Breakout Group #5

Considering the nitrogen budget: The way INC describes grain & meat as an Nr output, in the context of Nr pollution – recall that they are what feeds you!

Quantifying "reference" landscape conditions is a major research challenge; what is the background loss from natural systems? Recognizes the fact that setting criteria or standards cannot be uniform, as a function of the heterogeneous nature of the landscape.

For example, the ecoregion approach for setting standards is challenging -- because of the high degree of variability between watersheds over space & time, and air & water impacts. There is a huge value to considering **loads** as well as **concentrations** (for air & water) when considering standards. There is a need for an individual watershed approach. There is a need to identify loadings to air and water and to partition sources of these loads.

Seasonality is very important with regard to considering responses of the system, and environmental effects.

Can't get the right critical load value if you don't know what the endpoint is. The management goals in terms of ecosystem end points need to be defined.

A comprehensive Nr set of standards for air/land/water is needed. The Clean Air Act & the Clean Water Act are not

well coordinated with regard to Nr pollution. We need to consider how to **integrate** air & water. We need to consider how to **implement** this on the ground. **Airsheds** & **Watersheds** are both important when considering landcape-scale budgets and plans for solutions. EPA needs to take a holistic look at the regulations guidance & technical support that they give the states in developing such plans (e.g SIP & TMDL planning processes). Certainly will require thinking about landscapes on a water region basis that crosses state and county boundaries. Might require **reorganization** in EPA, **rule changes** and **technical support improvements**.

EPA is now thinking about air quality standards. Measuring NO2 in the air is insufficient. Oxidized **and reduced, and organic,** forms of Nr need to be quantified and considered as Nr pollutants.

Getting animal production and feed production co-located would be helpful toward Nr goals. Saves transportation emissions. Enables more efficient use of the nutrients in the waste materials.

More science is needed about how to optimize the use of organic or waste based fertilizer materials, in crop, forest, and rangelands.

EPA needs to work with USDA to develop optimum recommendations for environmental protection practices. For example, how to incentivize (e.g. under the farm bill)

good environmental practices; encourage producers to look at an integrated operation where you would have feedstock & livestock production close together. Recommend required nutrient management plans for all farms, not just farms with CAFOs.

We need to understand the effeciveness of BMPs. For example, there's USDA's conservation effects assessment project (CEAP), led by NRCS. That's the start of a framework & data collection. That could be expanded to bring in other agency research, data collection, etc.

In order to integrate things on a watershed or airshed basis, we need better MODELING and MONITORING. Multiscale efforts. These efforts should be coordinated, supported whole-heartedly, and supported Long-Term. This should involve partnership among agencies, and related educational programs.

We need a cohesive database center for N where nitrogen info can be accessed;
Metadata is very important
Data intercomparability