

Dr. RENÉ ZAMORA CRISTALES

Associate Professor and Strachan Chair in Forest Operations Management and Engineering

Department of Forest Engineering Resources and Management

College of Forestry

Oregon State University

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Education

PhD. Forest Engineering, Oregon State University Research: Economic optimization of forest biomass processing and transport for aviation biofuel	2013
Master of Science in Forest Resources, Applied Economics and Wood Technology Austral University of Chile, Cum Laude	2006
BS Forest Engineering Cum Laude Del Valle University of Guatemala	2003

Scholarships distinctions and professional service

United Nations Decade on Ecosystem Restoration Science Task Force member	2025- Actual
Co-Coordinator IUFRO Unit Sustainable Forest Operations for Landscape Restoration Division 3	2024-Actual
IUFRO Division 3 Outstanding service award	2022
Outstanding Global Doctoral Research Award, International Union of Forest Research Organizations	2019
Deputy Coordinator IUFRO Task Force on Forest Education	2021-2024
Member of IUFRO Task force on Transforming Forest Landscapes For Futures Climates and Human Well-Being	2019-2024
Courtesy Assistant Professor, Oregon State University	2019-Actual
Tropical Americas Representative, International Society of Tropical Foresters	2019-2021
Coordinator IUFRO Unit Sustainable Forest Operations for Landscape Restoration 3.01.09	2019-2024

IUFRO division 3 Communications Coordinator	2021-Actual
Initiative 20x20 Representative to the UN Decade on Ecosystem Restoration's Task Forces	2021-Actual
<i>Schulz family Graduate Fellowship</i>	2012
<i>Richard Strachan Forest Engineering Graduate Fellowship, College of Forestry, Oregon State University</i>	2011
Scholarship Program OAS placed Organization of American States LASPAU-Harvard for Postgraduate studies	2005-2006
Scholarship Agronomical Center of Tropical Research CATIE Best undergraduate Research	2002
Scholarship Exxon Standard Oil for undergraduate studies	1998-2003

Other Skills

Languages: Professional working proficiency in oral and written Spanish, English and Portuguese
Programming: Python, JAVA, Visual Basic

Funded Research and development projects

- **Adaptation Fund/Central American Bank of Economic Integration:** the project is focused on Use of Nature-based Solutions to Increase Resilience to Extreme Climate Events in the Atlantic Region of Central America. The project focuses in three countries: Belize, Guatemala, Honduras (PI) – 13.2 million USD.
- **International Climate Initiative (IKI) BMU Germany/International Union of conservation of Nature:** Forest Landscape Restoration Implementation Hub (Co-PI from WRI) – 2. M Euros (20 million Euros total)
- **International Climate Initiative (IKI) BMU Germany:** Supporting Initiative 20 by 20: A country-led effort to bring 20 million hectares of degraded lands in Latin America and the Caribbean into restoration by 2020 (PI) – 4.2 M Euros
- **Good Energies Foundation** Accelerating frontrunners in restoration implementation grant addressing the identification of innovative policies and design a Policy Accelerator (Co-PI) – 1 M Euros
- **Luxembourg Ministry of Climate and Sustainable Development,** Recover and maintaining functionality on Degraded land in Latin America. (Co-PI) - 700,000 Euros
- **HSBC Nature based solutions accelerator:** Restoration Policy Acceleration to scale-up restoration implementation. (Co-PI) – 4.25 Million USD
- **Canada Natural Resources, Global Forest Leadership Program.** Improving forest restoration in Latin America. (PI) -1 million USD

- **Global Environmental Facility, Restoration Impact Program.** Develop Knowledge products and research to support countries to achieve restoration targets. (PI) - 2.5 million USD.

Employment record

Associate Professor & Strachan Chair in Forest Operations Management Oregon State University <i>Department of Forest Engineering Resources and Management</i> <i>College of Forestry, Corvallis, Oregon, USA</i>	Actual
Director of Initiative 20x20 & Global Restoration Policy Global Restoration Initiative <i>Initiative 20x20, Department of Food Forest and Water</i> <i>World Resources Institute, Washington DC, USA</i>	2022-2025
Senior manager Restoration policy and research for Latin America Global Restoration Initiative <i>Initiative 20x20, Department of Food Forest and Water</i> <i>World Resources Institute, Washington DC, USA</i>	2015-2022
Postdoctoral Researcher, Economic Optimization Models <i>Department of Forest Engineering Resources and Management</i> <i>Oregon State University, Northwest Advanced Renewables Alliance (NARA)</i> http://www.nararenewables.org/	2013-2015
Graduate Research Assistant <i>Department of Forest Engineering Resources and Management</i> <i>Oregon State University</i> <i>Northwest Advanced Renewables Alliance (NARA)</i>	2011-2013
FAO-National Forest Service INAB <i>Improvement of Forest Supply Chain of Guatemala</i>	2010
Forestry Division Manager Mozambique, Africa <i>Tectona Forest of Zambezia , Mozambique, Southern Africa</i>	2009-2010
Forest-Economic Planning Manager <i>Interforest Limited</i> <i>Guatemala Central America</i>	2007-2009
Forestry Research Extension Small Forest enterprise development <i>VLIR (Vlamesse interuniversitaire raad) Belgium, Rafael Landivar University</i>	2006-2007
FAO. Improvement of Forest Education in Verapaces Region <i>Guatemala, Central America</i>	2007
General Manager Wood preservation and Drying Department	

<i>Maderas y Machihembres S.A.</i> Guatemala, Central America	2002-2005
Assistant Professor of Forest Products, and Economics (Forest Engineering program) <i>Del Valle University of Guatemala</i>	2007-2009
Assistant Professor of Forest Financial Models (Forest Management program) <i>Rafael Landivar University, Guatemala</i>	2007-2008

Publications

Zamora-Cristales R. 2024 Clearing the Smoke: The role of restoration in mitigating and preventing landscape fires in Latin America. *Forest Ecology and Management*. In preparation.

