JORGE E. PATIÑO

Senior researcher at RiSE Group, Universidad EAFIT, PEAK Urban project.

Geoscientist and postdoctoral researcher with experience in GIS, spatial data analysis and remote sensing. Researcher of remote sensing for regional science applications in urban settings.

🎓 EDUCATION

2016

Universitat Politècnica de València
Ph.D. in Geodesy, Cartography and Geographic Information Systems
📍 Valencia, Spain

Thesis: Cityscape, povery and crime: A quantitative assessment using VHR imagery.

2002

Universidad EAFIT
M.Sc. in Earth Sciences
📍 Medellin, Colombia

Thesis: Hidrometeorologic and geomorphologic study of 10 creeks in the Aburrá Valley.

1998

Universidad Nacional de Colombia
Geological Engineer
📍 Medellin, Colombia

Thesis: Geomorphologic influence in the integral environmental management of the Ceibal-Pascuala wetland complex, Magangué, Bolívar.

💻 RESEARCH EXPERIENCE

present | 2018

Senior Researcher
RiSE Group, EAFIT University
📍 Medellín, Colombia
• PEAK Urban project: Building capacity for the future city in developing countries. Subproject: Urban form and its impact on sustainable development.

2017

Researcher
RiSE Group, EAFIT University
📍 Medellín, Colombia
• *World Bank LCR Flagship Report on Cities and Productivity (P158837)*. Remote sensing and spatial data processing for building a spatial database of urban extents of Latin America and the Caribbean for econometric analysis. Support to the analysis of urban form and productivity, and metropolitan coordination and institutional fragmentation of Latin American cities.

CONTACT INFO

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SKILLS

Experienced in spatial data analysis, remote sensing, and GIS.

Skilled in R, QGIS, ArcGIS, ENVI, OpenGeoda, Python, OTB, and SNAP.

Fast learner, very organized, and good coworker.

This cv was made with the R package ***pagedown***.

Last updated on 2020-12-02.

Researcher

2014 | 2012

RiSE Group, EAFIT University   📍 Medellín, Colombia

• *Estimación de variables socioeconómicas en zonas urbanas con imágenes satelitales*. Image processing and spatial econometrics. Intra-urban poverty index estimation from remote sensing, and analysis of the relationships between crime and the urban layout in Medellín, Colombia.

Researcher

2010 | 2008

GIS Lab, EAFIT University   📍 Medellín, Colombia

• Participation in several projects: *Estructuración de una base de datos geoespacial fundamental para aplicaciones en mercadeo (2010); Soporte a Expedición Antioquia 2013 (2009-2010); Análisis espacial aplicado a la identificación de zonas de competencia entre centros comerciales y a la identificación de bolsas de clientes potenciales (2009); Campus EAFIT Georreferenciado - Fase 1 (2008-2009); and Apropiación Social de la Ciencia, la Tecnología y la Innovación - Experiencia Explora Medellín 3a Componente: Visualización del Valle de Aburrá (2008).* Data preprocessing, spatial data analysis and output maps production.

Research Assistant

2002 | 2001

Geology Department, EAFIT University   📍 Medellín, Colombia

• *Estudio hidrometeorológico y geomorfológico de 10 quebradas del Valle de Aburrá.* Field work, experiment design, spatial data integration for spatially distributed rainfall-runoff modeling, and hydraulic modeling for flood hazard mapping using GIS.

👤 TEACHING EXPERIENCE

present | 2017

Quantitative analysis, applied urban analysis
Master in Urban and Environmental Processes, EAFIT University.
       📍 Medellín, Colombia

present | 2017

Introduction to GIS and spatial data manipulation
Master in Urban and Environmental Processes, EAFIT University.
       📍 Medellín, Colombia

2018

Geocodification with open software tools.
Tailored course at the Logistics Department of Cemex Colombia.
       📍 Bogotá, Colombia

2018

Techniques for georeferenced data analysis
Master of Economics, EAFIT University.   📍 Medellín, Colombia

2017

Quantitative spatial data analysis.
Tailored course for the Strategic Security Direction at Empresas Públicas de Medellín.
       📍 Medellín, Colombia

2017

Geographic Information Systems
Master in Applied Mathematics, EAFIT University.
       📍 Medellín, Colombia

2017

Remotely sensed image processing
Master in Applied Mathematics, EAFIT University.
       📍 Medellín, Colombia

2016

Techniques for georeferenced data analysis - Introduction to GIS and spatial data processing
Master of Economics, EAFIT University.   📍 Medellín, Colombia

