

# **Timothy Boucher**

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## **Biography**

Tim Boucher is a conservation geographer at The Nature Conservancy. Working in international conservation science for the past 17 years, he has used remote sensing and geographic information science to assess habitat condition, protection, and threats. He has conducted field assessments on six continents, applying spatial analyses to a wide range of conservation issues ranging from marine spawning aggregations in Belize to global land-cover analysis.

In 2012, he investigated the linkages between conservation and human well-being. This research assessed the condition of grassland conservation projects that have socio-economic components. Using satellite data, he tested whether the conservation action has resulted in improved or stabilized grassland condition by comparing the conservation area against control sites. This work was conducted in South Africa, Mongolia, Ecuador and Kenya.

He is also working on the Dow Collaboration – one that will help businesses incorporate the value of nature into their decision-making. Specifically, he is investigating the effects of climate change on coastal habitats and their value on mitigating natural hazards.

Recently, Tim led the Natural Infrastructure Theme in Central Science, which examined where and how natural solutions may be effective and economical alongside or instead of “gray” solutions (e.g., levees, sea walls), with the goal of contributing the evidence base that can inform investments made by communities, governments and industry.

Currently, Tim is now working on developing novel, scientifically credible and cost effective ways to provide monitoring information for conservation project and programs.

Amongst his many publications, Tim is a co-author and the senior geographer for the Atlas of Global Conservation, and responsible for publishing the maps online. Tim is a South African native, has a Master’s degree in Geography from the University of Maryland, enjoys photography, hiking, and is an avid birder with an enviable life list.

## **Professional Summary**

Timothy Boucher is a Senior Conservation Geographer at The Nature Conservancy. An accomplished spatial analyst, he is skilled at achieving and communicating scientifically credible results using advanced methodologies and developing new techniques. He has project management and supervisory experience. He is comfortable working in harsh conditions and at ease with different cultures.

### **Qualifications**

- Highly proficient in most remote sensing and GIS technologies – including ERDAS and ESRI products
- Proven analytical skills – from project design to final product, including finding innovative ways to solve complex problems
- Experience in deriving indices to describe global to local habitat condition
- Experience in working with an array of remote sensing data at scales from drone to satellite; highly proficient in time series analysis
- Proven publication record in conservation field

### **Experience**

Senior Conservation Geographer - The Nature Conservancy – 2010 to Present

- Helped with recording soundscapes for 40 sites in a remote PNG forest.
- Developed a methodology using Google Earth Engine to analyze actual tree cover for 35 US cities, as part of a global study.
- Projected global protected area coverage using two scenarios for 2050 – business as usual and aggressive conservation activities.
- Supervised a team of three scientists and mentored a NatureNet Fellow.
- Science lead for Natural Infrastructure Theme
- Led the Camboriu (Brazil) Waterfund Land-cover Analysis
- CIAT-CGIAR WLE Innovation Fund Grant (Multi-institution collaboration for mitigation of sedimentation in the primary watershed of Nairobi)
- Dow Collaboration (assessing ecosystem services and resilience)
- Remote Sensing analysis for Conservation and Poverty Reduction Project (Mongolia, South Africa, Kenya, Ecuador, and Nebraska, USA)
- Establishing a Grassland Habitat Monitoring Methodology (global)
- Moore-Google-TNC Global Conservation Atlas collaboration – including Atlas web mapping tool

Conservation Information Manager - The Nature Conservancy – 2005 to 2009

- Lead geographer for Global Conservation Atlas
- Lead for publication of online maps
- Lead for biological assessment for site in the Matthews Range, Kenya
- Habitat Assessment Team geographer – Grassland and Forest Goal Analysis

Spatial Analyst – The Nature Conservancy – 2001 to 2005

- Global Priorities Group geographer – TNC 2015 Goal Analysis
- Various climate change remote sensing projects in Brazil and Peru

Landscape Ecology Assistant – The Nature Conservancy – 1998-2001

- Remote sensing projects in various geographies – including Yunan, China and Noel Kempff National Park, Bolivia

### **Education**

Master's Degree in Geography from the University of Maryland –2002

Thesis title: Threatened Ecoregions of Central America: an analysis of Central American Ecoregions by Landover, Protected Areas, and Population Density Distribution

### **Publications**

McDonald, R.I., Weber, K.F., Padowski, J., **Boucher, T.**, and D. Shemie. 2016. Estimating watershed degradation over the past century and its impact on water treatment costs for the world's large cities. *PNAS* (in press).