Cesar R. Cullen L., Biscola C. **Zamora-Cristales, R.** 2024. Sustainability Index for landscape restoration in the Pontal de Paranapanema Brazil. Technical Note World Resources Institute. In review

Gutierrez V., Lear E., Ramos J. Ruiz-Guevara N. **Zamora-Cristales R.** Díaz A., 2024. **Towards the Financing High-Quality Landscape Restoration in Latin America and the Caribbean.** Policy Brief. Commonland, Eco agriculture partners and Initiative 20x20. 13p.

Bustos E., Villalobos R., Delgado D., **Zamora-Cristales R.** Carrera F., 2024. **Standard for Guiding Restoration Efforts at the Scale of Tropical Landscapes: Proposal Based on the Analysis of Experiences in Four Model Forests in Latin America.** Technical report 462. <https://repositorio.catie.ac.cr/handle/11554/12629>

In book: *Restoring Forests and Trees for Sustainable Development, Policies, Practices, Impacts, and Ways Forward*. Edited by Pia Katila, Carol J. Pierce Colfer, Wil de Jong, Glenn Galloway, Pablo Pacheco, and Georg Winkel- 1. ed. – Santiago. César Sabogal, Jürgen Blaser, Kenichi Shono, Yitagesu Tekle Tegegne, **Rene Zamora Cristales**, Almeida Siteo, Tania Ammour, Adeline Dontenville, Mélanie Feurer, Jelena Markovic, Christophe Besacier, Silvio Simonit, Benjamin de Ridder, and Orjan Jonsson **Regional variation in forest landscape restoration,**. 2024 <https://global.oup.com/academic/product/restoring-forests-and-trees-for-sustainable-development-9780197683927?cc=us&lang=en&#>

In book: *Restoration of Forest Ecosystems*, Editors: Bannister J., Claramunt V., Ovalle J. Vargas R. -- 1. ed. – Santiago. **Zamora-Cristales R.**, Troppa C., Mujica R., Alvarez D., Villalobos R., Gonzalez M., Rachmaninoff V., Miljanic A. 2024. **Governance of Landscape Restoration and public policy.** 2024

Evans, K., Meli, P., **Zamora-Cristales, R.**, Schweizer, D., Méndez-Toribio, M., Gómez-Ruiz, P.A. and Guariguata, M.R., 2023. **Drivers of success in collaborative monitoring in forest landscape restoration: an indicative assessment from Latin America.** *Restoration Ecology*, 31(4), p.e13803. <https://doi.org/10.1111/rec.13803>

Zamora-Cristales R., Gonzalez M., Rachmaninoff V., Franco M., Vergara W., De Camino R., Miljanic A., Sanchez M., Hilton L., and Carazo F., 2021. Healing the wounded land: The role of public economic incentives in scaling up restoration efforts in six Latin American countries.. World Resources Institute Issue Brief 32 p. <https://www.wri.org/research/healing-wounded-land-public-economic-incentives-scaling-restoration-latin-america>

Firebanks-Quevedo, D., Planas, J., Buckingham, K., Taylor, C., Silva, D., Naydenova, G. and **Zamora-Cristales, R., 2022. Using machine learning to identify incentives in forestry policy: Towards a new paradigm in policy analysis.** Forest Policy and Economics, 134, p.102624.

Zamora-Cristales R. 2021. Financial Strategies for Forest and Landscape Restoration. In book: Ghazoul J. and Schweizer D. (eds) (2021) Forests for the future: Restoration success at landscape scale - what will it take and what have we learned? Prince Bernhard Chair Reports (issue 1). Series editors Almond, R.E.A., Grooten, M. and Van Kuijk, M., WWF-Netherlands, Zeist and Utrecht University, Netherlands. Publisher: WWF Nederland & Prince Bernhard Chair for International Nature Conservation, Utrecht University

Zamora-Cristales R. 2021 Building Bridges that bring together impact investors and landscape restoration. In book: Mobilising climate finance experiences and lessons learned from IKI projects in Central America and the Caribbean Edition: First; Chapter: 2; Publisher: Ann-Kathrin Schloenvoigt (GIZ), David J. Alfaro Obando (GIZ), Mariana Cerdas Gutiérrez (GIZ)

Zamora-Cristales R., Buckingham K., Anderson W. 2021. How mapping the social landscape can accelerate forest and landscape restoration: case of studies from Chile and Honduras. In book: Forest Landscape Restoration and Social Opportunities in the Tropical World Edition: First Chapter: 4 Publisher: Editors: Fabiane Carolyne Santos, Severino R. Ribeiro Pinto and Cindy E. Prescott. -- 1. ed. -- Recife, PE : Centro de Pesquisas Ambientais do Nordeste - Cepan, 2020.