2014 — **Spatial econometrics and impac analysis - Introduction to digital cartography and GIS**
Master of Economics, EAFIT University. ♀ Medellín, Colombia

2008 — **Diploma course: Geographic Information Systems**
CEC, EAFIT University ♀ Medellín, Colombia

2007 — **Diploma course: Remotely sensed image processing**
CEC, EAFIT University ♀ Medellín, Colombia

2005 — **GIS for urban planning**
Undergraduate course, Urban and Regional Planning School, Universidad Nacional de Colombia.
♀ Medellín, Colombia

2005 — **Photo-geology**
Undergraduate course, Faculty of Mines, Universidad Nacional de Colombia.
♀ Medellín, Colombia

2004 — **Introduction to GIS**
Diploma course, Geosciences Shcool, Universidad Nacional de Colombia.
♀ Medellín, Colombia

2004 — **Hidromorphometric and geostatistic applications with ArcInfo 8.2**
Diploma course, Department of Hydraulic Engineering and Environment, Universitat Politècnica de València.
♀ Valencia, Spain

2001 — **Introduction to GIS for Environmental Management**
Diploma course, CEC, EAFIT University ♀ Cali, Colombia

💼 PROFESSIONAL EXPERIENCE

2017 — **Project manager**
Innovación, EAFIT University, Project: *Geocoding and analysis of community and alternative media in Bogotá.*
♀ Bogotá, Colombia
• Project manager.
• Exploratory spatial data analysis and map production.
• Report writing and presentation.

2017 — **Geospatial team leader**
Innovación, EAFIT University, Project: *Study for Envigado municipality about economic vocation, tourism, decent work, and economic development policies.*
♀ Envigado, Colombia
• Geospatial data integration for socioeconomic characterization.
• Land cover classification from aerial images.
• Business hotspots identification and accessibility analysis.

2017
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2016 — **Geospatial consultant**
Innovación, EAFIT University, Project: *Ubitag model data geocoding.*
♀ Medellín, Colombia
• Data geocoding and spatial database design.
• Webmap design and deployment with ArcGIS Online.

2016

Geospatial team leader
Innovación, EAFIT University, Project: *Monitoring and assessment system for the education parks and citadeles network of the Department of Antioquia.*

📍 Medellín, Colombia

- Service area analysis and map production.
- Project management assistant.

2015

Data leader
Innovación, EAFIT University, Project: *Network of peace, development and reconciliation regional observatories, pilot chapters: Guaviare and Caquetá (Colombia).*

📍 Bogotá, Colombia

- Coordination of access to information at the local level.
- Report design and production for pilot regions.

2015

Geospatial analyst
Innovación, EAFIT University, Project: *Spatial study of economic, commercial and industrial strengths of Laureles-Estadio Commune, Medellín.*

📍 Medellín, Colombia

- Business hotspots identification and accessibility analysis.
- Geospatial data integration and analysis.
- Map production.

2015

Environmental consultant
Instituto de Investigaciones Biológicas Alexander Von Humboldt, Project: *Adaptation Fund, Wetlands component.*

📍 Bogotá, Colombia

- National wetland transformation analysis using geospatial data.
- Support to the design of the Colombian wetland classification
- system on geomorphology.
- Identification of wetlands functional boundary from geomorphologic data.

2014

Geospatial consultant
RiSE Group, EAFIT University, Project: *UN-Habitat's City Prosperity Index (CPI) Methodology.*

📍 Medellín, Colombia

- Selection and definition of indicators with a spatial dimension.
- Spatial data processing for pilot CPI in Medellín.
- Report writing.

2013

Geospatial analyst
Innovación, EAFIT University, Project: *Spatial study of economic, commercial and industrial strengths of Commune 14, Medellín.*

📍 Medellín, Colombia

- Business hotspots identification and accessibility analysis.
- Geospatial data integration and analysis.
- Map production.

2013
|
2012

Geospatial team leader
CICE, EAFIT University, Project: *Definition of strategic planning criteria for territorial development in the Urabá region, Antioquia Department, Colombia.*

📍 Medellín, Colombia

- Data integration, geoprocessing and spatial data analysis.
- Map production and report writing.

2011 | 2010

GIS team leader

CICE, EAFIT University, Project: *BIO 2030, Master plan Medellín - Aburrá Valley.*

📍 Medellín, Colombia

- Data integration from different sources.
- Geoprocessing and spatial analysis.
- Geodatabase design and implementation.
- Map production.
- Support to urban planning recommendations.

