Information and Research Needs for the Next Assessment

In the process of answering the questions posed at the beginning of this assessment, the Atmospheric Team noted voids where additional information would have improved the study process. Furthermore, many additional questions arose which dealt with areas for which scientists do not have ready answers. Therefore, the following information and research needs should be filled before another assessment on air quality is performed for the Southern Appalachians.

1. More air-quality monitoring is needed in rural and high-elevation areas for particulate matter, aerosol, acid deposition, and ozone. Also, more site-specific air-quality monitoring is needed to compare micro-climates versus area-wide conditions. For example, within a smaller scale geographic area, how does air quality differ on mountain top, mid-slope, and valley floor?

2. More work is needed to refine ozone exposures response for highly sensitive and moderately sensitive species. Growth losses may be occurring to moderately sensitive species, such as tulip poplar, at ozone exposures lower than what is reported in this assessment.

3. Research is needed to simulate more ambient-like exposures that reflect both the cumulative ozone exposure and number of hours greater than or equal to 0.10 ppm found in the Southern Appalachians.

4. The relationship of soil moisture and ozone exposure as it affects forest vegetation needs further investigation. What is the relationship between soil moisture and the opening of a leaf's stomate that allows ozone to penetrate?

5. Little is known about the effects, if any, ozone exposures are having on hard and soft nut production and on fruit production.

6. Future assessments might quantify the economic effects of forest growth attributable to air pollutants.

7. Correlation is needed to better understand the effects of regional meteorology on the dispersal of air pollutants within the region. For example, what effect do pollutants generated within the Atlanta metropolitan area have on the lower region of the Southern Appalachians?

8. The existing EPA-sponsored larger stationary point-source database is adequate; however, an area-source emissions database is needed to quantify the amount of pollutants from smaller point sources, fugitive sources, and mobile sources.

9. Development of a public participation process would assist with the definition of acceptable and unacceptable visibility conditions.

10. Further studies are needed to document the amount of PM10 and PM2.5 downwind, at various distances, from large prescribed fires.

11. Further research is needed on the role of nitrogen deposition to SAA ecosystems to determine to what extent nitrate deposition affects terrestrial and aquatic systems. Research in this area should continue to develop models to predict both short- and long-term impacts.

12. Further deposition monitoring is needed, specifically at high elevations, with an emphasis on estimation of cloudwater and dry deposition inputs.

13. Scientists need to better relate episodic acidification in streams with changes in biological populations using in situ observations and experiments. Models are needed to determine dose-response relationships for aquatic biota.

14. There is a need to evaluate the impact of continued sulfate deposition on the "delayed" acidification of streams as sulfate is released from soils once they become saturated.