RELATED WORK EXPERIENCE

University of Arizona, School of Natural Resources and the Environment
Postdoctoral Research Associate, 2009-present

Current Research Projects

- Barry M. Goldwater Range Inventory and Monitoring
- USGS Border Environmental Health Initiative, Upper Santa Cruz River Watershed; USGS/EPA Santa Cruz Watershed Ecosystem Portfolio Model
- Yellow-billed Cuckoo Habitat Modeling

University of Arizona, 2000-2009

Graduate Research

- **2007-2009**: *Research Associate*, Office of Arid Lands Studies. National Park Service Vegetation Mapping Program for Sonoran Desert Network Parks

- **2007-2009:** *Research Associate*, Sonoran Institute/National Park Service. Landscape Dynamics Monitoring protocol development and implementation, pilot study at Tumacácori NHS and Santa Cruz River watershed
- **2006-2007:** *Research Associate*, Office of Arid Lands Studies/National Park Service. Development and implementation of NPS Vegetation Mapping Program protocols for Sonoran Desert Network Parks
- **2006-2007:** *Research Associate*, Office of Arid Lands Studies. Vegetation mapping and landscape change monitoring on the Upper Santa Cruz River, Arizona
- **Fall 2006:** *Research Assistant*, Office of Arid Lands Studies/Mt. Graham Red Squirrel Monitoring Program. Mapping post-fire burn severity with high resolution satellite imagery for endangered species habitat monitoring
- **Spring 2005:** *Research Assistant*, Office of Arid Lands Studies/National Park Service. Remote sensing of human-caused impacts on natural and cultural sites near the U.S/Mexico border
- **Fall 2001-Spring 2003:** *Research Assistant*, Remote Sensing Specialist for NOAA funded grant to study urban change and forest fragmentation in the lower Brazilian Amazon
- **Summer 2002:** *Research and Field Assistant*, Laboratory of Tree Ring Research. 20th century fire history reconstructions and fuel modeling for Saguaro National Park

Course Instruction

- **Spring 2004:** *Instructor*, GEOG 414B Intro to Geographic Information Systems
- **Fall 2003:** *Teaching Assistant*, GEOG 220 Biogeography
- **Summer 2002:** *Instructor*, Geography 416A Computer Cartography
- **Fall 2001:** *Teaching Assistant*, GEOG330 Intro to Remote Sensing
- **Fall-Spring 2000:** *Teaching Assistant*, INDV102 Human Geography and Global Systems

Sonoran Institute/NPS Sonoran Desert Network, 2004-2005

Graduate Intern/ Monitoring Specialist, Tucson AZ

- Develop protocols for monitoring land cover and land use change, and ecosystem patterns and processes on and around National Park lands
- Border impacts monitoring: develop GIS and remote sensing approaches for monitoring impacts of border activities on NPS archeological and ecological sites

Cooper Aerial Surveys, 1998-2000

Photogrammetrist and Aerial Photographer, Tucson AZ

- Create digital maps from stereo photography
- Plan flight route and establish post-flight bridging
- Compose and photograph flight lines using Leica RC-30 aerial camera

PUBLICATIONS AND REPORTS

Villarreal, M. L., W.J.D. van Leeuwen, and J.R. Leon-Romo. 2010. Mapping and monitoring riparian vegetation distribution, structure and composition with regression tree models and post-classification change metrics. *Ecological Indicators*. *Submitted, In Review*.

Villarreal, M. L., Drake, S., Marsh, S.E and A.L. McCoy. 2010. The influence of wastewater subsidy, flood disturbance and neighboring land use on current and historical patterns of riparian vegetation in a semi-arid watershed. *Ecosystems*. *Submitted, In Review*.

Drake, S., S. Buckley, **M.L. Villarreal**, S. Studd and A.J., Hubbard. 2009. Vegetation classification, distribution and mapping report: Tumacácori National Historical Park. Natural Resource Report NPS/SODN/NRR-2009/148. National Park Service, Fort Collins, Colorado.

Buckley, S., J. A. Hubbard, S. Studd, S. Drake, **M.L. Villarreal**, and J. Greene. 2009. Vegetation classification, distribution, and mapping report: Casa Grande Ruins National Monument. Natural Resource Report NPS/SODN/NRR—2009/158. National Park Service, Fort Collins, Colorado.

Villarreal, M.L. and S.R. Yool. 2008. Analysis of fire-related vegetation patterns in the Huachuca Mountains, AZ and Sierra los Ajos, Sonora, Mexico. *Fire Ecology* 4(1): 15-33.

Drake, S., **M.L. Villarreal**, A.J., Hubbard, S. Studd and K. Beaupre. 2007. Sonoran Desert Network Parks Vegetation Mapping Methods Development. Project Report. I&M Program, National Park Service.

Drake, S., **M.L. Villarreal**, and J. McGovern. 2006. Applicable Remote Sensing and Cultural Resources Monitoring Research. Technical Report NPS/IMR/2006-XX. National Park Service. Denver, CO.