Reytar, K., Martin, D., Landsberg, F., Ray, S., Granizo, C.G., **Zamora-Cristales, R., Duraisami, M., Kanchana, C.B., Woldemariam, T., Stolle, F. and Arakwiye, B., 2021. Mapping Together: A Guide to Monitoring Forest and Landscape Restoration Using Collect Earth Mapathons.** World Resources Institute Guidebook.

Atkinson, R.J., Thomas, E., Roscioli, F., Cornelius, J.P., **Zamora-Cristales, R., Franco Chuaire, M., Alcázar, C., Mesén, F., Lopez, H., Ipinza, R. and Donoso, P.J., 2021. Seeding resilient restoration: An indicator system for the analysis of tree seed systems.** Diversity, 13(8), p.367. <https://doi.org/10.3390/d13080367>

Zamora-Cristales, R., Liere, M.A. and Hernández, E.A.S., 2020. Economic Prioritization and optimization of public incentives for riparian forest restoration. Revista Mesoamericana de Biodiversidad y Cambio Climático, 4(1), pp.23-43. <https://www.revistayuam.com/priorizacion-y-optimizacion-economica-de-los-incentivos-publicos-para-la-restauracion-de-bosques-riparios/>

Zamora-Cristales R., Herrador D., Cuellar N., Díaz O., Kandel S., Quezada J., De Larios S., Molina G., Rivera M., Morán_ramirez W., Jimenez A., Flores E., Franco Chuaire M., Gallardo Lomeli L., Vergara W. 2020. Landscape Sustainability Index for Restoration. World Resources Institute Report, 68p.

Reytar, K., Buckingham, K., Stolle, F., Brandt, J., **Zamora-Cristales, R.**, Landsberg, F., Singh, R., Streck, C., Saint-Laurent, C., Tucker, C.J. and Henry, M., 2020. **Measuring progress in forest and landscape restoration**. *Unasylva*, 71(252), pp.62-70.

Buckingham, K., Ray, S., Granizo, C.G., Toh, L., Stolle, F., Zoveda, F., Reytar, K., **Zamora-Cristales, R.**, Landsberg, F., Matsumoto, M. and Brandt, J., 2019. **The Road to Restoration**. World Resources Institute Guidebook.

Acuna, M., Sessions, J., Zamora, R., Boston, K., Brown, M., & Ghaffariyan, M. R. (2019). **Methods to manage and optimize forest biomass supply chains: A review**. *Current Forestry Reports*, 5(3), 124-141.

Petitmermet, J., Sessions, J., Bailey, J., & Zamora-Cristales, R. (2019). **Cost and Productivity of Tethered Cut-to-Length Systems in a Dry-Forest Fuel-Reduction Treatment: A Case Study**. *Forest Science*, 65(5), 581-592.

Daugherty B., Sessions J., Zamora-Cristales R. Wing. M. 2018. **Improving Large Trailer Access for Biomass Recovery in Steep Terrain**. *Journal of Forest Science*. <https://doi.org/10.1093/forsci/fxx020>

Ding H., Faruqi S., Wu A., Anchondo A., Altamirano J., Verdone M., **Zamora-Cristales R.** Chazdon R., Vergara W., 2017. **Roots for Prosperity: the Economics and Finance of restoring degraded lands**. World Resources Institute, Washington DC., 80p. <https://www.wri.org/sites/default/files/roots-of-prosperity.pdf>

Zamora-Cristales R. 2016. **Resource Allocation model for public incentives for forest landscape restoration in Latin America**. *Land Economics*; In preparation

Zamora-Cristales R. 2016. **Economic optimization of restoring riparian forest**. *Forest Policy and Economics*; In preparation

Chen C., Pierobon F., Zamora-Cristales R., Ganguly I., Sessions J., and Eastin I. 2016. **Modeling the processing and transportation logistics of forest residues using Life Cycle Assessment (LCA)**. *Journal of Forestry*, 115 (2): 86-94

Zamora-Cristales R., J. Sessions, and G. Marrs. 2016. **Economic implications of processing and transporting wet versus dry forest residues for biofuel production**. *Canadian Journal of Forest Research* <http://www.nrcresearchpress.com/doi/pdf/10.1139/cjfr-2016-0221>

Marrs G., R. Zamora-Cristales, J. Sessions. 2016. **Forest Biomass Feedstock Cost Sensitivity to Grinding Parameters for Bio-jet Fuel Production** *Renewable Energy*. <http://dx.doi.org/10.1016/j.renene.2016.07.071>

Zamora-Cristales R., J. Sessions, 2015. **Modeling forest residue collection for bioenergy production**. *Croatian Journal of Forest Engineering*, http://www.crojfe.com/rji/crojfe_37-2_2016/Zamora.pdf

Zamora-Cristales R., J. Sessions. 2015. **Are double trailers cost effective for transporting forest biomass on steep terrain?** *California Agriculture* 69(3):177-183 DOI: 10.3733/ca.v069n03p177

Zamora-Cristales R., J. Sessions, D. Smith. 2015. **Effect of grinder configuration on forest biomass bulk density, particle size distribution and fuel consumption**. *Biomass and Bioenergy*, 81: 44-54 <http://dx.doi.org/10.1016/j.biombioe.2015.05.025>

Zamora-Cristales, R., J. Sessions, K. Boston and G. Murphy 2014. **Economic Optimization of Forest Biomass Processing and Transport in the Pacific Northwest.** *Forest Science*. <http://dx.doi.org/10.5849/forsci.13-158>

