

## Exploring global changes in nitrogen and phosphorus cycles in agriculture, induced by livestock production, over the 1900-2050 period

### MODEL AND DATASETS INSTALLATION AND USE

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Data include for all years (1900, 1950, 2000 and 2050), the baseline and baseline-variants: a) 0.5 by 0.5 degree land cover maps (upland crops, legumes, wetland rice, grassland in mixed systems, pastoral grassland; b) input files `nutdata_year_scenario.csv` and `uptake_year_scenario.csv`; c) executable and documentation of the nutrient budget and emission model. The complete datasets of the IMAGE model as published in the IAASTD reports can be requested from the corresponding author.

The data is provided for reproducing the results presented here. Anyone can use these files for noncommercial academic research only. If you want to make a buck off of these files get in touch and we will talk. We would appreciate a short description of what you are planning to do with the data. If you feel that this data set is a major contribution to your research, we would like to be coauthor on any manuscript. If the data is being included in a published manuscript, we would like to see a preprint before submission to make sure the data description is correct.

The datasets and executable of the model are included in the zip folder “Model\_and\_datasets.”

1. This folder can be installed by right-clicking the mouse and select “winzip” and then “extract to here”, or double click the folder and in winzip select extract.
2. After doing this you’ll see a directory with subdirectories. The directory “mandist” contains the executable. Further directories are, for example, in2000 and out 2000. The directory in2000 contains all input files to run the executable. The directory out2000 is empty, but needs to be there to run the model.
3. In the main directory you’ll see the file “Nutrient\_budget\_model\_documentation\_April\_2011.doc”. This document is a manual and documentation.
4. The documentation file “Nutrient\_budget\_model\_documentation\_April\_2011.doc” has detailed information on the initialization file “manure.ini”, and the contents of the input directories (e.g. in2000), and the output of the model.
5. To run the model for the year 2000, double click the batch file `run2000.bat`. When completed, two files are generated in the directory out2000: `nutdata2000.csv` and `nutdata2000.log`. The logfile lists model version, input and output files, and if relevant, a

number of statements about possible exceedances of maximum manure input rates, or errors. Generally these are of no importance. The output file nutdata2000.csv is an ascii file with 146 columns separated by a semicolon (“;”), and data is presented for pre-defined world regions, and countries, provinces and states. The definition of the regions, and the country codes are in the file “country\_codes.xls”.

6. The batch file “run2000.bat” has information on the input directory and the initialization file “manure.ini”. In the bottom part of this file you’ll see:

```
Output
GRID OUTPUT          : NO
```

This prevents the model from generating the output on a 0.5 by 0.5 degree resolution. If you change this into:

```
Output
GRID OUTPUT          : YES
```

The model will now generate a large number of 0.5 by 0.5 degree resolution grid files. The filenames correspond to the column headers in the file nutdata2000.csv, and the documentation provides a full list of output files.

7. In the manure.ini file there are two more options:

FERTILIZER SCENARIO	YES/NO	Indicate whether fertilizer data are taken directly from input file or calculated from crop production data (see section 4 and 6 of manual). For historical years the default for FERTILIZER SCENARIO = “NO”, for future years “YES”. Calculation of N2O from fertilized fields according to Bouwman et al. (2002) (= YES) or Stehfest and Bouwman (2006) (=NO) (see manual); default = “YES”
N2O_NO CALCULATION 2002 (LEX)	YES/NO	

8. The 0.5 by 0.5 degree resolution grid files are maps. These maps are in a compressed format to save disc space. To uncompress the executable transform.exe is provided. To do so, copy this file into the output directory (e.g. out2000). In a DOS prompt, go to this directory (cd ..... Bouwman\_Supporting\_information\_datasets \out2000) and type:

- copy “filename.asc” “zzz.asc” (choose a filename with less than 8 characters; transform.exe cannot handle filenames with more than 8 characters)
- transform -ad -e x zzz.asc zzz.map, where x is the no\_data value, e.g. -9999 or 0.

Now the file has been converted to an ascii grid file.