Reddy, S. M., Guannel, G., Griffin, R., Faries, J., **Boucher, T.**, Thompson, M., Brenner, J., Bernhardt, J., Vertutes, G., Wood, S., Silver, J., Toft, J., Rodgers, A., Maas, A., and J.L. DiMuro. 2015. Evaluating the role of coastal habitats and sea-level rise in hurricane risk mitigation: An ecological economic assessment method and application to a business decision. *Integrated Environmental Assessment and Management*.

Fisher, J.R., **Boucher, T.M.**, Attwood, S.K. and Kareiva, P., 2013. How Do We Know an Agricultural System is Sustainable? [www.nature.org/science-in-action/science-features/ag-sustainability-metrics.pdf](http://www.nature.org/science-in-action/science-features/ag-sustainability-metrics.pdf)

McDonald, R. I., Weber, K., Padowski, J., Flörke, M., Schneider, C., Green, P. A., **Boucher, T. M.**, Grill, G., and M. Montgomery. 2014. Water on an urban planet: Urbanization and the reach of urban water infrastructure. *Global Environmental Change* 27:96-105.

Sayre, R., Comer, P., Hak, J., Josse, C., Bow, J., Warner, H., Larwanou, M., Kelbessa, E., Bekele, T., Kehl, H., Amena, R., Andriamasimanana, R., Ba, T., Benson, L., **Boucher, T.**, Brown, M., Cress, J., Dassering, O., Friesen, B., Gachathi, F., Houcine, S., Keita, M., Khamala, E., Marangu, D., Mokuu, F., Morou, B., Mucina, L., Mugisha, S., Mwavu, E., Rutherford, M., Sanou, P., Syampungani, S., Tomor, B., Vall, A., Weghe, J Vande., Wangui, E. 2013. A new map of standardized terrestrial ecosystems of Africa. *African Geographical Review*. <http://doi.org/ISBN> 978-0-89291-275-9

Leisher, C., Touval, J., Hess, S. M., **Boucher, T. M.** and L. Reymondin. 2013. Land and Forest Degradation inside Protected Areas in Latin America. *Diversity*. 5(4):779-795.

Oakleaf, J. R., Kennedy, C. M., **Boucher, T.** and J. Kiesecker. 2013. Tailoring Global Data to Guide Corporate Investments in Biodiversity, Environmental Assessments

and Sustainability. *Sustainability* 5(10):4444-4460.

**Boucher, T.**, Spalding, M. and C. Revenga. 2013. The Role and Trends of Protected Areas in Conservation. Encyclopedia of Biodiversity, 2nd Edition. Elsevier, Cambridge, UK.

Sanjayan, M., Samberg, L. H., **Boucher, T.**, and J. Newby. 2012. Intact faunal assemblages in the modern era. *Conservation Biology* 26(4):724-730.

Butchart, S., Scharlemann, J., Evans, M., Quader, S., Aricò, S., Arinaitwe, J., Balman, M., Bennun, L., Bertzky, B., Besancon, C., **Boucher, T.**, Brooks, T., Burfield I., Burgess. N., Chan, S., Clay, R., Crosby, M., Dutson, G., Fishpool, L., Foster, M., Lameroux, J., and S. Woodley. 2012 Protecting Important Sites for Biodiversity Contributes to Meeting Global Conservation Targets. *PLoS ONE* 7(3):e32529.