Zamora-Cristales R., J. Sessions, D. Smith, and G. Marrs. 2014. **Effect of high speed blowing on bulk density of ground residues.** *Forest Products Journal* 64 (7/8) 290-299: . <http://dx.doi.org/10.13073/FPJ-D-14-00005>

Zamora-Cristales, R., P. Adams, and J. Sessions. 2014. **Ground-based thinning on steep slopes in Western Oregon: Soil compaction and disturbance effects.** *Forest Science* 60(2):1-7 <http://dx.doi.org/10.5849/forsci.12-525>

Zamora-Cristales, R., K. Boston, J. Sessions, and G. Murphy. 2013. **Stochastic simulation and optimization of mobile chipping economics in processing and transport of forest biomass from residues.** *Silva Fennica* 47(5):1-21. <http://dx.doi.org/10.14214/sf.937>

Zamora-Cristales, R., J. Sessions, G. Murphy and K. Boston. 2013. **Economic impact of truck-machine interference in forest biomass recovery operations on steep terrain.** *Forest Products Journal* 63(56):162-173; <http://dx.doi.org/10.13073/FPJ-D-13-00031>

Sessions, J. and R. Zamora-Cristales. 2013. **Cost Effective Logistics For Forest Harvest Residuals: The Upstream Part of the Sugar Stream.** In Proceedings of the Seventh National New Crops Symposium "New Crops: Bioenergy, Biomaterials, and Sustainability" Association for the Advancement of Industrial Crops (AAIC), October 13-16, . Renaissance Hotel, DuPont Circle, Washington D.C.

Zamora-Cristales, Rene. 2013. **Economic Optimization of Forest Biomass Processing and Transport.** *PhD. Oregon State University*, 196 pp. <http://hdl.handle.net/1957/39180>

Sessions, J., K. Tuers, K. Boston, R. Zamora and R. Anderson. 2012. **Pricing Forest Biomass for Power Generation.** *Western J. of Applied Forestry* 28(2):51-56; <http://dx.doi.org/10.5849/wjaf.12-012>

Zamora R. 2008. **Forest certification Financial Analysis: Teak Plantations.** Cape Town Southafrica. *ASDI, Sweden*.

Aguilera A. Zamora R. **Surface roughness in sapwood and heartwood of Blackwood (*Acacia melanoxylon* R. Br.) machined in go-o direction,** *European Journal of Wood and Wood Products* Springer Berlin / Heidelberg ISSN0018-3768 (Print) 1436-736X (Online) Volume 67, Number 3/ agosto de 2009. www.springerlink.com/content/61840h80480002to/

Aguilera A. Zamora R. 2007 **Wood Machining process monitoring of Blackwood (*Acacia Melanoxylon*) with acoustic emission technique and his relationship with resulting surface roughness** *SciELO, Revista Maderas Ciencia y Tecnología* 9(3): 323-332. www.scielo.cl/scielo.php?script=sci_isoref&pid=So718-221X2007000300011&lng=es&tlng=en

Zamora R. 2006. **Effect of machining sapwood and heartwood of *Acacia melanoxylon* in sound and acoustic emission.** *Tesis de grado Master en ciencias mención recursos forestales* Valdivia 104p.

Zamora R. 2004. **Economic and Technical feasibility of construction low cost Dry wood Kilns for the development of a Dry lumber Market in small sawmills.** *Guatemala Forestal (1)1, Gremial forestal.*

Zamora R. 2004. **Effect of forest economic Incentives in rural communities of the central part of Guatemala.** *Ciencia Forestal* 2(4) 15-18.

Zamora R. Alvarado S. Castañeda C. 2003 **Economic and Technical Evaluation of Forest Incentives Program in Guatemala.** *Centro Agronómico de Investigación tropical CATIE – Instituto Nacional de Bosques INAB* 120p.

Project Management

Coordinating a Policy acceleration program on Incentives for Forest and Landscape Retoration. Preparing the proposal funding and executing the budget/managing deliverables

Supporting Initiative 20x20. International Climate Initiative (IKI), BMUB, Germany. Writing the proposal and budgets, Managing Workplans and budgets as well as implementing activities in Mexico, Peru, Colombia, Costa Rica, Guatemala, Chile, Argentina, Uruguay and Ecuador.

Monitoring Landscape Restoration, International Climate Initiative (IKI), BMUB, Germany. Writing the proposal and budgets, Managing Workplans and budgets as well as implementing activities in El Salvador, Nicaragua and Honduras.

Resource allocation for Public Incentives, International Climate Initiative (IKI), BMUB, Germany. Leading research efforts to allocate public resources for restoration.

Economic Supply Chain Analysis, United States Department of Agriculture, Lead the design of a landscape model to optimize the forest biomass supply chain.

Recent Presentations in Conferences and Conventions

*IUFRO world congress 2024. Session implemented Keynote **Top five business and policy innovation challenges to accelerate landscape restoration as a nature-based solution** Stockholm Sweden June 2024*

*International Agroforestry conference. **Keynote: Agroforestry for the Resilience of Multifunctional Landscapes: Impacts in Carbon Biodiversity and Agricultural productivity.** Concepcion, Chile April 2024*

*National Forestry Congress Guatemala. XII Forest Congress: Contribution of Forestry to the Sustainable Development Goals (SDG). **Keynote: Adaptation, Photosynthesis and Resilience: How Guatemala can achieve the Carbon Neutrality?** Flores, Petén Guatemala, October 2023*

*Credit Suisse 2023 Conservation Finance Conference - 10th Anniversary. From Scaling to At-Scale: Challenges to deploying investment capital for biodiversity and climate goals. **Panelist: on conservation and restoration Finance in Latin America and the Caribbean,** New York, USA May 2023*

United Nations Decade on Ecosystem Restoration Initiative 20x20 Joint Annual Latin America Meeting 2023. Keynote: Accelerating Blended Finance and for Forest Landscape Restoration in Latin America, February 2023.