2008

GIS team leader

Idea-UN, National University of Colombia, Project: *Carrying capacity estimator for the Envigado municipality Zone 10: Santa Catalina and Escobero.*

📍 Envigado, Colombia

- Geoprocessing and data integration from different sources.
- Support with spatial data for mathematical modeling.
- Support to the project managament.
- Report writing and presentation.

2007 | 2006

GIS team leader

Geosciences School, National University of Colombia, Project: *Aburrá river watershed management plan.*

📍 Medellín, Colombia

- Data integration from different sources.
- Geoprocessing and spatial analysis.
- Geodatabase design and implementation.
- Map production.
- Support to land use recommendations with geospatial analysis.

2006

GIS team leader

Architecture Faculty, National University of Colombia, Project: *Revision of the Itagüí municipality's land management plan.*

📍 Medellín, Colombia

- Data integration from different sources.
- Geoprocessing and spatial analysis.
- Geodatabase design and implementation.
- Map production.

2006 | 2005

GIS team leader

Geosciences School, National University of Colombia, Projects: *Studies for the regulation of use of the Doña María creek waters, and Updating of Medellin city's Center-Eastern Zone stream network.*

📍 Medellín, Colombia

- Field data digitalization.
- Geodatabase design and implementation.
- Map production.

2005

Geologist and GIS leader

Proingecon Ltda, Project: *Geodatabase for the mining cadastre of Medellín City.*

📍 Medellín, Colombia

- Field data digitalization.
- Geodatabase design and implementation.
- Map production and report writing.

2004

GIS analyst
Faculty of Mines, National University of Colombia, Projects: *CO concentration on air and noise intensity in downtown Medellin, Assessment of groundwater potential of Santa Fe de Antioquia, Sopetrán, San Jerónimo, Olaya and Liborina municipalities, and Identification, classification, and characterization of hydrogeologic features of wetlands and assessment of recharge zones and their relation to geology and the stream network of Envigado municipality.*

📍 Medellín, Colombia

• Field data digitalization.
• Geoprocessing and spatial data integration and analysis.
• Map production.

2003

Field coordinator
Department of Cartographic Engineering, Geodesy and Photogrammetry, Polytechnique University of Valencia, Project: *Analysis of the Valencian mountains visitor profile.*

📍 Valencia, Spain

2003

GIS and Remote Sensing analyst
Faculty of Mines, National University of Colombia, Projects: *Fluvial, coastal and deltaic dynamics of Canal del Dique's delta; and Design of the methodology for the formulation of the integral land management plans of micro-watersheds and its application to the Iguaná creek lower watershed.*

📍 Medellín, Colombia

• Field data digitalization.
• Updating land cover maps from remote sensing imagery.
• Geoprocessing and spatial data integration and analysis.
• Map production.

2002

GIS analyst
Integral S.A., Project: *Caroní river (Venezuela) master plan.*

📍 Medellín, Colombia

• Geoprocessing and spatial data integration.
• Map production.

1999 | 1998

Geologist
Idea-UN, National University of Colombia, Project: *Assessment of geologic, geomorphologic and hydrologic hazards, and geotecnical characterization of 33 urban areas in the Huila Department, Colombia.*

📍 Huila, Colombia

• Field work and discussion with local authorities.
• Data integration and analysis.
• Report writing.

1999 | 1998

GIS analyst
CIDI, UPB, Project: *Systematization and digitalization of high risk prone areas census of Medellín city - SIMPAD UPB agreement.*

📍 Medellín, Colombia

• Field data digitalization.
• Geodatabase implmentation.

1997 ● **Junior geologist**
Idea-UN, National University of Colombia, Project: *Pre-assessment of the Ciénaga Grande de Magangué and the Ceibal-Pascuala wetland complex environmental management plans.*

 Magangué, Colombia
• Wetland and stream connections mapping from field work and aerial photointerpretation.
• Geomorphologic mapping and fluvial dynamics analysis.

