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Grasslands Initiative [1]

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Published in 1996

Dust storms whirled through the American Midwest, wrenching nutrient-rich topsoil from the landscape. 1930 dust bowl conditions resulted from excessive land use and agricultural mismanagement in the prairie regions of central North America. Since then, some steps have been taken to mitigate the effects of agriculture on North American grassland biomes, but many more global grassland regions have been turned into agricultural zones -- without benefit of extensive study of the ecological and climatological ramifications. The merit of long-term, well-documented study is well recognized. However, studies are rarely funded for more than a few years.

> Researchers establish a baseline for understanding net primary productivity.
> - About ORNL DAAC [2]

One fifth of the Earth's land surface is grassland, a biome found on every continent except Antarctica. In many parts of the world, grasslands are among the most ecologically productive lands with high levels of soil nutrients. Consequently many of the grasslands around the globe have been replaced by agriculture.

The International Geosphere-Biosphere Programme (IGBP) is taking the first steps towards attaining a better understanding of the effects of such biome perturbations. The IGBP's data and information system is part of a program to make global data available to the scientific community. The main goal of the Global Primary Production Data Initiative (GPPDI) is to establish a baseline of net primary productivity (NPP) data from existing field data sets from grasslands and other biomes such as tropical rainforests and northern coniferous forests.

"Grassland systems are among the easiest in which to measure net primary productivity," said Richard Olson, Staff Scientist at Oak Ridge National Laboratories. NPP is the flux of carbon and energy between the atmosphere and green plants, and an indicator of the condition of the land. NPP is also a likely indicator of the response of ecosystems to rising atmospheric carbon dioxide and global climate change.

Olson used a study of the Central Plains Experimental Range (a Long Term Ecological Research site) by William Parton at Colorado State University to compare the accuracy of different NPP models. Thirteen different grassland sites were available from which comparison of the accuracy of different NPP models could be estimated. "These 13 data sets gave us a good starting point. From there, we spent some time standardizing the documentation between the different data sets, but it seemed an easy place to begin data collection for the archive," said Olson.

Olson is heading the Oak Ridge component of the GPPDI effort to find, validate, and archive existing NPP data for various global biomes by pulling together existing measurements, literature, and unpublished reports available worldwide. "Our job is to organize the data so that it is fairly consistent and representative of biomes worldwide," said Olson.

Data collection begins with a literature search by Olson and Oak Ridge Postdoctoral Fellow Jonathan Scurlock. Any small bit of pertinent information gleaned from published papers leads to correspondence with the principal investigator. "By establishing a good working relationship with the principal investigators, we are increasing our data catalog," Olson said. "Not only do we frequently receive the initial data set but we also receive data updates for the archive."

Next, Olson and Scurlock sort through and visually check the incoming data. Questions arising from checking the data and metadata are answered either in the accompanying literature or by the principal investigator.

Long range plans include up-scaling these data sets to accurately represent 50-by-50-kilometer sites. This work began in late 1996 at the University of Maryland. Climate and vegetation data from GPPDI study sites are used

as parameters in biogeochemical cycle models to represent regional NPP. These regional data sets may then be used to validate existing and future models. Ultimately, complete, regional scale data sets will be available for incorporation into scientists' models and research efforts to produce better models of global processes.

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