

BETZY EUGENIA HERNÁNDEZ SANDOVAL

PROFILE

My educational background includes a Bachelor of Science degree in agronomic engineering from the University of San Carlos in Guatemala, and a master's degree in renewable energy jointly from the University of San Pablo in Guatemala and UNINI in Puerto Rico. I am currently a Research Associate with the Earth System Science Center of the University of Alabama in Huntsville (UAH), providing support to the SERVIR Science Coordination Office at NASA Marshall Space Flight Center. In that position, I also serve as SERVIR's Regional Science Coordination Lead for Central America. Previously, I was a Research Scientist with the Water Center for the Humid Tropics of Latin America and the Caribbean (CATHALAC). At CATHALAC, I worked on a number of projects, including the NASA-supported SERVIR-Mesoamerica project and the European Commission-funded PREVDA project, where I applied my remote sensing expertise in developing an updated map of Central America's land cover. In 2008, I served as National GIS Coordinator for the Guatemala's National Protected Areas Council (CONAP), where I was responsible for a range of activities, from spatial analysis to modeling scenarios for projects in protected areas, among others. My research interests include land cover assessment, spatial hydrology, and the use of Earth observation data for disaster management.

EDUCATION

Master of Science in Renewable Energy, Universidad Internacional Iberoamericana (UNINI) Puerto Rico and University of San Pablo, Guatemala City, Guatemala, 2016

Bachelor of Science, Agronomic Engineering, Faculty of Agronomy, University of San Carlos, Guatemala City, Guatemala, 2006

PROFESSIONAL EXPERIENCE

January 2017 – present, *Earth System Science Center (ESSC) of the University of Alabama in Huntsville (UAH)*, Huntsville, Alabama

Research Associate

- Since late 2021, has served as the SERVIR Science Coordination Office's Regional Science Coordination Lead for Central America, with duties including helping to establish a new SERVIR hub for Central America and the Dominican Republic
- Has served since early 2018 as the Associate Program Manager within the Capacity Building Program of NASA's Applied Sciences Program, with responsibility for overseeing seven ongoing (2018-2022) AmeriGEO and Human Planet projects
- Has participated on behalf of the U.S. Government in a number of international committees, including the Capacity Development Working Group (CD WG) of the inter-governmental Group on Earth Observations (GEO), and the Inter-American Capacity Development Working Group
- Currently supports the implementation of the Joint Statement signed in 2019 between NASA's Earth Science Division and the General Secretariat of the Central American Integration System (SICA)
- Has presented on Earth observation and capacity development research at conferences like the American Geophysical Union's annual fall meeting, from 2017 through 2022
- From late 2018 to late 2021, served as the Capacity Building Lead at the SERVIR Science Coordination Office at the NASA Marshall Space Flight Center (MSFC), coordinating with the Capacity Building Leads at five SERVIR regional hub organizations based in Africa, Asia, and South America
- From early 2017 to late 2018, provided support to the Data Science & Informatics Group (DSIG) in the implementation of a NASA Marshall Space Flight Center (MSFC) project regarding the Common Metadata Repository (CMR), including curation of the Big Earth Data Initiative (BEDI) metadata records from NASA's 12 Distributed Active Archive Centers (DAACs)
- Provided support to NASA in the context of the Joint BIOMASS-NISAR Multi-Mission Algorithm and Analysis Platform (MAAP), including documentation of data requirements for the MAAP, development of user cases, and coordination with personnel at other NASA centers

- Has held the positions of Research Associate I (January 2017 – May 2018), Research Associate II (May 2018 – May 2021), and Research Associate IV (May 2021 – present)

October 2013 – September 2016, *Water Center for the Humid Tropics of Latin America & the Caribbean* (CATHALAC), City of Knowledge, Panama City, Panama, Central America

Research Associate

- Coordinated the development of technical reports on “Potential Impacts on Climate Change on Water Resources in Central America and the Caribbean” and employing spatial hydrological modeling with the IPCC’s SRES and RCP climate change scenarios as inputs, along with future land use change scenarios
- Served as a consultant in the development of the 3rd National Greenhouse Gas Inventory of Panama, using GIS and statistical modeling for the development of activity data for emission estimation for the period 1985-2013
- Provided technical support to CATHALAC in the elaboration of analyses regarding the early 2014 extreme weather events in the Eastern Caribbean, the 2015 fire season in Central America and water contamination in Guatemala’s Lake Atitlan in 2015, and landslides in Guatemala in 2015

March 2009 – October 2013, *Water Center for the Humid Tropics of Latin America & the Caribbean* (CATHALAC), City of Knowledge, Panama City, Panama, Central America

