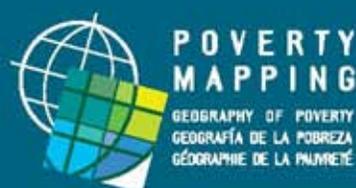


Mapping biophysical factors that influence agricultural production and rural vulnerability



ENVIRONMENT AND NATURAL RESOURCES SERIES
[GEO-S PATIAL DATA AND INFORMATION] ENVIRONMENTAL MANAGEMENT ASSESSMENT AND MONITORING GLOBAL ENVIRONMENTAL CHANGE





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FOREWORD

GIS technology provides the tools for integration of environmental and socio-economic geospatial data through space and time, allowing possibilities for assessment, monitoring, and change detection in both human and natural systems.

This publication, jointly prepared by FAO and IIASA, explains the GIS-based methodologies used for constructing a set of databases relating to biophysical factors that influence agricultural production and rural vulnerability and shows the distribution of rural populations in various agro-ecological environments. The databases themselves have been released by FAO as part of a larger collection – the *Food Insecurity, Poverty and Environment Global GIS Database (FGGD)* – which is available as a digital atlas on two DVDs, with an accompanying hardcopy version.

We are confident that continued application of such GIS-based analysis techniques will not only deepen our understanding of the links between poverty and the environment, but will also prove to be of immediate use to those concerned with improving living conditions in vulnerable environments in a sustainable manner.

FAO is grateful to the Government of Norway for the encouragement and funding it has provided for this work.



Jeffrey B. Tschirley
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ABSTRACT

This monograph is part of a series of reports that explain how techniques of spatial analysis can be used to investigate poverty and environment links worldwide. It combines rural population distribution data contained in the global rural population database for the year 2000 (FAO, 2005) with methods and results of the *Global agro-ecological assessment for agriculture in the 21st Century* (Fischer *et al.*, 2002), in order to estimate the distribution of the world's rural population by agricultural suitability class, land use category and type of farming system. Refinements in GIS databases and analysis techniques have been developed collaboratively by FAO and IIASA in the project *Improving Methods for Poverty and Food Insecurity Mapping and its Use at Country Level*, which was jointly implemented by FAO, UNEP/GRID-Arendal and CGIAR centers and funded by the Government of Norway. The report considers the constraints imposed by environmental conditions at different levels of human input, evaluates agricultural production potential of the world's land area at a resolution of 5 arc-minutes (about 85 square kilometre at the equator), and reports on rural habitation in relation to agricultural production potential, land use patterns and farming systems. Other related reports are: *A geospatial framework for the analysis of poverty and environment links*, *Mapping global urban and rural population distributions and Food Insecurity, Poverty and Environment Global GIS Database (FGGD) and Digital Atlas for the Year 2000*.

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by Harrij van Velthuizen, Barbara Huddleston, Günther Fischer, Mirella Salvatore, Ergin Ataman, Freddy O. Nachtergaele, Marina Zanetti and Mario Bloise

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Global agro-ecological zones, GAEZ, AEZ, productivity potential, suitability, rural population, GIS, land cover, farming system, environmental constraint, poverty mapping

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A list of documents published in the above series and other information can be found at the Web site: www.fao.org/sd/enpub1_en.htm

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ACRONYMS

AEZ	Agro-Ecological Zones
AGAH	Animal Health Service
AGAL	Livestock, Information, Sector Analysis and Policy Branch
AGLW	Water Resources, Development and Management Service
AGPC	Crop and Grassland Service
CGIAR	Consultive Group on International Agricultural Research
CRU	Climate Research Unit of the University of East Anglia
CSI	Crop suitability index
CV	Coefficient of variation
ESDG	Global Perspective Studies Unit
FAO	Food and Agriculture Organization
FS	Farming systems
GAEZ	Global Agro-Ecological Zones
GIS	Geographic Information System
GLCC	Global Land Cover Classification
GRID-Arendal	Global Resource Information Database (Arendal, Norway)
GTOPO30	Global 30 arc-second Digital Elevation Model
IFPRI	International Food Policy Research Institute
IIASA	International Institute for Applied Systems Analysis
IUCN	International Union for the Conservation of Nature and Natural Resources
LGP	Length of growing period
LUTs	Land Utilization Types
MS	moderately suitable
mS	marginally suitable
NOAA	National Oceanic and Atmospheric Administration
NPP	Net Primary Productivity
ORNL	Oak Ridge National Laboratory
PSI	Pasture suitability index
S	suitable
SD	Standard deviation
SDRN	Environmental and Natural Resource
UN	United Nations
UNEP	United Nation Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
VS	very suitable
WCMC	World Conservation Monitoring Centre