Goldman-Benner, R., Benitez, S., **Boucher, T.**, Calvache, A., Daily, G., Karieva, P. and A. Ramos. 2012. Water funds and payments for ecosystem services: practice learns from theory and theory can learn from practice. *Oryx* 46(1):55 – 63.

Leisher, C., Hess, P., **Boucher, T.**, van Beukering, P. and M. Sanjayan. 2012. Measuring the Impacts of Community-based Grasslands Management in Mongolia's Gobi. *PLoS ONE* 7(2):e30991.

McDonald, R. M. and **T. M. Boucher.** 2011. Global development and the future of the protected area strategy. *Biological Conservation* 144:383–392.

Rodríguez, J.P., Rodríguez-Clark, K.M., Baillie, J.E., Ash, N., Benson, J., **Boucher, T.**, Brown, C., Burgess, N.D., Collen, B., Jennings, M. and Keith, D.A., 2011. Establishing IUCN red list criteria for threatened ecosystems. *Conservation Biology*, 25(1), pp.21-29.

Leisher, C., Brouwer, R., **Boucher, T.**, Vogelij B., and B. Bainbridge. 2011. Striking a Balance: Socioeconomic Development and Conservation in Grassland through Community-Based Zoning. *PLoS ONE* 6(12), 1-10.

Hoekstra, J., Molnar, J., Jennings, M., Revenga, C, Spalding, **Boucher, T.**, Robertson, J., and T. Heibal. 2010. The Atlas of Global Conservation - Changes, Challenges, and Opportunities to Make a Difference. University of California Press.

Parr, M.J., Bennun, L., Boucher, T., Brooks, T., Chutas, C.A., Dinerstein, E., Drummond, G.M., Mittermeier, R. and Molur, S., 2009. Why we should aim for zero extinction. *Trends Ecol. Evol.*, 24.

Wiens, J.A., Anderson, M.G. and **Boucher, T.**, 2008. Land cover and conservation: from protected areas to landscapes. *Campbell JC, Jones KB, Smith JH et al*, pp.153-168.

Stolton, S., **Boucher, T.**, Dudley, N., Hoekstra, J., Maxted, N. and Kell, S., 2008. Ecoregions with crop wild relatives are less well protected. *Biodiversity*, 9(1-2), pp.52-55.

Jennings, M.D., Hoekstra, J., Higgins, J. and **Boucher, T.**, 2008. A comparative measure of biodiversity based on species composition. *Biodiversity and Conservation*, 17(4), pp.833-840.

Kareiva, P., Watts, S., McDonald R. M. and **T. Boucher.** 2007. Domesticated nature: shaping landscapes and ecosystems for human welfare. *Science* 316:1866-1869.

Spalding, M., Kelleher, G., **Boucher, T.**, Fish, L. 2006. How protected are coral reefs? *Science* 314:758-758.

Hoekstra, J., **Boucher T.**, Ricketts, T. and C. Roberts. 2005. Confronting a biome crisis: global disparities of habitat loss and protection. *Ecology Letters* 8:23-29.

Ricketts, T., Dinerstein, E., **Boucher, T. M.**, Brooks, T., Butchart, S., Hoffman, M., Lamoreux, J., Morrison, J., Parr, M., Pilgrim, J., Rodrigues, A., Sechrest, W., Wallace, G., Berlin, K., Bielby, J., Burgess, N., Church, D., Cox, N., Knox, D., Loucks, C., Luck, G., Master, L., Moore, R., Naidoo R., Ridgley, R., Schatz, S., Shire, G., Strand, H., Wettengel, W. and E. Wikramanayake. 2005. Pinpointing and preventing imminent extinctions. *Proceedings of the National Academy of Sciences* 51:18497-18501.

Young, B.E., Stuart, S.N., Chanson, J.S., Cox, N.A. and **Boucher, T.M.**, 2005. Disappearing jewels: the status of new world amphibians. *Appl Herpetol*, 2, pp.429-435.

