Natural Earth Vector

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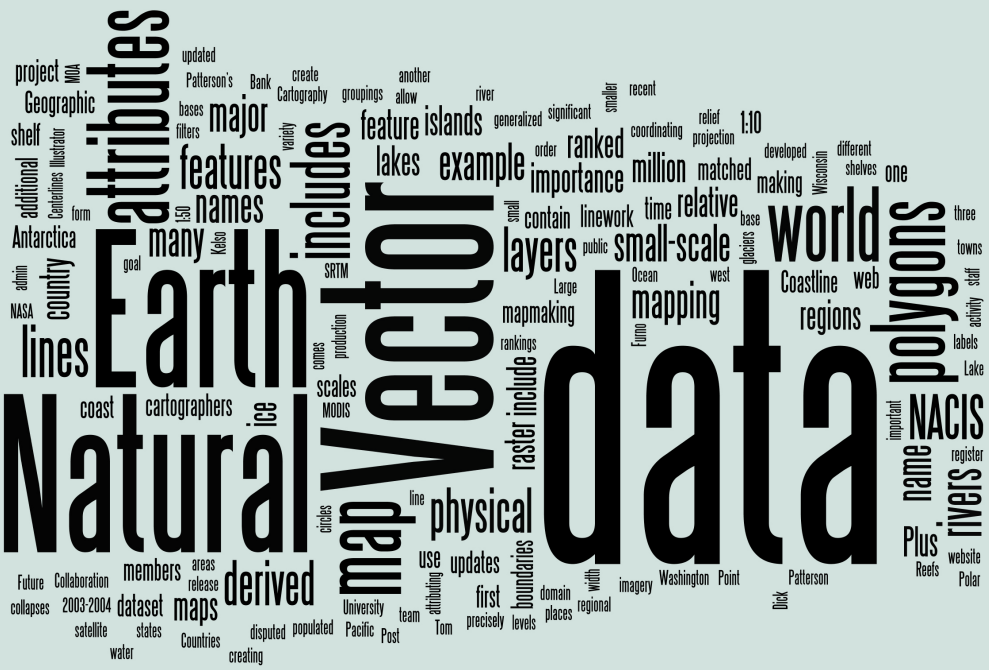
Natural Earth
naturalearthmaps.com



Natural Earth Vector (NEV) is a public domain, vector dataset available at 1:10, 1:50, and 1:110-million scales. At NACIS 2009 in Sacramento, the goal is to give cartographers an off-the shelf solution for creating small-scale world, regional, and country maps.

Natural Earth Vector builds on Tom Patterson's Natural Earth raster data first introduced in 2005. With NACIS backing, we are launching a new website, naturalearthmaps.com, where you can download Natural Earth Vector and updated versions of Natural Earth Raster imagery of Natural Earth I and II raster imagery in perfect registration with the linework. Both political and physical features are included in Natural Earth Vector.

Natural Earth Vector solves a problem that many NACIS members face: finding vector data for making publication-quality small-scale maps. In a time when the web is awash in interactive maps and free, downloadable vector data, such as Digital Chart of the World and VMAP, mapmakers are forced to spend time sifting through a confusing tangle of poorly attributed data. Many cartographers working under tight project deadlines must use manually digitalized bases instead.

Small-scale map datasets of the world do exist, but they have their problems. For example, most are crudely generalized—Chile's fjords are a noisy mess, the Svalbard archipelago is a coalesced blob, and Hawaii has disappeared into the Pacific two million years ahead of schedule. They contain few data layers, usually only a coast and country polygons, which may not be in register. The lack of good small-scale map data is not surprising. Large mapping organizations that release public domain data, such as the US Geological Survey, are not mandated to create small-scale map data for a small user community that includes mapmaking shops, publishers, web mappers, academics, and students—in other words, typical NACIS members. Natural Earth Vector fills this oft-overlooked but important niche.

COLLABORATION

Natural Earth Vector is a collaboration of many volunteer NACIS members. Nathaniel Vaughn Kelso and Tom Patterson began working on the project in late 2008. Following the path of least resistance, the idea was to repurpose existing data that we already had as an integrated world dataset at three map scales. The 1:50 million and 1:110 million-scale data comes from bases developed by Dick Furno and additional staff at the *Washington Post* for quick turnaround newspaper mapping. The *Washington Post* Legal Department kindly granted us permission to use these data. The kernel for the 1:10 million data was a compilation by Patterson for the "Physical Map of the World," consisting of coastlines, rivers, lakes, and physical feature labels. Expanding and improving on this foundation has been our chief activity. The core team has now grown to include Tanya Buckingham, who coordinates data attributing by Ben Coakley, Kevin McGrath and Sarah Bennett at the University of Wisconsin Cartography Lab; Dick Furno as populated places guru; Nick Springer as the website developer; and Lou Cross as NACIS liaison. A cast of consultants, many regulars on the Cartotalk.com discussion forum, is assisting with place names for various world regions. They include Leo Dillon, Hans van der Maarel, Will Pringle, Craig Molyneaux, Melissa Katz-Moye, Laura McCormick, Scott Zillmer and fellow staff at XNR Mapping. Work continues apace on Natural Earth Vector as we write this article.