Research Scientist

- Use of remote sensing to do image classification of multi-temporal Landsat and MODIS data for the development of an updated map of Central America’s land and forest cover for 2010, in the context of the European Commission-funded 2009-2011 PREVDA project
- Use of Landsat data for mangrove mapping in Guatemala in support of the Guatemalan Ministry of the Environment and Natural Resources (MARN)
- Harmonization of land cover data for Panama in the context of the UN-REDD initiative
- Spatial hydrological modeling at the regional (insular Caribbean and Central America) and sub-national levels (Dominican Republic, Guatemala) for assessment of potential climate change impacts on water resources, in the context of the 2012-2016 IDRC-funded “Climate Change and Water Security in Central America and the Caribbean” project
- Analysis of remotely sensed air quality datasets in the context of SERVIR’s regional air quality monitoring in Mesoamerica
- Use of optical and radar imagery for post-disaster hazard mapping for a range of events (e.g. 2010 Haitian earthquake, 2011 flooding in Panama, 2009-2013 continued flooding of Lago Enriquillo in the Dominican Republic, cyanobacteria blooms in Guatemala’s Lake Atitlan in 2009 and 2011)
- Training of regional technical specialists in land cover classification methodologies
- Execution of training activities in the basics of geographic information systems (GIS), spatial hydrological modeling, and GIS for disaster management, among other topics
- Maintenance of a network of regional contacts with national partner institutions

2008, *Geographic Information Systems Unit, National Protected Areas Council* (CONAP), Government of Guatemala, Guatemala City, Guatemala, Central America

National Coordinator

- Responsible for coordination of personnel in the Geographic Information Systems Unit (SIG-CONAP, in Spanish)
- In charge of the maintenance and updating of the Government of Guatemala’s National Database of Protected Areas (SIGAP, in Spanish)

January – July 2007, *National Statistics Institute*, (INE) Guatemala City, Guatemala, Central America

Digital Cartography Technician

- Responsible for the geographical and cartographical aspects of the 2007 National Agricultural Survey

August 2005 – May 2006, *Ministry of Agriculture, Livestock, and Nourishment (MAGA)* Guatemala City, Guatemala, Central America

Researcher

- Evaluated domestic water sources in Patzicía, Chimaltenango
- Monitored municipal shipyards in Zaragoza and Patzicía, near the Soco mountain
- Environmental education discussions in Patzicía and Acatenango
- Development of a proposal entitled “Forest Management in the municipality of Astillero, Zaragoza”
- Technical assistance in plant nurseries in Santa Maria Cerro Alto, Patzicía

2003, *University of San Carlos*, Guatemala City, Guatemala, Central America.

Research Assistant

- Assisted in the forest inventory of the Soledad Farm in the municipality of Tecpán, Chimaltenango

LANGUAGES

SPANISH: as native tongue, is fluent in conversational and written Spanish

ENGLISH: Fluency in conversational English, high proficiency in written English

FRENCH: Good command of spoken French, including certification at B2.1 level

TECHNICAL SKILLS

- **Geographic Information Systems (GIS):** High proficiency in geo-processing, geospatial modeling and other spatial analysis techniques, via *ArcGIS Desktop 10.x*, and spatial hydrological modeling using the *Soil & Water Assessment Tool (ArcSWAT)*, the *Non-point Source Pollution & Erosion Comparison Tool (N-SPECT)*, and hydraulic modeling using *HEC-RAS*
- **Global Positioning Systems (GPS):** Use of GPS Navigators and sub-metric GPS units
- **Remote sensing (RS):** Satellite image processing / manipulation and multispectral image classification using platforms such as *ENVI*, *ERDAS Imagine*, and *TerrSet (IDRISI)*
- **Statistical analyses:** Basic ability using *R*
- **Technical writing:** Development of grant proposals, project performance reports and other technical documents

PUBLICATIONS

1. Thapa, R.B., Tripathi, P., Matin, M.A., Bajracharya, B., **Hernandez Sandoval, B.E.** 2021. Chapter 14: Strengthening the Capacity on Geospatial Information Technology and Earth Observation Applications. In: Bajracharya, B., Thapa, R.B., Matin, M.A. (Eds.) 2021. *Earth Observation Science and Applications for Risk Reduction and Enhanced Resilience in Hindu Kush Himalaya Region*. Springer. ISBN 978-3-030-73568-5. 375 pp.
2. Cherrington, E.A., Griffin, R.E., Anderson, E.A., **Hernandez Sandoval, B.E.**, Flores-Anderson, A.I., Muench, R.E., Markert, K.E., Adams, E.C., Limaye, A.S., Irwin, D.E. 2020. Use of public Earth observation data for tracking progress in sustainable management of coastal forest ecosystems in Belize, Central America. *Remote Sensing of Environment*, 245, 111798.
3. Flores-Anderson, A.I., Griffin, R.E., Dix, M., Romero-Oliva, C.S., Ochaeta, G., Skinner-Alvarado, J., Ramirez Moran, M.V., **Hernandez Sandoval, B.E.**, Cherrington, E.A., Page, B., Barreno, F. 2020.