Rwanda National Restoration Roundtable Meeting. **Keynote: Payment for ecosystem services to accelerate restoration and public finance.** Kigali, Rwanda, January 2023

Land and Carbon Lab Summit. Keynote **Monitoring systems for Effectiveness of Payment for Ecosystem Services.** Brussels Belgium, June 2023

United Nations Climate Change Conference COP 27 Egypt. **Land Restoration into the future: Policy and private finance to scale effort to protect and restore our forests.** Sharm El Sheikh, Egypt December 2022

World Forestry Congress 2022. **Business Innovation Ecosystem and public incentives to streamline Forest Landscape Restoration in Latin America.** Accepted and to be presented at World Congress in South Korea in 2022.

Global Policy Dialog Series *Strong Public Policies to Restore Land: Breaking Through the Barriers to Success, Accelerating public incentives in FLR.* **September 2021**

Global Policy Dialog Series *How Carbon Taxes And Markets Can Scale Up Landscape Restoration:, The nexus between Carbon and taxes for a resilience economy* **October 2021**

Society of Ecological Restoration World Congress 2021. **The investment ecosystem in Latin America.** Virtual Format, June, 2021

The 43rd annual meeting of the Council on Forest Engineering (COFE) and the 53rd annual meeting of the International Symposium on Forest Mechanization (FORMEC), Keynote: **How forest engineering can help to curb climate change.** September 2021

Latin American Forum on Impact Investment. **"Impact Investments in Landscape Restoration"** Merida Yucatan, Mexico. February 2020

International Conference on Tropical Forests, Yale School of Forestry, **"Monitoring and Transparency of Landscape Restoration"**, Washington DC, February 2020, USA.

Wilson Center for International Scholars **"Healthy Landscapes for Prosperity: Land Restoration in El Salvador"**, New Haven, CT, February 2018, USA.

IUFRO World Congress. **"Catalog of Ecosystem Services from Restoration in Latin America"** Curitiba, Brazil, October 2019

International Association of Landscape Ecology **"Economics and Finance of landscape restoration in Latin America"** Concepcion, Chile, May 2018.

International Conference on Tropical Forests, Yale School of Forestry, **"Multi-objective optimization of indicators for Monitoring impacts of Restoration"**, New Haven, CT, February 2018, USA.

International Union of Forest Resource Economist annual meeting **"Optimizing public resources for landscape restoration at scale in Latin America"** New Orleans, LA, USA, 2017.

Congreso de la red chilena de restauración ecológica, **Iniciativa 20x20 for Restoration of Degraded lands in Latin America**, La Serena, Chile, 2016

Congreso de la red colombiana de restauración ecológica **Economic modeling of Riparian Forest Restoration in Guatemala**, Medellin, Colombia, 2016

The second Northwest Wood-Based Biofuels + Co-Products Conference, **Economics of wet vs fresh material for biofuel production**. Seattle, WA, USA, 2016

Wood to Biofuel Webinar Series, Northwest Advanced Renewables Alliance, "Decision support for forest harvest residue collection". October 15, 2015.

Western Forest Economics and International Union of Forest Resource Economist annual meeting "Resource allocation for public incentives in Latin America" Seattle, WA, USA, 2015.

Western Forest Economics and International Union of Forest Resource Economist annual meeting "Forward reaching optimization to increase the value of wood poles" Vancouver BC, Canada, May, 2015.

International Union of Forest Research Organizations IUFRO world congress 2014. "Economics of forest biomass processing and transport on steep terrain" Salt Lake City Utah, USA, October, 2014.

Council of Forest Engineering Annual Meeting 2014, "A simulation model for forest biomass collection", Moline, IL, USA

Washington Contract Loggers Association, Annual Meeting 2014. "Improving Efficiencies in Forest Biomass in Biomass Collection and Transportation" Spokane, Washington, USA, March 2014

15th Symposium in System Analysis in Forest Resources, "A Decision Support System for the Economic Optimization of Forest Biomass Processing and Transportation" Quebec City, Canada, August, 2013.

Council of Forest Engineering Annual Meeting 2013, "RENO: A Computerized Solution Procedure and Decision Support System for Forest Biomass Recovery Operations", Missoula, Montana USA

Western Forestry Graduate Symposium, "Economic optimization of mobile chippers for biomass processing", April 24, 2013 Corvallis, Oregon USA.

CAMCORE, Data management for Forest Genetic Trials, 26 July-2 August 2009, Sabie, South Africa.

Swedish International Development agency Forest Certification Training Program First Part Sweden 14-30 May 2008. *Second part* 5-20 November South Africa 2008.

National Forestry Congress Guatemala 2008 Keynote speaker: "Optimal Cutting Age for Pine. Plantations in Guatemala: An Economic Analysis". Guatemala 2008.