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DATA FOR CARTOGRAPHY

We developed a world base map data suitable for making a variety of visually pleasing, well-crafted maps. Unlike other map data intended for scientific analysis or military mapping, Natural Earth Vector is designed to meet the needs of mainstream production cartographers. Maximum flexibility was a goal. For example, Natural Earth Vector comes in ESRI shapefile format, the Geographic projection, and WGS datum, which are de facto standards for vector geodata.

Neatness counts with Natural Earth Vector. The carefully generalized linework maintains consistent, recognizable geographic shapes at 1:10m, 1:50m, and 1:110m scales. As Natural Earth Vector was built from the

ground up, you will find that all data layers align precisely with one another. For example, where rivers and country borders are one and the same, the lines are coincident.

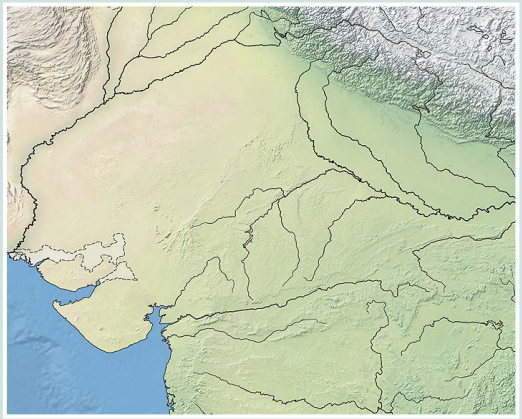
Natural Earth Vector, however, is more than just a collection of pretty lines. What lies beneath the surface, the data attributes, is equally important for mapmaking. Most data contain embedded feature names, which are ranked by relative importance. Up to eight rankings per data theme allow easy custom map "mashups" to emphasize your map's subject while de-emphasizing reference features.

Other attributes facilitate faster map production. For example, width attributes assigned to rivers allow you to create tapered drainages with ease. Assigning different colors to contiguous country polygons is another task made easier thanks to data attribution.

OTHER KEY FEATURES:

- Vector features include name attributes and bounding box extent so you know the Rocky Mountains are larger than the Ozarks.
- Large polygons, such as bathymetric layers, are split for more efficient data handling.
- Projection friendly—vectors precisely match at 180 degrees longitude. Lines contain enough data points for smooth bending in conic projections, but not so many that processing speed suffers.
- Raster data include grayscale-shaded relief and cross-blended hypsometric tints derived from the latest NASA SRTM Plus elevation data and tailored to register with Natural Earth Vector.
- Optimized for use in web mapping applications, such as Google or Yahoo, with built-in scale attributes to direct features to be shown at different zoom levels.

1:10 MILLION DATA LAYERS



Vector coastlines and drainages register with Natural Earth 2 raster data.

GEOGRAPHIC LINES

Polar circles, Tropical circles, International dateline, and Equator

GRATICULES

1-, 5-, 10-, 15-, 20-, and 30-degree increments

GLACIATED AREAS

Polygons derived from DCW, except for Antarctica derived from MOA. Includes name attributes for major polar glaciers.

ANTARCTIC ICE SHELVES

Derived from 2003-2004 MOA. Reflects recent ice shelf collapses.

BATHYMETRY
Nested polygons at 0, -200, -1,000, -2,000, -3,000, -4,000, -5,000, -6,000, -7,000, -8,000, -9,000, and -10,000 meters. Created from SRTM Plus.

RIVERS
Ranked by relative importance. Includes name and line width attributes.

LAKES
Ranked by relative importance, coordinating with river ranking. Includes name attributes.

LAKE CENTERLINES
Segments for creating continuous rivers without reservoir and lake interruptions. Don't want minor lakes? Turn on their centerlines to avoid unseemly data gaps.

COASTLINE
Ocean coastline, including major islands. Coastline is matched to land and water polygons.

ISLANDS
Additional small ocean islands ranked to three levels of relative importance.

REEFS
Major coral reefs from WDB2.

