INFORMATION TECHNOLOGY AND LIBRARIES

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[*Summary by Ruth Gustafson and Gene R. Major*]

Dr. Melillo began his talk by mentioning the President's report on ecological diversity, which was issued by the Office of Science and Technology entitled "Environmental Change in the Face of Global Change." Stewardship of the earth is now in the hands of over 6 billion humans. To be good stewards of the Earth, we have to manage the Earth as a system of ecosystems. We need to collect information, organize it, synthesize it, and share it.

There are four major components of Global change: 1) changes in land cover and land use; 2) changes in the biological environment (alien/introduced/nonindigenous/invasive species); 3) changes in the chemical environment (air, water and soil); the first three lead to the consequence 4) changes in climate.

Dr. Mellilo stated that the primary means of changing land cover and land use are deforestation, wetland drainage and desertification. Using GIS and modeling, it is evident that about 20% of the earth's natural resources have been converted to cropland density.

The biological environment changes wrought by introduced species stem from plant introductions for agricultural purposes or from inadvertent plant, animal and microbe introductions.

Increased accumulation of CO_2, CH_4, N_2O and O_3 is causing changes in the chemical environment of the atmosphere. Precipitation chemistry studies indicate high levels of N, P, S and heavy metals with a doubling of the rate of the nitrogen cycle. Anthropogenic effects upon the nitrogen cycle rate include fertilizers, legume cultivation and burning fuels at very high temperatures. All of these impacts require much better surface and ground waters management.

Climate change consists of four major components: the greenhouse effect; concentration of atmospheric CO_2; global temperature; and precipitation rates. Overall, emissions of CO_2 and greenhouse gases are growing. There is a clear correlation between CO_2 levels and the global temperature record. Dr. Melillo briefly reviewed global temperature patterns from the past 100 years. How does warming affect the water cycle? It speeds up the process with higher temperatures leading to higher rates of evaporation and transpiration. More water is then present in the air and the soil becomes dryer.

What can we say about climate change over the next 100 years? It will get warmer and we will have more precipitation. Warming will be greater over land with the largest warming in northern latitudes in winter. This may mean the loss of alpine ecosystems. Sea levels will rise.

Dr. Melillo noted the cross-disciplinary cooperation of atmospheric scientists, economists, biologists and physical scientists (fluid dynamicists) in the development of the integrated assessment tools which are components of the MIT/MBL Global System Model. He concluded with the statement that the library is becoming a more dynamic and "real-time" place for the dissemination of data necessary to conduct this type of research. "As managers of information systems in partnership with scientists, economists, and others, we will play a central role in the stewardship of the biosphere, the complex of ecosystems on Earth that is our life support system.