

**Land Use/Management Change and
Trace Gas Emissions in East Asia
(APN 2000-01)**

Project Leaders:

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APN Funding

Two year proposal -Year 1 US \$82,700, Year 2 US \$56,400 - project began June, 2000

Participating countries

China, Japan, the Philippines, Thailand, USA

Introduction/Background

Land use and land management data sets exist for Temperate East Asia and for Southeast Asia but are currently not interactively linked. We proposed the development of a trace gas database (from existing studies) to which we would link these land use and land management databases. From these databases an analysis and synthesis of the impact of land management and land use changes on trace gas emissions (methane and nitrous oxide) from terrestrial ecosystems in East Asia are proposed. These analyses would facilitate policy development for land management and atmospheric constituents in the region. The main objectives of the project are to: (a) develop an East Asian trace gas flux data base; (b) continue development of Temperate East Asia and Southeast Asia land cover/use data bases; (c) integrate agricultural land management into land use databases; (d) link these databases; (e) evaluate methodologies, using land use databases, to project regional trace gas emissions; and (f) to consider mitigation strategies.

Outline of activities conducted

The first organizational workshop for the project was held in Nanjing, China, 19-21 June 2000. Funding for the workshop was provided by APN and was hosted by the Institute of Soil Science, Chinese Academy of Science in Nanjing. Eighteen persons participated, 8 from outside China. Four Chinese scientists who are conducting trace gas work in China were invited to join the project: Dr. Huang Yao (Nanjing), Dr. Zheng Xunhau (Beijing), Dr. Huang Guohong (Shenyang) and Dr. Xing Guangxing (Nanjing). Dr. Rhoda Lantin from the Philippines represented the UNDP methane project and Dr. Sakorn Phongpan (Bangkok, Thailand) substituted for Pornpimol Chaiwanakupt (Bangkok, Thailand).

Our objectives for the first workshop were for participants to get acquainted and to start forming working relationships, to identify trace gas data sets, and to identify common links for setting up the trace gas database. The processes of linking Temperate East Asia and Southeast Asia land use databases and identifying mechanisms of scaling from field to provincial, national, and regional scales was also initiated. Overall project goals were confirmed.

The goal was set to have the first phase of trace gas and land use data base development established by the time of the second workshop which was held in Bangkok, January 19-23, 2001. In addition, the main integrative tool to link trace gas and land use/management data bases is the DNDC (Denitrification Decomposition model

developed by Changsheng Li), a workshop was planned to conduct an initial DNDC model validation for a test case using Thailand data that was contributed to the databases. Jariya Boonjawat volunteered to set up a project web page through her START office in Bangkok.

At the second workshop we evaluated the trace gas and land use data bases that have been compiled. These databases are now held on CD and are available for project use. During the workshop we identified gaps in the databases and mechanisms by which to fill the gaps. The trace gas database contains more than 80 data sets from China, Indonesia, Japan, the Philippines and Thailand. About 60% of the sets contain only methane flux data and the remainder contain both nitrous oxide and methane data. The majority of the data sets are from agricultural systems, typically rice based agriculture, which constitutes a significant agricultural practice land area of East Asia. Goals for the second year of the project are outlined below.

Outcomes/Products

The main goal for the first year of the project was to perform the initial data base development both for trace gases and land use/management. This activity was successfully completed and the database holds the data. This effort also initiated the first steps to integrate Southeast Asia and Temperate East Asia land use databases. The addition of land management information is an important new development for land use databases (database structure and CD of initial databases can be available for review if needed). APN project participants presented project results during an IGAC (International Global Atmospheric Chemistry activity of IGBP) scientific meeting in Bangkok January 22-23, 2001, following the APN workshop.

Future directions/Follow-up work

During the Bangkok workshop the following goals for the coming year were set:

- 1) Continue to improve the trace gas database.
- 2) Continue to improve the land use/management databases.
- 3) Begin linkage of Southeast (Bangkok, Jariya Boonjawat) and East (Beijing, Chuang Liu) Asian databases.
- 4) We have identified 5 main projects in which we will use the databases for analysis and integration of trace gas fluxes in East Asia:
 - Development and use of a detailed land use database for the Philippines to be used for the country-scale estimation of methane emissions;
 - Intercomparison of different up-scaling methodologies for estimating methane emissions from rice at the country scale;
 - Land use management data integration at different scales in support of biogeochemical analysis;
 - An analysis of the relationship between methane and nitrous oxide emissions during wet/dry season cropping sequences in East Asia; and
 - Managing agricultural soils to mitigate net greenhouse gas emissions in rice-based cropping systems.
- 5) The projects noted above will require intensive collaborative efforts to complete. The goal to present completed manuscripts that describe the results of the project at a third workshop, tentatively, to be held at the International Rice Research Institute

in Los Banos, the Philippines, during the week of 7 January 2002. Using the format set by the U.S. Trace Gas Network, we hope to publish the papers as a set in Global Biogeochemical Cycles. In addition, goals for formulation of documents to support policy will be discussed during the coming year. The possibility of linking this APN project to other related efforts, such as the APN Land Use/Cover Change in Asia and the Carbon Cycle project that met in 29 January, 2001 in Kobe.

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