Geophysical Research Abstracts
Vol. 18, EGU2016-17180, 2016
EGU General Assembly 2016
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Global Mapping of Provisioning Ecosystem Services

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Attributing monetary value to ecosystem services for decision-making has become more relevant as a basis for decision-making. There are a number of problematic aspects of the calculations, including consistency of economy represented (e.g., purchasing price, production price) and determining which ecosystem subservices to include in a valuation. While several authors have proposed methods for calculating ecosystem services and calculations are presented for global and regional studies, the calculations are mostly broken down into biomes and regions without showing spatially explicit results. The key to decision-making for governments is to be able to make spatial-based decisions because a large spatial variation may exist within a biome or region. Our objective was to compute the spatial distribution of global ecosystem services based on 89 subservices. Initially, only the provisioning ecosystem service category is presented. The provisioning ecosystem service category was calculated using 6 ecosystem services (food, water, raw materials, genetic resources, medical resources, and ornaments) divided into 41 subservices. Global data sets were obtained from a variety of governmental and research agencies for the year 2005 because this is the most data complete and recent year available. All data originated either in tabular or grid formats and were disaggregated to 10 km cell length grids. A lookup table with production values by subservice by country were disaggregated over the economic zone (either marine, land, or combination) based on the spatial existence of the subservice (e.g. forest cover, crop land, non-arable land). Values express the production price in international dollars per hectare. The ecosystem services and the ecosystem service category(ies) maps may be used to show spatial variation of a service within and between countries as well as to specifically show the values within specific regions (e.g. countries, continents), biomes (e.g. coastal, forest), or hazardous regions (e.g. landslides, flood plains, war zones). A preliminary example of the provisioning ecosystem service category illustrates the valuation of deltaic regions and a second example illustrates the valuation of the subservice category of food production prices in flood zones. Future work of this research will spatially represent the calculations of the remaining three ecosystem service categories (regulating, habitat, cultural) and investigate the propagation of uncertainty of the input data to ecosystem service maps.