Central America Forestry Congress. Oral presentation: "Wood machining Process" San Salvador El Salvador 2007

Software Development

- AURORA Assessment, Understanding and Resproting of Restoration Actions, Application Web <http://restoration-projects-tool.vielca-ingenieros.com/#/>
- Sustainability Index for Landscapae restoration Monitoring WebApp <http://simulador-isr.vielca-ingenieros.com/#/>
- RENO: Residue Evaluation and Network Optimization program: Optimizing the economics of forest biomass processing and transport
- POLEBUCK: Maximizing the value of a tree for wood poles and sawlog production.

Reviewer

- Perspectives in Ecology and Conservation
- Forest Science, Society of American Foresters
- Canadian Journal of Forest Research
- Forest Policy and Economics
- Journal of Forestry, Society of American Foresters
- Silva Fennica, The Finnish Society of Forest Science and the Finish Forest Research Institute
- Forest Products Journal, Forest Products Society
- Biomass and Bioenergy Journal, Elsevier.
- International Journal of Forestry Research, Hindawi.
- California Agriculture Journal
- Forests
- Biofuels
- Energies
- World Resources Institute internal reports
- UN Decade on Ecosystem Restoration

Teaching experience

Instructional Summary Credit Courses

Del Valle University, Guatemala

Del Valle University is a highly renowned research-focused university in Guatemala that promotes undergraduate education around science and engineering. The university was founded with support from the United States in 1962 and has become the main research institution in Engineering and Natural Science. Del Valle University was the first University to develop a Forest Engineering Program in Guatemala.

IF-471 Wood Technology and Economics of Forest Products (4-credits)

This is a senior level course taught at the Forest Engineering program (5-year program). This includes basic concepts about the wood procurement value chains, economics, and environmental sustainability practices. The course also included 4 field visits to forest operations and industry to allow the students to understand the connection between the forest management, and the impact in the industry and products. I taught this course in 2004, 2005 and 2007, and 2008. This course is

not elective, and it is part of the core program providing 4 credits. The number of students enrolled in the course where as follows: 2004, 17; 2005 15; 2007, 18; 2008, 15.

IF-462 Forest Planning products and Industry (4-credits)

This is a senior course taught at the Forest Engineering program (5-year Program) and focused on planning operations at timber industries including sawmills, pulp and paper facilities, particleboard plants, among others. The course also includes differences between the conifer-based industry compared to the broadleaf based industry. The course included 3 field visits, one focused in conifer sustainable management, harvesting and production; a second field visit to tropical broadleaf forest and industry and a third focused on visiting industries developing high value-added products such as furniture, and musical instruments. I taught his course from 2003 to 2005. This course is part of the core program of Forest Engineering degree and provide 4 credits. The number of students enrolled in the course where as follows: 2004, 13; 2005 15; 2007, 14; 2008, 18.

Forest Industry School Program (1-credit):

At Del Valle University I developed an innovative Forest Industry School program to allow junior and senior students from the Forest Engineering program to gain experience in the industry. The program was developed between 2004 and 2005. The program consisted in partnering with key Forest Companies where students spent between 2 weeks distributed in two periods of time. The program provided students with key research questions that they have to address to improve operations. The program also included an induction day for students to know each of the components of the company and operations and asked students from their fresh perspective what improvements would they suggest based on their observations. The program provided 1 credit towards the Supervised Professional Practice (EPS acronym in Spanish). A type of internship required by the Forest Engineering program in order qualify for graduation. Different to a regular internship the program provided total immersion in real world problems managers face every day from the forest to the industry. In this program 10 students participated, 3 in 2004 and 7 in 2005. Later the program was adopted by more forest industries and expanded.

Wood Technology Master of Science Program:

At Del Valle University I led the development of a Master of science program in Wood Technology and Forest Value Chain management. This program was aimed to provide professionals with new tools to plan better operations to harvest, transform and conversion. The program had a heavy focus on planning tools including simulation and mathematical optimization and heuristics. The program later inspired other Universities to develop complementary Master of Science programs given the interest and demand.

Rafael Landivar University, Alta Verapaz

Rafael Landivar University is a private University in Guatemala recognized for its focus on rural development. Forest engineering courses and programs are developed in regional campuses close to the forest and Indigenous populations to allow for opportunities for higher education while improving local capacities to address sustainability problems.

(Codigo: 661707) Wood technology and Forest Industry (4-credits)

This is a senior course taught the final year of the 6-year undergraduate program that focuses on providing the student tools to plan wood procurement operation and management of processing timber. The course includes an analysis in the cost and benefits of harvesting and transportation and building strategies to maintain a sustainable wood flow for industry. The course required two field trips to understand operations. For this course I enabled a cooperation agreement with a Technical Community College to provide practical training in wood machinery and conversion tools. I taught this course between 2006 and 2008. This is a core course in the Forest Engineering Program and provide 4 credits.

- 2006: enrollment # 32

- 2007: enrollment #35
- 2008: enrollment #38

Forest Engineering Pensum revision:

At Rafael Landivar University, I was led the committee to revise and improve the pensum of the Forest Engineering Program including the revision of credits, field work required. Changes in the curriculum were implemented in subsequent years to improve rural forest education. The pensum revision was done in Collaboration with the Food and Agriculture Organization from the United Nations (FAO).

Oregon State University

FE441/FE541 Forest Planning (3-credits)

I taught this course in Spring 2015 for undergraduates and graduate students. My evaluation for the course and the laboratory is attached for your records.