📄 PUBLICATIONS

Patino, J. E. (2020). Analyzing long-term availability of urban green space by socioeconomic status in Medellin, Colombia, using open data and tools. In 2020 IEEE Latin American GRSS & ISPRS Remote Sensing Conference (LAGIRS) (pp. 87–92). Santiago, Chile: IEEE. https://doi.org/10.1109/LAGIRS48042.2020.9165672

Duque, J. C., Lozano-Gracia, N., **Patino, J. E.**, & Cadavid, P. R. (2020). Institutional fragmentation and metropolitan coordination in Latin American cities: Are there links with city productivity? Regional Science Policy & Practice, 1–33. https://doi.org/10.1111/rsp3.12314

Gómez, J. A.,**Patiño, J. E.**, Duque, J. C., & Passos, S. (2020). Spatiotemporal Modeling of Urban Growth Using Machine Learning. Remote Sensing, 12(1), 109. https://doi.org/10.3390/rs12010109

Duque, J. C., Lozano-Gracia, N., **Patino, J. E.**, Restrepo, P., & Velasquez, W. A. (2019). Spatiotemporal Dynamics of Urban Growth in Latin American Cities: An Analysis Using Nighttime Lights Imagery. Landscape and Urban Planning, 191(August), 103640. https://doi.org/10.1596/1813-9450-8702

Ricaurte, L. F., **Patiño, J. E**., Zambrano, D. F. R., Arias-G, J. C., Acevedo, O., Aponte, C., … Junk, W. J. (2019). A Classification System for Colombian Wetlands: an Essential Step Forward in Open Environmental Policy-Making. Wetlands. https://doi.org/10.1007/s13157-019-01149-8

Duque, J. C., Lozano-Gracia, N., **Patino, J. E.**, & Restrepo, P. (2019). Institutional Fragmentation and Metropolitan Coordination in Latin American Cities: What Consequences for Productivity and Growth? The World Bank. https://doi.org/10.1596/1813-9450-8696

Duque, J. C., Lozano-Gracia, N., **Patino, J. E.**, & Restrepo, P. (2019). Urban Form and Productivity: What Is the Shape of Latin American Cities? The World Bank. https://doi.org/10.1596/1813-9450-8697

Duque, J. C., Lozano-Gracia, N., **Patino, J. E.**, Restrepo, P., & Velasquez, W. A. (2019). Spatio-Temporal Dynamics of Urban Growth in Latin American Cities: An Analysis Using Nighttime Lights Imagery. The World Bank. https://doi.org/10.1596/1813-9450-8702

Duque, J.C., **Patiño, J. E**., Restrepo M., Daniel E., & López Uribe, Mauricio (2018). Identificación de municipios a intervenir en un escenario de pos acuerdo. In: Contribuciones de la Universidad a la Agenda de la Habana. pp 195-234. Ed. Universidad EAFIT. ISBN: 978-958-720-555-8.

Patino, Jorge E. (2017). Book review: Emilio Chuvieco, Fundamentals of satellite remote sensing: An environmental approach. 2nd ed. CRC Res: Boca Raton, FL, 2016. 468 pp. ISBN 9781498728058. $ 79.96 (Hardback), 69.97 (eBook). Environment and Planning B: Urban Analytics and City Science. https://doi.org/10.1177/2399808317711988.

Arribas-Bel, Daniel, **Patino, Jorge E.** and Duque, Juan C. (2017) Remote sensing-based measurement of Living Environment deprivation: Improving classical approaches with machine learning. PLoS One, 12(5), e0176684. https://doi.org/10.1371/journal.pone.0176684

Duque, J. C., **Patino, J. E.**, & Betancourt, A. (2017). Exploring the Potential of Machine Learning for Automatic Slum Identification from VHR Imagery. Remote Sensing, 9(9), 895. https://doi.org/10.3390/ rs9090895

Betancur-Vargas, T., García-Giraldo, D. A., Vélez-Duque, A. J., Gómez, A. M., Flórez-Ayala, C.,**Patiño, J.**, & Ortiz-Tamayo, J. Á. (2017). Aguas subterráneas, humedales y servicios ecosistémicos en Colombia. Biota Colombiana, 18(1), 1–28. https://doi.org/10.21068/c2017.v18n01a1

Duque, Juan C., **Patino, Jorge E.** and Betancourt, Alejandro (2016) Exploring the potential of machine learning for automatic slum identification from VHR imagery. CAF working paper No. 2016/13.

Patiño, J. E. (2016). Análisis espacial cuantitativo de la transformación de humedales continentales en Colombia. Biota Colombiana, 16(3), 86–105. http://doi.org/10.21068/c2016s01a05.

Patiño, Jorge E., Estupiñán Suárez, Lina M. and Úrsula Jaramillo (2016). Humedales y actividades antropogénicas. In: Gómez, M.F., Moreno, L.A., Andrade, G.I. y Rueda, C. (Eds.) Biodiversidad 2015, Estado y tendencias de la biodiversidad continental de Colombia. Instituto Alexander von Humboldt. Bogotá D.C., Colombia. Index card: 205.

