0.0 Executive Summary

The idea for a major study of the ecological and biogeochemical consequences of land–use and land–cover changes in the Amazon region grew out of a series of five meetings held between 1993 and 1995. A summary of the outcome of these meetings was published as the Manaus Workshop Report in 1995. This report formed the basis for one of the currently funded components of the Large Scale Biosphere–Atmosphere Experiment in Amazonia (LBA): LBA–Ecology, which is primarily funded by the National Aeronautics and Space Administration (NASA).

This Experiment Plan describes plans developed by NASA and the Instituto Nacional de Pesquisas Espaciais (INPE) for the execution of LBA–Ecology, and includes a compilation of individual investigator research plans, as well as details about infrastructure and logistical support. This Experiment Plan is the final step in developing the necessary agreement between INPE and NASA, in accordance with the terms of the Implementing Arrangement between the Government of Brazil and the Government of the United States of America.

NASA's LBA–Ecology Project Office is composed of two primary functional groups: 1) the general Project Office at NASA Goddard Space Flight Center (GSFC) under the direction of Donald Deering, and 2) the Science Office at the University of New Hampshire under the direction of Michael Keller. In addition, the Data and Information Support Office at Oak Ridge National Laboratory (associated with the Biogeochemistry Distributed Active Archive Center or DAAC) is an integral component of the general Project Office at GSFC. Its activities are coordinated by Merilyn Gentry. The Project Office is responsible for coordination of activities and resource sharing among investigators. The Project Office also provides the planning expertise, coordination capabilities, and logistical support to enable the investigators to fulfill their objectives.

Science Team

The Science Team for LBA–Ecology includes all of the Principal Investigators and Co–Investigators. The LBA–Ecology Science Team is responsible for providing the scientific content, direction, and priorities for the project. They have worked with the Project Scientist and Project Office staff in the preparation of the final LBA–Ecology Experiment Plan. It will be their responsibility to refine the preliminary study design as necessary and to detail the specific activities to be conducted during the project, as well as to integrate its activities with those of the other LBA modules. A data management, data sharing, and data protocol plan will also be established by the Science Team, the Project Scientist, and the Project Office in cooperation with INPE.

The Science Team efforts are grouped into four science themes: Land–Cover and Land–Use Change, Carbon Dynamics, Nutrient Dynamics and Surface Water Chemistry, and Trace Gas and Aerosol Fluxes. The investigators in Land–Cover and Land–Use Change study past and current vegetation and land use throughout the Amazon region. They also strive to predict the location and magnitude of future land–cover and land–use changes in the region. The Carbon Dynamics group studies the quantification of the carbon pools in vegetation and soils and the rates of carbon exchange among the atmosphere, vegetation, and soils, and the ways that these rates are altered by natural and human disturbances. Those in the Nutrient

Dynamics group focus on quantification of nutrient pools and fluxes. Finally, Trace Gas and Aerosol Flux Investigators measure the fluxes of trace gases between the land and the atmosphere and determine the biological and physical factors that control these fluxes. For each of the thematic areas of the study, there are scientific questions posed that motivate research tasks. The main approaches the investigations are taking to execute their tasks are identified, and the tasks that are to be accomplished by each investigation team are indicated in this Experiment Plan. A labeling scheme has been developed to indicate which science theme is associated with each task; the themes are abbreviated as follows:

CD – Carbon Dynamics
LC – Land–Cover Land–Use Change
ND – Nutrient Dynamics and Surface Water Chemistry
TG – Trace Gases and Aerosol Fluxes

A preliminary table listing the types of data collected by each investigative team is organized in alphabetical order by the first investigator listed on the proposal.

Training and Education

Creating a strong training and education component of LBA–Ecology has been central to the development of this research initiative. LBA–Ecology's training and education activities support the LBA objective to enhance the understanding of global change processes. Two goals of the training and education effort are to increase the number of South American participants in LBA research and to expand the environmental and global change research community in Amazonia. LBA–Ecology will contribute as appropriate to short courses, workshops, and technical training developed by LBA to focus on science themes, scientific techniques, and project implementation exercises. Investigators will serve as instructors in scientific techniques for these activities, which are coordinated by the LBA Training and Education Committee. Each LBA–Ecology scientific investigation selected for participation has a plan to contribute to LBA training and education, such as the training of Master's, Doctoral, and Postdoctoral students, as well as internships, exchange programs, and technical instruction.