- 2015: enrollment 6 (SET = 5.2 lec; 5.4 lab)

SNR 532 Planning Agroforestry Projects (2-credits)

I supported an online synchronous session on Landscape Monitoring presenting the students a diverse set of tools and methods. I also provided real-world examples.

2020: enrollment # 21 participants

Non-Credit Courses and Workshops

The Tropical Agricultural Research and Higher Education Center (CATIE)

CATIE is one of the best graduate education schools in Latin America in Natural Resources, offering a diverse set of Master and PhD programs with international projection.

International Landscape Restoration Course

I served as the coordinator and designer of the course along with another colleague from CATIE. The course consists of 2-weeks of intensive training from 7:30 am to 6:00pm with presentations and group work on various topics that included Investment Finance, Monitoring and geospatial tools, Policy incentives, and enabling conditions. I coordinate the organization, program development, and implementation. I taught the component on Forest Planning and Economics and the component of Optimization and Land use planning. During the course, we improved the capacities of a total of 140 participants from Mexico to Chile in Latin America. In the in-person modality from 2016 to 2019 included 5 days of field work visiting forest plantations, conservation areas, and fragmented landscapes to show students the challenges around the sustainable management of forest.

- 2016 (in-person): enrollment # 34
- 2017 (in-person): enrollment # 45
- 2018 (in-person): enrollment # 38
- 2019 (in-person): enrollment # 41
- 2020 (online, synchronous): enrollment # 27
- 2021 (online, synchronous): enrollment # 51
- 2022 (online, synchronous): enrollment # 39

National Institute of Ecology Mexico

Certificate/Diploma of Ecosystem Restoration and environmental services

This was Technical Professional Certificate/Diploma in Ecosystem restoration (online) certified by the National Institute of Ecology in Mexico and provided credits to students to get a Diploma. I taught three components of the components of the program focused on Economics and Finance of Landscape Restoration, Monitoring of Landscapes and Policy and Incentives for Landscape Restoration. This was done in fourth editions 2020, 2021, 2022 and 2023. The program was done in collaboration with the International Foundation for Ecosystem Restoration.

- 2020 (On-line asynchronous): enrollment # 46
- 2021 (On-line asynchronous): enrollment # 32
- 2022 (On-line asynchronous): enrollment # 36
- 2023 (On-line asynchronous): enrollment # 28

International Forest Model Network

Sustainable Landscapes

This is a course focused on undergraduate students interested in interdisciplinary work in natural resources. I taught the course on financial mechanisms for forest restoration.

- 2024 (online synchronous): enrollment # 25

Applications of Mathematical Programming in Forest Landscapes

- October 2024 (on-line synchronous): expected enrollment # 40 maximum

US Forest Service International Programs & Food and Agriculture Organization (FAO)

Guatemala National Restoration Course in Forest Landscape Restoration:

I was part of the coordination and design of the course focused on forest managers and restoration practitioners implementing actions in the ground. I taught the Forest Economics and Land use Planning component.

- Guatemala 2016 (In-Person, Jalapa), enrollment # 22
- Guatemala 2017, (In-person, San Marcos): enrollment # 43
- Guatemala 2018, (In-person, Escuintla), enrollment # 45
- Guatemala 2020 (On-line synchronous): enrollment # 53

German International Cooperation Agency (GIZ)

Dominican Republic National Restoration Course in Restoration:

I was part of the coordination and design of the course focused on forest managers and restoration practitioners implementing action in the ground. I taught the Forest Economics and Land use Planning component.

- Dominican Republic 2019 (in-person, Punta Cana): enrollment #43

Development of Teaching Resources

Forest Education Competition: Innovations post-COVID

I led the Forest Competition in 2023 in Forest Education Competition: Forests are crucial for human flourishing in numerous ways. Therefore, it is important to understand how these ecosystems function, their role in our health and well-being, and the threats they face. This understanding enables us to become responsible stewards of this versatile resource.

Education about forests fosters a greater admiration for these natural marvels and paves the way for a future where humans and forests can coexist harmoniously. The COVID-19 pandemic altered the educational system, affecting forestry education as well. Nevertheless, this disruption sparked a surge of innovation that promises to enrich the field for future generations.

The Global Competition on Best Practices in Forest Education 2.0 provided valuable insights into the innovations developed by scientists, professors, and teachers globally to navigate the challenges posed by COVID-19 and maintain the flow of knowledge to students. This competition aims to showcase and disseminate the creative solutions educators have employed to meet new challenges and inspire the creation of innovative teaching materials related to forests. We had a total of 17 participants from 13 countries worldwide. The proposals varied, encompassing blended learning approaches that merge online components with traditional in-person methods and gamification techniques where games were created to mimic forest management practices, facilitate tree identification, or raise awareness about environmental issues.

Landscape Policy Accelerator

I also designed the Policy Accelerator program as an innovation-hub for knowledge transfer. This program was inspired in MIT Policy Accelerator program that nurture innovation in design and development of public policy. The Landscape Policy Accelerator is an International Course and training program collaborative network that helps government leaders solve these key problems and push each other toward success. By building south-south networks of mutual support and promoting smart policies, the Policy Accelerator hopes to help governments boost restoration implementation on the ground and continue to lead in the global movement to restore landscapes. The detailed information of the program is available here:

<https://www.wri.org/initiatives/landscape-policy-accelerator> During the program we have provided support to close to 75 government officials that selected around 8 policies to improve. The project allowed countries such as Guatemala to improve the monitoring of impacts of the Forest Incentives Program. This program invests at least 25 million USD annually in Reforestation, Agroforestry, silvopasture and conservation. In Costa Rica, the program developed the framework of a registry to collect.