Patino, Jorge E. and Estupinan-Suarez, Lina M. (2016). Hotspots of wetland area loss in Colombia. Wetlands, doi:10.1007/s13157-016-0806-z.

Patiño Quinchía, Jorge Eduardo (2016). Cityscape, poverty and crime: A quantitative assessment using VHR imagery. Revista de Teledetección, [S.l.]. (46): 165-170.

Patiño, Jorge E. (2016). Delimitación de humedales a partir de criterios geomorfológicos, Capítulo VI. Tras las huellas del agua. In: Cortés-Duque, J. y L. M. Estupiñán-Suárez. (Eds.). (2016). Las huellas del agua. Propuesta metodológica para identificar y comprender el límite de los humedales de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. Fondo Adaptación. Bogotá D. C., Colombia. 340 pp.

Estupiñán Suárez, Lina M., Arias García, Juan Carlos, Acevedo Amaya, Oscar Javier, **Patiño, Jorge E.**, Prieto Cruz, Adriana, Restrepo Zambrano, Diego F., Rojas, Sergio, Rudas Lleras, Agustín (2016). Revisión de Información disponible, Capítulo IV. In: Cortés-Duque, J. y L. M. Estupiñán-Suárez. (Eds.). (2016). Las huellas del agua. Propuesta metodológica para identificar y comprender el límite de los humedales de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. Fondo Adaptación. Bogotá D. C., Colombia. 340 pp.

Patino, Jorge E., Estupiñán-Suárez, Lina (2016). La extensión de las transformaciones. In: Jaramillo, Ú., Cortés-Duque, J., & Flórez, C. (Eds.). (2016). Colombia Anfibia. Un país de humedales. Volumen II. Bogota D.C., Colombia: Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. 116 pp.

Ricaurte, Luisa Fernanda , **Patiño, Jorge E.**, Arias-G, Juan Carlos, Acevedo, Óscar, Restrepo, Diego, Jaramillo Villa, Úrsula, Flórez-Ayala, Carlos, Estupiñán-Suárez, Lina, Aponte, César, Rojas, Sergio, Vélez, Jaime Ignacio, Duque, Santiago, Núñez-Avellaneda, Marcela, Lasso, Carlos, Correa, Iván Darío, Rodríguez Rodríguez, Alexandra, Duque Nivia, Andrés Alberto, Restrepo, Santiago, Cleef, Antoine, Manrique, Oscar, Moreno, Evelyn Paola, Vilardy Quiroga, Sandra Patricia, Finlayson, Max, Junk, Wolfgang (2015). Tipos de humedales de Colombia - Sistema de clasificación de humedales. In: Jaramillo, Ú., Cortés-Duque, J., & Flórez, C. (Eds.). (2015). Colombia Anfibia. Un país de humedales. Volumen 1. Bogota D.C., Colombia: Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. 140 pp.

Castiblanco Sierra, Miguel Ángel, Pérez Cubides, Francisco Javier, Estupiñán-Suárez, Lina, Rojas, Sergio, **Patino, Jorge E.** (2015). Las geoformas de un complejo cenagoso. In: Jaramillo, Ú., Cortés-Duque, J., & Flórez, C. (Eds.). (2015). Colombia Anfibia. Un país de humedales. Volumen 1. Bogota D.C., Colombia: Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. 140 pp.

Patino, Jorge E., Rojas, Sergio, Estupiñán-Suárez, Lina, Flórez-Ayala, Carlos (2015). Las planicies inundables - Las geoformas de la Sierra y la Ciénaga. In: Jaramillo, Ú., Cortés-Duque, J., & Flórez, C. (Eds.). (2015). Colombia Anfibia. Un país de humedales. Volumen 1. Bogota D.C., Colombia: Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. 140 pp.

Duque, J. C., **Patino, J. E.**, Ruiz, L. A., & Pardo-Pascual, J. E. (2015). Measuring intra-urban poverty using land cover and texture metrics derived from remote sensing data. Landscape and Urban Planning, (135): 11–21.

Patino, J. E., Duque, J. C., Pardo-Pascual, J. E, Ruiz, L. A. (2014). "Using remote sensing to assess the relationship between crime and the urban layout". Applied Geography, (55): 48-60.

Duque, J. C., **Patino, J. E.**, Ruiz, L. A., Pardo-Pascual, J. E. (2013). "Quantifying slumness with remote sensing data". Documento de trabajo CIEF, Universidad EAFIT, No. 13-23.

