



## Ecosystem Markets: Forest Carbon

This EnviroAtlas Marketplace map displays the location of land-based carbon offset markets as of 2014. Polygons for projects represent the area of primary impact. Polygons for markets represent the entire region that shares market infrastructure and rules or a larger program encompassing many smaller projects. Points represent the centroids of forest carbon markets and latitude/longitude locations of forest carbon projects with the exception of national markets where points represent administrative headquarters locations.

### Why are carbon markets important?

Healthy ecosystems provide us with a wide range of services, such as reliable clean water, climate regulation, and productive soils, and they underpin many of our basic needs, economic processes, and cultural or spiritual values. However, except for primary goods like food, fuel, and fiber, most of these ecosystem services do not have widely-accepted, tangible market values.<sup>1</sup> As a result, ecosystems continue to decline because protection of ecosystem services is rarely considered in economic decisions. The Millennium Ecosystem Assessment found that >60% of ecosystem services are degraded faster than they can regenerate.<sup>2</sup>

One approach to safeguarding ecosystem services is through incentive mechanisms for conservation, including markets. With ecosystem services markets, companies, communities, and other beneficiaries pay landowners and managers to protect, restore, or mitigate for impacts to ecosystems.<sup>3</sup> Ecosystem market mechanisms range from simple contracts between a buyer and seller to sophisticated markets for environmental credits representing delivery of an ecosystem service. All of these mechanisms share the common practice that parties will restore or maintain the delivery of an ecosystem service or group of services in exchange for financial compensation.

Typically, markets focus on a single ecosystem service or asset. The most well-established markets in the United States represent forest carbon sequestration, imperiled species and habitat conservation, wetland and stream conservation, and watershed services. The term ‘market’ here is used somewhat loosely, referring to any initiative or program using a market-based mechanism and resulting in financial compensation for the delivery of ecosystem service assets. For example, a percentage of an industry’s emissions



Photo: Mt. Washington, New Hampshire

requirements may be met with the purchase of forest carbon offsets.<sup>4</sup>

Forest carbon offset transactions may be either voluntary or compliance-driven. The voluntary carbon marketplace encompasses all transactions of carbon offsets that are purchased without participation in an active regulated carbon market. Voluntary demand for carbon offsets is driven by companies and individuals that take responsibility for offsetting their own emissions as well as entities that purchase pre-compliance offsets before emissions reductions are required by regulation.

Voluntary markets co-exist with compliance offset markets driven by mandated caps on greenhouse gas emissions that operate at a significantly larger scale. Compliance carbon markets are marketplaces through which regulated entities obtain and surrender emissions permits (allowances) or offsets in order to meet predetermined regulatory targets.<sup>4</sup> In cap-and-trade programs, participants—often including both emitters and financial intermediaries—are allowed to trade allowances to make a profit from unused allowances or to meet regulatory requirements.

### How can I use this information?

This map is one of a group of Marketplace maps displaying information on ecosystem market size, scope, and activity in the United States. Users can examine this map layer to understand the geographic distribution of ecosystem markets, identify potential market opportunities, and explore markets and projects by asset type, goals, reason for

implementation, exchange mechanism, and intervention. This map can be combined with other EnviroAtlas map layers to provide a context for market activity and analyze the market's contribution to conservation objectives. The Ecosystem Markets: Forest Carbon map may be compared with other Marketplace map layers, such as Enabling Conditions for Ecosystem Markets, for additional detail on market scope and the role of policy and regulation.

### How were the data for this map created?

These data were generated by Ecosystem Marketplace research on carbon markets conducted during 2008–2014. Data were collected via Ecosystem Marketplace surveys and desk research regarding the market coverage areas associated with carbon markets. Market coverage areas were drawn from 2010 U.S. Census national and state boundary layers. Tabular attribute data compiled by Ecosystem Marketplace were standardized, imported into an ArcGIS table, and joined with corresponding spatial records.

### What are the limitations of these data?

EnviroAtlas uses the best data available, but there are still limitations associated with the data. These data originate from the U.S. Army Corps of Engineers Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) database and on responses to Ecosystem Marketplace's annual 'State of the Market' survey of project developers, market and program administrators, brokers, retailers, and other market actors. Wherever possible, responses are checked against credit registries and other third-party sources. However, EnviroAtlas and Ecosystem Marketplace provide geographic data "as is" and make no guarantee or warranty concerning the accuracy of information contained in the geographic data. Users of these data are strongly advised not to use the content of Marketplace data in isolation but to take that information together with other market information to formulate one's own views, interpretations, and opinions. The user is strongly advised to

seek appropriate legal and professional advice before entering into commercial transactions. We recommend that the user become familiarized with the terminology and concepts used in these data.

### How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded.

### Where can I get more information?

Additional information on carbon markets in the United States can be found at Forest Trends' [Ecosystem Marketplace](#). Ecosystem Marketplace also maintains an inventory of forest carbon projects, based on the same dataset used to develop these EnviroAtlas layers but providing additional details, at the [Forest Carbon Portal](#). A selection of resources related to ecosystem valuation, markets, and carbon offsets is listed below, including Forest Trends' primer on ecosystem markets and finance. For additional information on how the data were created, access the metadata for the data layer from the drop down menu on the interactive map table of contents and click again on metadata at the bottom of the metadata summary page for more details. To ask specific questions about this data layer, please contact the [EnviroAtlas Team](#).

### Acknowledgments

EnviroAtlas is a collaborative effort led by EPA. The Marketplace layers were created through a collaborative effort among Ecosystem Marketplace, USDA, and EPA. Data was obtained from Forest Trends' Ecosystem Marketplace. The Marketplace geospatial dataset was compiled by Katherine Sever, Colorado State University. The fact sheet was written by Genevieve Bennett, Ecosystem Marketplace, and Katherine Sever, Colorado State University.

### Selected Publications

1. King, D.M., and M. Mazzotta. 2000. [Ecosystem valuation](#). Accessed March 2016.
  2. Millennium Ecosystem Assessment. 2005. [Ecosystems and human well-being: Synthesis](#). Island Press, Washington, DC.
  3. Forest Trends' Ecosystem Marketplace. 2016. [Atlas of ecosystem markets in the United States](#). Accessed October 2016.
  4. Forest Trends' Ecosystem Marketplace. 2015. [Ecosystem markets and finance: A global primer](#). Accessed March 2016.
- Funk, W. [Constitutional implications of regional CO<sub>2</sub> cap and trade programs: The northeast regional greenhouse gas initiative as a case in point](#). *UCLA Journal of Environmental Law and Policy* 27(2):353–369.
- Goulder, L.H., and A. Schein. 2013. [Carbon taxes vs. cap and trade: A critical review](#). Working Paper 19338, National Bureau of Economic Research, Cambridge, Massachusetts. 38 p.
- New Forests. 2014. [Conservation assets: Forest carbon and mitigation banking](#). New Forests Sector Overview. Accessed March 2016.