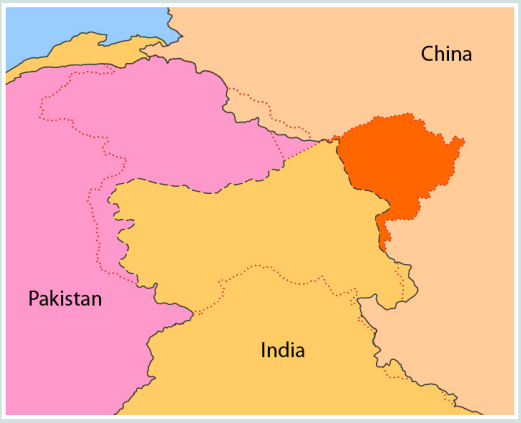
URBAN POLYGONS
Derived from 2002-2003 MODIS satellite data.

POPULATED PLACES
Point symbols with name attributes. Includes capitals, major cities and towns, plus significant smaller towns in sparsely inhabited regions. We favor regional significance over population census in determining rankings.

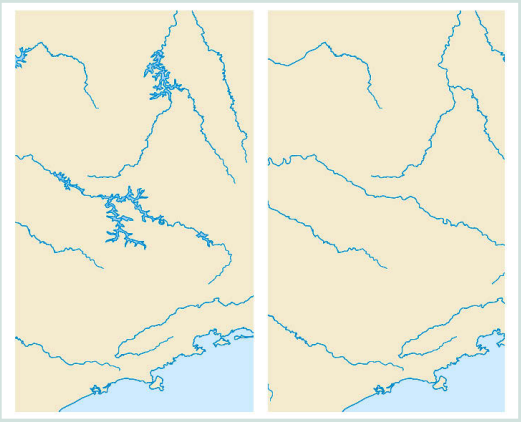
COUNTRIES
Matched boundary lines and polygons with names attributes. Includes disputed boundaries and areas, breakaway regions, subnational territories, dependencies, and transnational cultural regions.

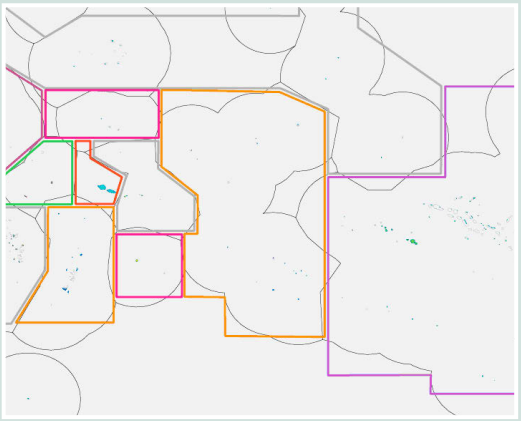
PACIFIC NATION GROUPINGS
Boxes for keeping these far-flung islands tidy.

WATER BOUNDARIES
200-mile nautical limits, plus disputed, treaty, and median lines.

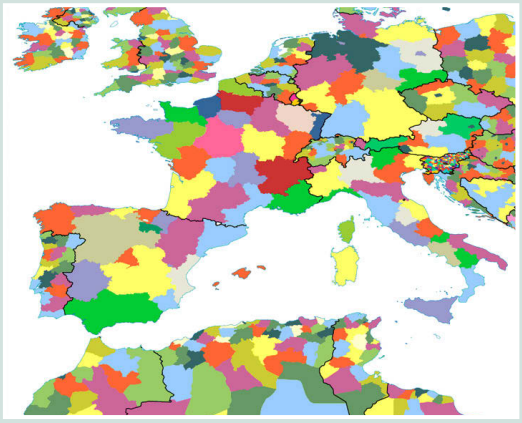


Disputed boundaries, Kashmir region.


Brazil drainages with reservoirs (left) and without (right).


Pacific nation boundaries.


Urban areas, Korean Peninsula.



First order administrative areas.

FIRST ORDER ADMIN (PROVINCES, DEPARTMENTS, STATES, ETC.)

Internal boundaries and polygons for all but a few tiny island nations. Includes names attributes and some statistical groupings of the same for smaller countries.

PHYSICAL FEATURES

Polygon and point labels of major physical features.