Duque, J. C., Gutiérrez, D., Betancourt A., **Patino, J. E.** (2013). "Análisis de la distribución espacial de la demanda de agua potable como efecto de políticas de ahorro en su consumo en el Área Metropolitana del Valle de Aburrá". Documento de trabajo CIEF, Universidad EAFIT, No. 13-22.

Patino, J. E. and Duque, J.C. (2013). "A review of regional science applications of satellite remote sensing in urban settings". Computers, Environment and Urban Systems, (37): 1-17. (http:// www.sciencedirect.com/science/article/pii/S0198971512000567).

Patiño, J. E. (2012) "The potential of satellite remote sensing as a tool for urban and enviromental planning in the Aburrá Valley". In: Hermelin, M., Echeverri, A., and Giraldo, J. (ed) (2012). Medellín environment, urbanismo, society. Chapter 1 Environment, article No. 5. EAFIT University (e-book ISBN: 9789587201147).

Patiño, J.E. (2010). "Potencial de las imágenes satelitales como herramienta para la planificación urbana y ambiental en el valle de Aburrá". In: Hermelin, M., Echeverri, A. y Giraldo, J. (ed.) (2010). Medellín, Medio Ambiente, Urbanismo, Sociedad. Medellín: Fondo Editorial Universidad EAFIT. pp 112 – 127.

Acosta, S. and **Patiño, J. E.** (2009). "Alguien nos observa". El Eafitense. No. 99: pp. 88 – 91. ISSN 0124-3624.

Bedoya V., J, Botero, N. L., Manotas, E. C., Giraldo, A., Gallego, L. M. and **Patiño, J. E.** (2005). "Community Noise and CO Levels in Downtown Medellín". Conference proceedings 98th Annual Meeting and Exhibition of the Air and Waste Management Association AWMA. Minneapolis: 21-24 Junio, 2005. Abstract # 05-A-530-AWMA; AB-5a. Current Noise Issues, 2005. ISBN 0-923204-88-1.

Patiño, J. E., Montoya, J. J., Hermelín, M. and Botero, V. (2004). "Zonificación geomorfológica de microcuencas: una herramienta útil para análisis hidrológico". Boletín de Ciencias de La Tierra. No. 16: pp. 23 – 36. ISSN 0120-3630.

Botero F., V., Smith, R. and **Patiño, J. E.** (2004). "Zonificación del uso de microcuencas urbanas como base para el ordenamiento territorial". Conference proceedings XXI Congreso Latinoamericano de Hidráulica, Sao Pedro, 2004.

Botero, V., Smith, R. and **Patiño, J.** (2004). "Zonificación de Microcuencas Urbanas". Conference proceedings IV Foro Centroamericano y del Caribe de Cuencas Hidrográficas. La Habana, 2004.

Botero, V., Smith, R. and **Patiño, J. E.** (2004). "Metodología para la Zonificación del uso de microcuencas urbanas". Conference proceedings II Simposio Internacional sobre Gestión Integral del Agua y el Medio Ambiente. Barquisimeto, 2004.

Botero, V., Smith, R. and **Patiño, J. E.** (2004). "Metodología para la Zonificación del uso de microcuencas urbanas". Conference proceedings XVI Seminario Nacional de Hidráulica e

Hidrología. Armenia, 2004.

Vélez, J. I., Rave, C., Caballero, H., Botero , V., **Patiño, J.**,and Escobar, D. (2003). "Evaluación de Riesgos en Cuencas Urbanas". Avances En Recursos Hidráulicos. No. 10: pp. 17-32, 2003. ISSN 0121-5701.

Smith, R., Botero, V. and **Patiño, J.** (2003). "Zonificación de microcuencas urbanas para efectos de ordenamiento territorial". Avances En Recursos Hidráulicos. No. 10: pp. 33 – 46. ISSN 0121-5701.

Botero, V., Caballero, H., Montes, L. F and **Patiño, J. E.** (2003) "La zonificación morfodinámica como insumo en la evaluación de la amenaza por movimientos en masa: una propuesta metodológica". Resúmenes IX Congreso Colombiano de Geología. Medellín, Colombia. July 30 - August 1 2003.

Vélez, J. I., Rave, C., Caballero, H., Botero, V., **Patiño, J.**, Escobar, D. and Smith, R. (2003) "Evaluación de Riesgos en Cuencas Urbanas". Conference proceedings III Congreso Latinoamericano de Manejo de Cuencas Hidrográficas. Arequipa, Perú. June 9 – 13 2003.