Infrastructure and Logistics

The infrastructure and logistical support plans described within this Experiment Plan include the study site descriptions as well as the planned infrastructure support. The study sites are located along two transects that are described in section 2.4.5. The site description section is divided into two sections: 1) the site description for the Proposed Intensive Study Sites and 2) the site descriptions for the Other Proposed Study Areas. These site locations had not been finalized in earlier versions of this plan, as site selection had not yet taken place prior to the adoption of the initial version of the Experiment Plan. The "Intensive" study sites have a higher density of researchers in these areas and increased infrastructure support (e.g., towers, laboratory space) than the "Other Proposed Study Areas." Tables have been included with each site, detailing which research teams will work at these locations. Changes to the study sites will be documented in subsequent versions of the Experiment Plan.

Infrastructure elements described within this document include instrumentation towers, laboratory facilities, ancillary buildings, and supporting structures such as access roads and walkways. Logistical planning encompasses activities such as shipping and customs

procedures, coordination of vehicle use and maintenance, and other general support for field operations.

The field support that will be provided by the NASA LBA–Ecology Project Office is determined by the needs of the Science Team and the responsibilities outlined in the Implementing Arrangement. The NASA responsibilities include:

- Deploying ground–based instrumentation/infrastructure and planning the field experiment, site selection, and use of Brazilian aircraft.
- Arranging the necessary support services, field facilities, laboratory space, lodging, and meeting space in Brazil.
- Providing and maintaining LBA–Ecology remote sensing and other instrumentation to be deployed on Brazilian aircraft.
- Providing and maintaining the LBA–Ecology ground-based instrumentation, supporting equipment, and expendable supplies.

An LBA–Ecology Project Office liaison representative is stationed at the LBA Project Office at Centro de Previsão de Tempo e Estudos Climáticos (CPTEC) near Cachoeira Paulista, SP. Additional staff members will be stationed in Brazil as needed, in locations to be determined, in order to facilitate logistical arrangements and to oversee the construction of field facilities required for LBA–Ecology scientific investigations. The support listed herein is generally designed around the specific requests of the Science Team and is being provided as a general LBA–Ecology project resource.

Data and Information System

Plans for the LBA Data and Information System (DIS) have not been finalized; however, the Science Steering Committee has recommended that the DIS be a data search and retrieval system. The LBA–Ecology DIS as a component of the overall LBA DIS will also be a data search and retrieval system that is compatible with the overall LBA DIS.

LBA–Ecology DIS will be a distributed system, comprising an Internet–based metadata search and data retrieval or delivery component and a general support component. The system is designed to:

- Minimize the time for data sets to become available to all investigators.
- Minimize requirements (time, hardware and software, human resources) for both data providers and data users.
- Maximize the ease of searching for data sets and retrieving them for users.
- Facilitate the preparation of value–added and integrated data sets.
- Develop and operate at a minimal cost to NASA and INPE.

Support of the data and information system for the Science Team will be provided primarily through Internet Web sites at both GSFC and Oak Ridge National Laboratory (ORNL). GSFC maintains the project and science implementation support information while ORNL maintains a mirror site of the main LBA Web site at CPTEC and the public site for LBA–Ecology data access.

The data archive function is primarily resident with the ORNL Distributed Active Archive Center (DAAC) for biogeochemical Earth science. The Science Team, NASA and INPE

Program Management, or other established LBA review panels will select data sets to be submitted to the ORNL DAAC for permanent archive. All data sets will be available to anyone through the LBA–Ecology DIS and/or the LBA DIS.

Remote Sensing

LBA–Ecology's objectives for regional synthesis and integration require remote sensing data. The Remote Sensing section of the Experiment Plan has been organized by satellite system, with notes addressing spatial and temporal sampling of interest, the investigators expecting to use the data, sources, and other issues, if applicable. The information presented in this section is based upon a survey of requirements solicited during the first LBA-Ecology Science Team meeting held in Miami in December 1997; additional information has been gathered from the investigator proposals, later Science Team meetings, the draft Science Plan, and through correspondence with the investigators. Science team members were asked to specify data source, frequency, spatial resolution, location, and other similar information. The particular data sets to be acquired and NASA and INPE responsibilities for acquiring them have not been decided yet. This issue will be addressed in a future version of the Experiment Plan.

The LBA–Ecology Project Office at NASA, in collaboration with the LBA Central Office at INPE, has produced Version 1.0 of the Experiment Plan based on the content of the proposals, discussions, and presentations at the Science Team meetings, and numerous written and oral exchanges with Science Team members. It is envisioned that this Experiment Plan will be updated periodically to reflect additions of new investigators, more complete information on study sites, more fully developed infrastructure and logistical support plans, etc. These modifications will be maintained dynamically on the LBA-Ecology Web site at **http://lba-ecology.gsfc.nasa.gov/lbaeco/**.