

B-15 Special Collaborative Studies for Developing the Asian-Pacific Integrated Model (AIM) to Assess Global Warming Abatement Policies with Developing Countries

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The Asian-Pacific Integrated Model (or AIM for short), is a large-scale computer simulation model for assessing policy options to stabilize the global climate, particularly in the Asia-Pacific region, from the two perspectives of reducing greenhouse gas emissions and avoiding the impacts of climate change. During 1991-1993, a preliminary global module of AIM and several prototype models have been developed. This project intends to develop AIM based on the work of the past three years in conjunction foreign research institutes, especially in developing countries.

This project is made up of three sub-projects. The first aims to develop a countrywide greenhouse gas emission model in the Asian-Pacific region, and to improve the global components of the emission and climate models. The second will develop and improve the capability of several models for predicting the impact of global warming on regional aspects such as agricultural production, vegetation and human health. The third has the very specific objective of developing a Food Supply and Demand Model that will be able to assess global warming abatement policies related to agricultural production.

The outcomes of these studies during 1994-1996 are as follows:

1. The emission/climate model has produced six outcomes;

- (i) Country-wide CO₂ emission models have been developed for China, Korea, India, and Indonesia in cooperation with the collaborative Institutes in each countries. These models have been applied to emission predictions.
- (ii) Japanese CO₂ emission model has been improved and applied to long-term predictions of emission. This model has also been applied to evaluation of policy linkage of carbon tax to a special subsidy policy using a newly developed algorithm.
- (iii) An Asian-Pacific module and a global module have been applied to simulate the regional and global emission scenarios linked to the above country models.
- (iv) The developmental process of Asian environmental policies were compared in order to extend the application of the CO₂ emission model for assessment of local secondary effects;
- (v) A global tropical deforestation model was created to estimate the carbon flux caused by tropical deforestation, and a global terrestrial carbon cycle model was developed to estimate CO₂ fertilization of terrestrial vegetation.
- (vi) A simulation was made of temperature increases based on various recent emission scenarios and safe emissions corridor was estimated using the revised climate change model.

2. The impact model has produced three results:

- (i) Asian impact models and country-wide impact models were developed based on high-resolution Geographical Database, in cooperation with collaborative Institutes in the region.
- (ii) Agricultural impact models were developed and applied to estimate the potential change in yields of major crops in the region.
- (iii) A long-term prediction model of food supply and demand has started to be developed to estimate the undirected effects of agricultural impacts in conjunction with International Institute for Applied Systems Analysis.

3. As for the food supply-demand model:

A Food Supply and Demand Model was extended to a long-term prediction model, and it was applied to analyze the impacts of climate change on international price of crops.