**GNB**

1. Go to folder of activity data\\GNB

2. read the folder and store the files of inputs/outputs in vector

3. read vector and disaggregate per year

4. sum inputs and specify columns; sum outputs and specify columns

5. calculate gnb based on year

**N-NH3**

1. Go to folder of activity data\\N-NH3

2. Read each subfolder (ie storage, housing, application) and store files in vector

3. Disaggregate per year

4. merge all N-NH3 losses per year into a main db

Muni\_id, ID, muni, housing, storage, fert\_app, man\_app, ss\_app, graz

5. Divide each column per UAA of the respective year

6. Sum each column into total\_N-NH3

**N-N2O**

1. Go to folder of activity data [\\N-N2O](file:///\\N-N2O)

2. Read each subfolder (ie storage, housing, application) and store files in vector

3. Disaggregate per year

4. merge all N-N2O per year into a main db

Muni\_id, ID, muni, housing, storage, fert\_app, man\_app, ss\_app, graz

**N-NOx**

1. Go to folder of activity data \\N-NOx

2. Read each subfolder (ie storage, housing, application) and store files in vector

3. Disaggregate per year

4. merge all N-NOx per year into a main db

Muni\_id, ID, muni, housing, storage, fert\_app, man\_app, ss\_app, graz

**Calculate NS**

1. Read output of GNB

2. Read output of N-NH3

3. Disaggregate each one per year

4. GNB-N-NH3

**Runoff**

1. Read GNB inputs

2. Disaggregate per year

3. Specify sludge, fertiliser, manure, grazing

4. Multiply per UAA of the respective year

5. Read the initial N-NH3 files

6. Disaggregate per year

7. Specify sludge, fertiliser, manure, grazing

8. Load CAA\_ID shapefile with runoff fractions and disaggregate per year

9. Downscale points 4 and 7 to the CAA scale

10. Subtract inputs per N-NH3 losses in application

11. Multiply point 10 by the runoff fraction /100

12. Divide per UAA

**Leaching**

1. Load GNB and total outputs of NH3, N2O, NOx and Runoff

2. Disaggregate per year

3. GNB-NH3-N2O-NOx-Runoff

4. Load CAA\_ID with leaching fractions and disaggregate pear