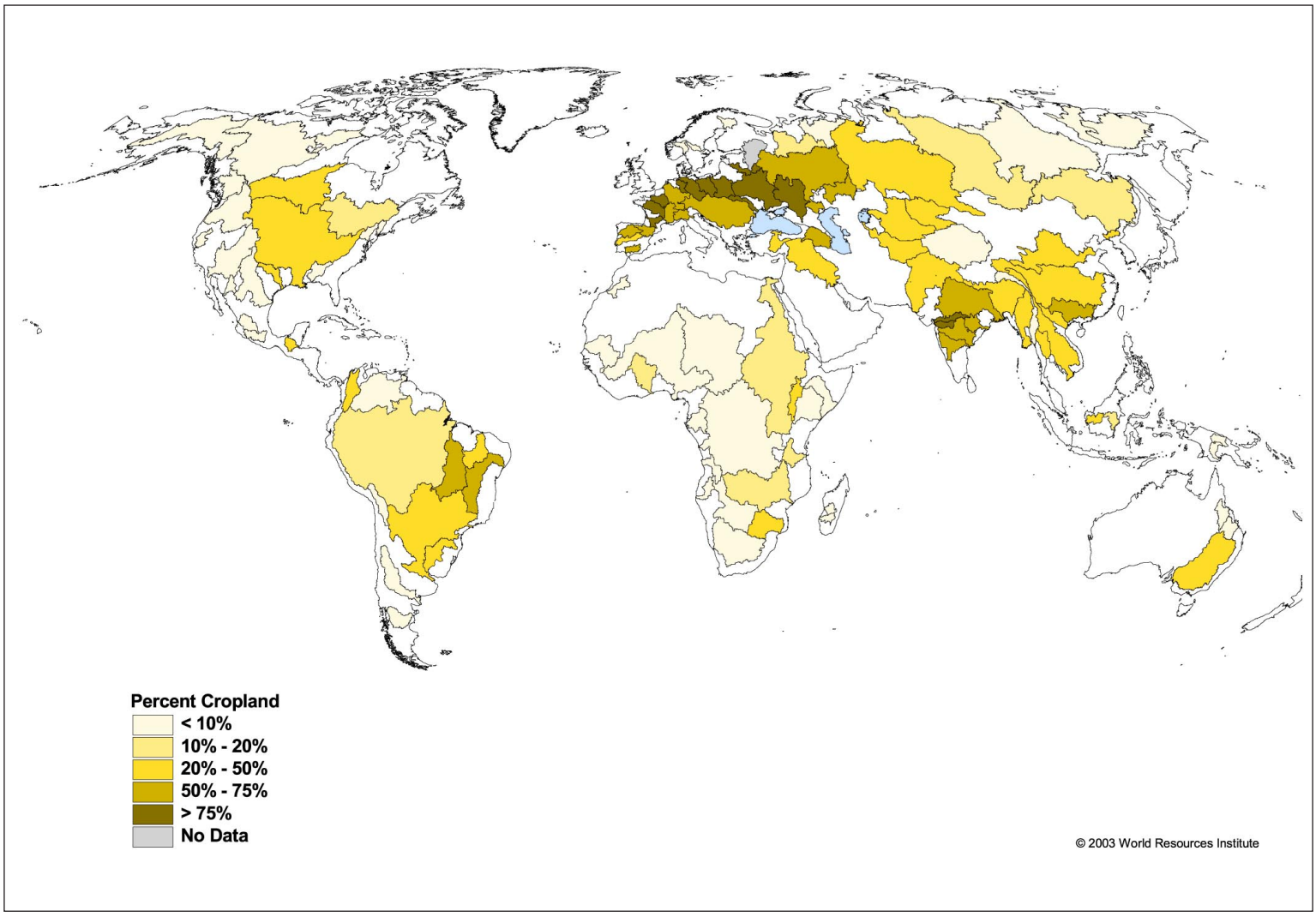
Watersheds of the World : Global Maps

06. Cropland Area by Basin



Map Description

Freshwater systems are influenced by changing land-use patterns in the whole basin area. The pattern and extent of cities, roads, agricultural land, and natural areas within a watershed influences infiltration properties, transpiration rates, and runoff patterns, which in turn impact water quantity and quality. For example, expanding agricultural land increases the load of nutrients and fertilizers from crops that end up in rivers and streams, impacting the water quality and the biodiversity of freshwater ecosystems. Seventy percent of all freshwater withdrawal is used for agriculture, and although just 17 percent of all cropland is now irrigated, these lands account for an estimated 30-40 percent of crop production (Wood et al. 2000). Most irrigation systems are relatively inefficient, exacerbating the scarcity problems in many areas of the world. Over half of the water withdrawn for irrigation never reaches the target crop because of leakage and evaporation. Water for agriculture in many countries is also subsidized, which does not provide the economic incentives to improve irrigation systems and make them more efficient.

In addition, because most of the fertile lands are already under agriculture use, the remaining areas for agriculture expansion are areas that require irrigation and usually other inputs such as fertilizers. In many cases these agricultural practices cause soil erosion, water logging, salinization, and water pollution from runoff that reduce the capacity of the soil to produce crops in a sustainable way and also damage freshwater ecosystems.

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Current damaging agricultural practices and basin mismanagement not only threaten the integrity of freshwater ecosystems, but global food production as well. Prevalent farming methods have degraded soils, parched aquifers, polluted waters, and caused the loss of animal and plant species (Wood et al. 2000). Agricultural lands face an enormous challenge to provide food for the expected population surge of 1.5 billion people over the next 20 years. Soil degradation, including nutrient depletion, erosion, and salinization has already reduced crop productivity, with severe consequences for poor, heavily populated countries, such as China and India.

This map presents the distribution of watersheds containing intensive agriculture as well as areas with a large extent of cropland mixed with natural vegetation mosaic. Watersheds with intensive agricultural development are likely to experience water quality degradation from pesticide and nutrient runoffs and increased sediment loads. This map shows that intensively cropped land is concentrated in five areas: Europe, India, eastern China, Southeast Asia, the midwestern United States, and basins in eastern Brazil, Argentina, and the Murray-Darling basin in Australia. Africa is striking in its lack of intensively cropped land, reflecting the minimal use of chemical inputs and the low level of agricultural productivity in most African countries.

Mapping Details

The USGS Global Land Cover Characterization Database (GLCCD 1998) with the International Geosphere Biosphere Programme (IGBP) classification was used to identify the extent of different land cover types within each basin. The land cover database is derived from 1-kilometer resolution satellite imagery spanning April 1992 through March 1993. Because these data are most useful for analyzing general land cover patterns at a continental or large scale, these data are less reliable for smaller watersheds. Percent cropland indicates the percentage of the basin classified as cropland or as cropland/natural vegetation mosaic. Percentage cropland and cropland/natural vegetation mosaic areas were aggregated by large river basins to create the global map.

Map Projection

Robinson

Sources

GLCCD (Global Land Cover Characteristics Data base), Version 1.2. 1998. Loveland, T.R., B.C. Reed, J.F. Brown, D.O. Ohlen, Z. Zhu, L. Yang, and J. Merchant. 2000. “Development of a Global Land Cover Characteristics Data base and IGBP DISCover from 1-km AVHRR data.” International Journal of Remote Sensing 21 (6-7): 1303–1330. Data available on-line at: http://edcdaac.usgs.gov/ glcc/glcc.html.

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