DATA DEVELOPMENT

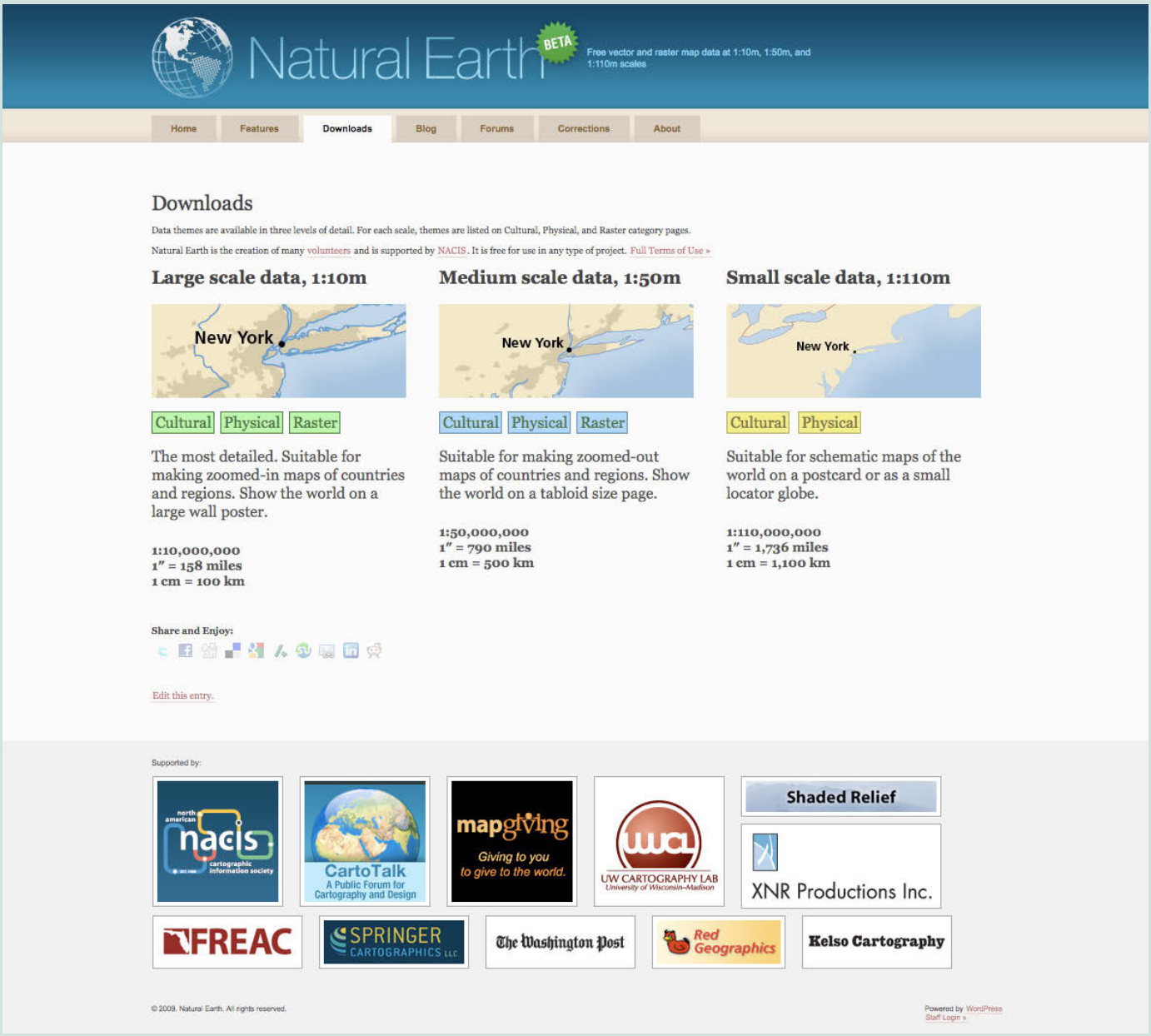
Since Natural Earth Vector is for visual mapmaking, we prepared the base layers in Adobe Illustrator in conjunction with Avenza MAPublisher import and export filters. Illustrator offered us flexible tools for editing lines and polygons, organizing data on layers, and inspecting the final data in a map-like form. A variety of third-party plug-in filters and scripts, some written by Kelso, were essential for linework generalization and other tasks.

World Data Bank 2 was the primary vector data source that required significant modifications. For example, we found that the entire West Coast of the United States was about seven miles west of its true position and adjusted it accordingly. Slight adjustments to river positions better matched them to shaded relief derived from recent satellite data. For Antarctica, we completely abandoned World Data Bank 2. Here, the coast, glaciers, and ice shelves derive from 2003-2004 NASA Mosaic of Antarctica, a MODIS product. We also updated the data to reflect recent ice shelf collapses.

Contributors from around the globe researched additional feature names beyond those original to Patterson's Physical Map of the World. Attributing the data was performed in Arc GIS by the team at the University of Wisconsin.

FUTURE ACTIVITY

We regard the initial release of Natural Earth Vector as a starter dataset that will be periodically updated. With any project as complex as this, flaws and omissions are bound to emerge, requiring our attention. One proposal is to form a Natural Earth map data committee to incorporate information and coordinate updates from users, perhaps using a Wiki model. Rivers, lakes, and first-order admin are components still in need of refinement. Possible data for future updates include transportation (roads and railroads), time zones, and terrestrial hypsography. If you have ideas for Natural Earth Vector, please drop us a line.



Natural Earth Data web site