Brooks, T.M., Bakarr, M.I., **Boucher, T.**, Da Fonseca, G.A., Hilton-Taylor, C., Hoekstra, J.M., Moritz, T., Olivieri, S., Parrish, J., Pressey, R.L. and Rodrigues, A.S., 2004. Coverage provided by the global protected-area system: Is it enough?. *BioScience*, 54(12), pp.1081-1091.

Calderón, R., **Boucher, T.**, Bryer, M., Sotomayor, L., Kappelle, M., Charles, A., Cotto, A., Lehnhoff, A., Hammel, B. and Miller, B., 2004. Setting biodiversity conservation priorities in Central America: Action site selection for the development of a first portfolio. *Nature Conservancy*.

## Reports

Measures Guidebook for Flood and Storm Risk Reduction. North America Risk Reduction and Resilience Priority. 2016. Authored section on Core Metrics - Coastal Habitat Extent and Connectivity.

Kroeger T, C Klemz, T Boucher, JRB Fisher, D Shemie, P Petry, E Blainski, J Deneddy-Frank, K Dacol, L Garbossa, R Comparim Santos and A Targa Cavassani. 2016. Estimating the return on investment of watershed conservation: Best practices approach and case study for the Rio Camboriú watershed, Santa Catarina, Brazil. Manuscript in preparation.

West Papua - Lower Mamberamo Rapid Assessment Program - Report of 2007 field investigation and remotely sensed imagery analysis of condition of habitat and biota (for Conservation International).

Papua New Guinea, Adelberts Mountains - Report of 2006 field-based vegetation classification and remotely sensed imagery analysis.

Establishing Baselines for Forestry Carbon Projects Using Change Detection in Rio de Janeiro State - 2002 report of field-based assessment and remotely sensed imagery analysis of forested areas

Establishing Baselines for Forestry Carbon Projects Using Change Detection in Sao Paulo State - 2002 report of field-based assessment and remotely sensed imagery analysis of forested areas

Classifying Brazilian Araucaria Forests 2001 report of field-based assessment and remotely sensed imagery analysis of remaining forest fragments of southern Santa Catarina State of Brazil

Establishing Baselines for Forestry Carbon Projects Using Change Detection in Santa Catarina, Brazil - 2001 report of field-based assessment and remotely sensed imagery analysis of forested areas

Estimating Forest Biomass to Implement the Kyoto Protocol - 2001 global assessment based on satellite imagery.

Mapping Land Use and Natural Vegetation for Islands of Jamaica, Puerto Rico and Dominica - 2000 report to USAID.

Map of Central America Landcover Types - 1998 report for the Central American Commission on Environment and Development.

### **Training (provided to others)**

Remote Sensing – 2014 - Grassland monitoring workshop, Colorado.

GIS Training - 2000, Quito, Ecuador - for TNC Ecuador partner organization CLIRSEN (Center for Integrated Surveys of Natural Resources by Remote Sensing)

GIS/Remote Sensing Workshop - 2000, Miami, Florida - Latin America and Caribbean Division of the Nature Conservancy

GIS Workshop - 1999, Topes de Collante, Cuba - Annual Meeting of the Society for the Conservation and Study of Caribbean Birds

### **Presentations**

AAG San Francisco - Simple yet powerful Remote Sensing in the Cloud (2016)

Utah Bird Festival – Keynote and Featured Guest (2014)

TNC Legacy Club Meeting (2014)

TNC All Science Conference - Plenary on Remote Sensing (2013).

TNC Board Trustees Presentation (2013).

MAC URISA Conference - Keynote (2012).

ICCB Auckland, New Zealand – Symposium on Poverty and Conservation (2011)

Society for Conservation Biology - Global Poverty Distribution - Paper session presentation, Port Elizabeth, South Africa (2007).

Society for Conservation Biology - Effective Conservation - Paper session presentation, San Jose, California (2006).

Society for Conservation Biology - Crisis Ecoregions - Poster presentation, Brasilia, Brazil (2005).

Durban World Parks Congress - Global Habitat Assessment. Session presentation (2003).