Mau-Crimmins, T., A. Hubbard, D. Angell, C. Filippone, N. Kline. (**M.L. Villarreal** - Contributor). September 2005. Sonoran Desert Network Vital Signs Monitoring Plan. Technical Report NPS/IMR/SODN-003. National Park Service. Denver, CO.
http://science.nature.nps.gov/im/units/sodn/docs/Final_SODN_MonPlan_20051104.pdf

PAPERS PRESENTED

L. M. Norman, J. B. Callegary, C. van Riper, F. Gray, N. Paretti, and **M.L. Villarreal (presenter)**. “The Border Environmental Health Initiative: Investigation of the Transboundary Santa Cruz Watershed”. 2009 American Geophysical Union, San Francisco, California.

Villarreal, M.L., van Leeuwen W. and R. Romo. “Mapping and Monitoring Change in Riparian Vegetation Structure and Pattern Using Landsat TM Satellite Imagery”. 2009 Association of American Geographers Annual Meeting, Las Vegas, Nevada.

Villarreal, M.L., van Leeuwen W. and R. Romo. “National Park Service Landscape Dynamics Monitoring: Seven Decades of Landscape and Vegetation Change at Tumacácori National Historical Park”. Santa Cruz River Researcher’s Meeting. Tucson, Arizona. March, 2009.

Villarreal, M.L., van Leeuwen W. and R. Romo. “Integrating Phenology into Satellite-based Classifications for Landscape Dynamics Monitoring”. Characterizing the Phenology of Southwest Landscapes. U.S.A. National Phenology Network (NPN) & Southwest U.S. Region, American Society of Photogrammetry and Remote Sensing (ASPRS). Tucson, Arizona. October 2008.

Villarreal, M.L. “Linking Fine-Scale Ecosystem Disturbance with Historical Landscape Change”. 2008 Association of American Geographers Annual Meeting, Boston, Massachusetts.

Villarreal, M.L., van Leeuwen W. and R. Romo. “Protocol Development of Landscape Dynamics Monitoring for Sonoran Desert Network National Parks”. National Park Service Sonoran Desert Network I&M Program Review. Hilton Tucson East, Tucson, Arizona. July, 2008.

Villarreal, M.L. “Mapping and Monitoring Riparian Vegetation: Remote Sensing Applications”. Regional Monitoring Partnership. Saguaro National Park, Tucson, Arizona. May, 2007.

Villarreal, M.L. “Resolving Burn Severity in Montane Conifer Forests using Multitemporal High Resolution Satellite Imagery”. 2007 Association of American Geographers Annual Meeting. San Francisco, California.

Villarreal, M.L. “Using Remote Sensing and Repeat Photography to Monitor Riparian Vegetation”. Regional Monitoring Partnership. US Fish & Wildlife Service, Tucson, Arizona. January, 2007.

Villarreal, M.L. “Detecting Trails and Roads in Protected Areas on the U.S/Mexico Border Using High-Resolution Satellite Imagery”. 2006 Association of American Geographers Annual Meeting. Chicago, Illinois.

POSTERS PRESENTED

Drake, S. and **M.L. Villarreal**. “Vegetation Map of Tumacácori National Historical Park”. Santa Cruz River Researcher’s Day Meeting. Tucson, Arizona. March, 2009.

Villarreal, M.L., van Leeuwen W. and R. Romo. “National Park Service Landscape Dynamics Monitoring: Assessing Seventy Years of Change at Tumacácori National Historical Park”. George Wright Society Biennial Meeting. Portland, Oregon. March 2009.

Villarreal, M.L., van Leeuwen W. and R. Romo. “Satellite Image-based Classifications for Landscape Dynamics Monitoring of Sonoran Desert National Parks”. University of Arizona Graduate Interdisciplinary Program Student Poster Contest: Remote Sensing and Spatial Analysis Program Selection. Tucson, Arizona. November, 2008.

Villarreal, M.L. and C. Sorrenson. “Analysis of Urbanization and Related Forest Fragmentation in the Brazilian Lower Amazon Using Remote Sensing”. 2003 Association of American Geographers Annual Meeting. New Orleans, Louisiana.

SERVICE AND CONSULTATION

City of Tucson and City of Marana. 2008. Remote Sensing and Long-term Ecological Monitoring for Habitat Conservation Plans (HCPs).

Pima County. 2007. Remote Sensing and Land Cover monitoring for the Sonoran Desert Conservation Plan.

ACADEMIC GRANTS and FELLOWSHIPS

2000-09 Graduate Fellowship, University of Arizona

2003-09 Travel Grant, Department of Geography and Regional Development

2003 Graduate College Professional Development Award, University of Arizona

2002 University of Arizona Minority Student Fellowship, University of Arizona

HONORS AND AWARDS

2008 University of Arizona, Graduate Interdisciplinary Programs Advisory Council Recognition for Exceptional Graduate Research