- 2020, Landscape Policy Accelerator (On-line Synchronous): Participation of 32 government officials from six countries, Guatemala, El Salvador, Costa Rica, Colombia, Peru and Chile
- 2021, Landscape Policy Accelerator (On-line Synchronous): Participation of 40 government officials from eight countries, Mexico, Brasil, Guatemala, El Salvador, Costa Rica, Colombia, Peru and Chile

Landscape Monitoring Accelerator

The Landscape Monitoring Accelerator is a peer-to-peer capacity development program for policymakers and government officials looking to improve or design monitoring systems to track the performance and impacts of restoration and land use policies. Through workshops and individualized mentoring with world-class experts, participants identify challenges and co-create solutions to shift and measure the effectiveness of their restoration programs. By collaborating with mentors and other cohort members, participants will design systems to help them better understand whether their policies are supporting smallholder farmers, protecting endangered species, sequestering carbon and more. Details of the program are available here:

<https://www.wri.org/initiatives/landscape-monitoring-accelerator>. The program aims to improve institutional by providing capacity development around the measurement of economic, environmental, and social impacts of restoration policies, particularly incentives. These programs are designed to identify research questions around policy instruments that can later be addressed with technical support. The accelerator serves as a laboratory for innovation in policy design to restore and conserve our forests.

- 2022, Costa Rica (in-person), Landscape Monitoring Accelerator to support Climate Change ambitions to Paris Agreement (in-person): Participation of 40 government officials from 9 Countries

- 2023, Guatemala (in-person), Landscape Monitoring Accelerator (In-person): Participation of 40 government officials from ten countries in Latin America
- 2024, Brazil (in-person), Landscape Monitoring Accelerator (In-person): The nexus of restoration and biodiversity Participation of 58 government officials from twelve countries in Latin America

AURORA

I developed a web application AURORA to allow students to learn how to plan and select indicators for Landscape Restoration. The tool takes the user through a series of steps to allow for developing a comprehensive set of indicators for a restoration project. AURORA allow the user to generate an index that aggregates the different indicators to produce a landscape metric. AURORA is available here: <https://auroramonitoring.org/#/>

Students Advised

Student: Wendy Lorenzana

Year: 2023

Program: Master of Science in forest management use and conservation

Thesis: Analysis of the socioeconomic relationships between local communities, forest resources and other forest contributions in an Amazon Deforestation front (Solano-Caquetá)

Role: Co-advisor

Institution: University Francisco Jose Caldas, Colombia

Student: Daniel Pinillos

Year: 2021

Program: PhD, Production Ecology & Resource Conservation

Dissertation: Perspectives for multifunctional landscapes in the Amazon: analyzing farmers' strategies, perceptions, and scenarios in an agricultural frontier

Role: External Committee member

Institution: Wageningen University & Research and Montpellier SupAgro, Erasmus Mundus Joint Doctorate Program Agricultural Transformation by Innovation (AgTrain)

Student: Hernan Zaldivar Schrader

Year: 2021

Program: Master of Science in Conservation and management of Tropical Forest and Biodiversity

Thesis: Guide to Sustainability Criteria for Investment Projects in Forestry and Agroforestry Sectors in Latin America

Role: Co-advisor

Institution: The Tropical Agricultural Research and Higher Education Center (CATIE), Costa Rica

Student: Elizabeth Bustos Linares,

Year: 2018,

Program: Master of Science in Conservation and management of Tropical Forest and Biodiversity

Thesis: Standard for Guiding Restoration Efforts at the Scale of Tropical Landscapes: Proposal Based on the Analysis of Experiences in Four Model Forests in Latin America

Role: Co-advisor

Institution: The Tropical Agricultural Research and Higher Education Center (CATIE), Costa Rica

Student: Michael Berry

Year: 2017,

Program: Doctor of Philosophy Sustainable Forest Management

Thesis: Evaluating Transportable Conversion Facilities for a Forest Biomass Supply

Chain in the Pacific Northwest, USA
Role: Committee Member
Institution: Oregon State University, USA

Student: Joshua Petitmermet
Year: 2017,
Program: Master of Science Sustainable Forest Management
Thesis: Tethering and Biochar: Two Emergent Technologies with Implications for Fuels Treatments on Federal Forest Lands
Role: Committee Member
Institution: Oregon State University, USA

Student: Janna Loeppky
Year: 2015,
Program: Master of Forestry Sustainable Forest Management
Thesis: Energy consumption assessment of Grinding unbaled and baled biomass residues following harvest from forested land in Western Oregon
Role: Committee Member
Institution: Oregon State University, USA

Courtesy/Adjunct Appointments

Appointment: Adjunct Faculty
Institution: The Tropical Agricultural Research and Higher Education Center (CATIE),
Program/Department: Graduate School
Country: Costa Rica
Type: Voluntary/Unpaid

Appointment: Adjunct Faculty,
Institution: National University of Loja
Program/Department: Master of Science in Restoration of Tropical Landscapes
Country: Ecuador
Type: Voluntary/Unpaid

Appointment: Advisor
Food and Agriculture Organization
Program/Department: UN Decade on Ecosystem Restoration, Restoration Policy Facility.
Country: Regional Africa/Latin America
Type: Voluntary/Unpaid

Professional References

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