Land-based pollution (sediment delivery)

Data used to produce the map on the threat from land-based sources of pollution (sediment delivery) are from the 2011 Reefs at Risk Revisited project, executed by the World Resources Institute. The full report, downloadable datasets, facts sheets and an interactive map are available from the project website at: http://www.wri.org/publication/reefs-at-risk-revisited

A watershed-based analysis of sediment and pollution was implemented to develop an estimate of this

threat. The analysis of the impact of sediment and pollution on reefs incorporates land cover type, slope, soil characteristics, and precipitation for all land areas, using a simplified version of the Revised Universal Soil Loss Equation (RUSLE) in order to estimate relative erosion rates for each 1 km resolution grid cell. These relative erosion estimates are summarized by watershed. Since not all erosion makes its way to the river mouth, sediment delivery ratios (based on watershed size, dam locations, and mangroves) were applied in order to estimate relative sediment delivery at the river mouth. It should be noted that relative erosion rates and sediment delivery are being used as a proxy for both sediment and pollution delivery.

Sediment plumes from the watershed discharge point were estimated on the basis of relative sediment delivery and distance from the river mouth. Any given location can have contributions from multiple rivers. Model results were calibrated using data on river discharge, sediment delivery, and observations of plumes from MODIS Aqua satellite data. The model for plume dispersion was implemented by a consultant affiliated with the University of California, Santa Barbara, in collaboration with WRI.

Data Sets Used in the Analysis of Watershed-based Pollution:

- Watershed boundaries - Based on HydroSHEDS (15 arc-second/500 meter resolution) produced

  by the World Wildlife Fund in partnership with the U.S. Geological Survey (USGS), the International Centre for Tropical Agriculture (CIAT), The Nature Conservancy (TNC), and the Center for Environmental Systems Research (CESR) of the University of Kassel, Germany. Available at: http://hydrosheds.cr.usgs.gov.;

- Land cover data - ESA/ESA GlobCover Project, led by MEDIAS-France, 2008 coupled with

  agricultural areas from Global Land Cover Database (GLC2000), EU Joint Research Centre 2003.

- Precipitation - Data are from Berkeley/CIAT/Rainforest CRC (www.WorldClim.org), Average Monthly Precipitation 1950–2000, version 1.4, 2006.;

- Soil porosity - FAO/IIASA/ISRIC/ISS-CAS/JRC. Harmonized World Soil Database (version 1.0).

  FAO, Rome, Italy, and IIASA, Laxenburg, Austria, 2008.;

- Dams - Global Water System Project. Global Reservoir and Dam (GRanD) Database, 2008.

- Mangroves - Spalding, M. D., M. Kainuma, and L. Collins. 2010. World Atlas of Mangroves. London: Earthscan, with International Society for Mangrove Ecosystems, Food and Agriculture

  Organization of the United Nations, UNEP World Conservation Monitoring Centre, United Nations Scientific and Cultural Organisation, and United Nations University.

Detailed description of modeling procedure and equations used are available in the Technical Notes of the Reefs at Risk Revisited project, available from the project website (see link above). The classification scheme for the levels LOW, MEDIUM and HIGH as displayed on the map are also defined in these Technical Notes.