- Hyperspectral Satellite Remote Sensing of Water Quality in Lake Atitlán, Guatemala. *Frontiers in Environmental Science*, 8:7. DOI: 10.3389/fenvs.2020.00007.
4. Cherrington, E.A., Flores-Anderson, A.I., Thapa, R.B., Herndon, K.E., Wahome, A., Oduor, P., Mubea, K., Ouko, E., Quyen, N.H., Saah, D., Bako, M., Bartel, P., Mensah, F., Ofori-Ampofo, S., Anderson, E.R., Adams, E.C., Muench, R.E., Markert, A., Nicolau, A., Ellenburg, W.L., Markert, K.N., **Hernandez Sandoval, B.E.**, Limaye, A.S., Griffin, R.E., Irwin, D.E. 2019. Chapter 8: Perspectives on the Future Application of SAR in Forest and Environmental Monitoring. In: Flores-Anderson, A.I., Herndon, K.E., Thapa, R.B., Cherrington, E.A. (Eds.) 2019. *The SAR Handbook: Comprehensive Methodologies for Forest Monitoring and Biomass Estimation*. First edition. U.S. National Aeronautics & Space Administration (NASA). DOI:10.25966/nr2c-s697. 307 pp.
 5. **Hernandez Sandoval, B.E.** and E. Cherrington. 2014. Impactos potenciales del cambio climático en los recursos hídricos en América Central y el Caribe: Perspectiva Regional, Parte II. Technical report. CATHALAC / IDRC. Panama City, Panama. 33 pp.
 6. **Hernández Sandoval, B.E.**, Ortiz López, A., Méndez, M.A., Castillo, H., Elías Gramajo, S., y M. Ayala. 2012. Voluntad de pago de los usuarios del agua de uso doméstico, proveniente de la montaña El Socó, por el método de valoración contingente, en el municipio de Patzicía, Chimaltenango, Guatemala. *Revista Tikalia*. Volumen 30, No. 1: 49-84.
 7. **Hernández Sandoval, B. E.**, Cherrington, E., Bosarreyes, A. Gálvez, J., Oyuela, M. Sempris, E. 2012. Clasificación de cobertura actual del mangle de las costas del Pacífico y Atlántico de Guatemala, a través de técnicas de percepción remota. Centro del Agua del Trópico Húmedo para América Latina y el Caribe (CATHALAC) / Ministerio de Ambiente y Recursos Naturales de Guatemala (MARN). 16 pp.
 8. **Hernández Sandoval, B.E.**, Flores, A., Garcia, B., Clemente, A., Moran, M., Cherrington, E., Oyuela, M., Smith, O., and J.M. Guardia. 2011. "Satellite Monitoring of Lake Atitlan in Guatemala." *Proceedings of the Second International Symposium on Building Knowledge Bridges for a Sustainable Water Future*: 234-238. Panama City, Panama. November 2011.
 9. **Hernández Sandoval, B.E.**, Garcia, B., Cherrington, E., y F. Picado. 2011. Informe Final: Mapa Centroamericana de Cobertura y Uso de la Tierra, Cambios de Cobertura y Uso de la Tierra 1980-1990-2000-2010. Programa Regional para la Reducción de la Vulnerabilidad y Degradación Ambiental, PREVDA/ Centro del Agua del Trópico Húmedo para América Latina y el Caribe (CATHALAC). Panamá, Republica de Panamá. 164 pp.
 10. Cherrington, E.A., Anderson, E.A., Flores, A.I., **Hernández Sandoval, B.E.**, Clemente, A.H., Sempris, E., Picado, F., and D.E. Irwin. 2011. Implications of Climate Change for Forest Structure and Carbon Storage in the Tropical Zones of Latin America and the Caribbean. Technical report. Water Center for the Humid Tropics of Latin America and the Caribbean (CATHALAC) / Regional Visualization & Monitoring System (SERVIR). 19 pp.
 11. Cherrington, E.A., Ek, E., Cho, P., Howell, B.F., **Hernández Sandoval, B.E.**, Anderson, E.R., Flores, A.I., Garcia, B.C., Sempris, E., and D.E. Irwin. 2010. Forest Cover and Deforestation in Belize: 1980-2010. Technical report. Water Center for the Humid Tropics of Latin America and the Caribbean / NASA / Belize Ministry of Natural Resources and the Environment. Panama City, Panama. 43 pp.
 12. **Hernández Sandoval, B.E.** 2006. Evaluation of the community-forest relationship in the municipality of Patzicía: a contingent valuation study of the willingness to pay for water and domestic services on Socó Mountain in Patzicía, Chimaltenango. Bachelor of Science thesis, Faculty of Agronomy, University of San Carlos, Guatemala City, Guatemala.