

# **Economic and Institutional Studies of the Impacts of Climatic Change on Agriculture and Farm Economy and of the Farmers' and Policy Responses to These Impacts in the Eastern Mediterranean Area**

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## **1. Participating Researchers**

### **1.1 Japan side members:**

Dr. Hiroshi Tsujii, Prof., the project leader, Grad. Sch. of Agr., Kyoto University

Dr. Chieko Umezu, Associate Professor, Research Institute for Humanity and Nature

Dr. Masaru Kagatsume, Professor, Graduate School of Agriculture, Kyoto University

Dr. Y. Asami, Associate Professor, Graduate School of Agriculture, Kyoto University

Dr. Kameyama, Associate Professor, Graduate School of Agriculture, Kagawa University

### **1.2 Turkey side members:**

Dr. Erol H. Cakmak, Professor,

Dr. Onur Erkan, Professor

### **1.3 Israel side participants**

### **1.4 Egypt side participants**

## **2. The Research Objectives and Methods**

### **2.1 The research objectives**

In this socio-economic research sub-project of ICCAP we would like to identify the impacts of climatic change, economic, policy, and institutional factors on cropping patterns and soil and water conservation, agricultural and food markets, farm economy and other socio-economic conditions through their effects to natural resources in Eastern Mediterranean area, especially in Turkey and Egypt. These impacts have resulted in the decline of wheat yield from 5.3 tons per hectare to about 4.4 tons since late 80's to 2001 in Turkey. The yield had increased since 1961 to 1987. We assume these impacts have been and will be large, and the impacts themselves and the mechanism through which these impacts operate should be identified for Eastern Mediterranean area. The identified impacts and the mechanism will be compared with the similar impacts and the mechanisms in the other world semi-arid areas that could be studied by us or by other researchers, and more general findings about the impacts and the mechanism will be identified. In the long run we would like to expand our research area to sub-Saharan Africa, Deccan Plateau of India and northern China.

## 2.2 The methodology

In order to attain above objectives, first, we would like to conduct economic, econometric, institutional economics, and statistical studies based on farm household surveys, literature studies, interviews and discussions with experts in relevant universities and research and government institutions, and field observations in the research areas by the participating researchers on the impacts of our interest of past climatic changes or weather variations **during the past several decades**. Second, we will conduct studies on the impacts toward the future in the later years of our five-year project.

## 3. The Structure of the Socio-economic Research Sub-project

Our sub-project consists of four components. They are (1) farmers' perception of climatic changes, technological changes and policy and institutional changes and farmers' responses to these changes, (2) a regional econometric study of the interactions among climatic changes, agricultural supply and demand, and agricultural policy, (3) a regional positive mathematical programming analysis of the interdependences among cropping pattern, water use, agricultural economy and policy, and climatic changes and (4) institutional economic analyses of management of commons such as water management and water demand (with an emphasis on the roles of water users' association), soil fertility conservation, pasture management, and conflicts between pastoralists and farmers. In this paper I will explain the first component in detail, and the fourth components to some extent, and the other participating researchers in charge will present the other components.

If our budget allows, we would like to ask one major Turkey counterpart for each component research project of our socio-economic sub-project in order to conduct economic and institutional research together. If not, we request one agricultural economist to be our major counterpart in Turkey.

### 3.1 Farmers' Response and Perception study: Tsujii, Dr. Onur Erkan & Dr. Asami.

#### 3.1.1 Objectives of Our Farm Survey and the Survey Framework

In order to attain our research objectives it is very important to identify farmers' perceptions of climatic changes, technological changes and policy and institutional changes and farmers' responses to these changes in the representative areas of a country. In this component on our socio-economic sub-project, first, we will conduct farm household surveys in 6 villages in Turkey in 2002 regarding farmers' perceptions of climatic changes, and policy and institutional changes and of the changes in soil fertility and agricultural sustainability, the impacts of these changes on agricultural and food production and farm economy, and farmers' technological, economic, and institutional responses to these changes. The survey villages will be selected in the representative agro-climatic zones of Turkey. They will be two villages in irrigated area and two villages in rain-fed area in Jeyhan-Ceyhan Basin and two rain-fed villages in central Turkey. 50 randomly selected farms for each survey village will be interviewed.

#### 3.1.2 Farm Survey Questionnaire, Its Contents, and the Problems Analyzed

A questionnaire that is distributed separately to the participants of this meeting and that has been developed through the farm surveys on the farmers' behavior relating to sustainable agricultural development in Java, Nigeria, and Tanzania during the past few years will be used for our Turkey farm survey. Using the data collected from the farm surveys, the farmers' perceptions of the changes, farmers' technological, economic, and institutional responses to these changes, and the relationships among the perceptions, the responses, and agricultural sustainability will be analyzed by economic, econometric, institutional economic, and statistical methods. Currently we have completed the farm surveys in semi-arid areas of Nigeria and Tanzania in Africa, in mountainous areas of Java in Indonesia. We are about to launch similar farm surveys in Turkey. We plan to conduct international comparative analysis on our research interests mentioned just above.

Our questionnaire surveys the conditions of each surveyed farm household, of major agricultural plots, and of the surveyed village from both short run and long run viewpoints. Thus the questionnaire consists of farm survey part and plot survey part, and each of these parts consists of short-run questions and long-run questions. For our farm household survey, our questionnaire covers farm family structure and its changes, family labor use and education, etc., participation with rural organizations and their roles, the structure of farm household incomes and expenditures and its changes, the structures of live stock, capital stock, and managed land and their changes, borrowings and their uses, crop/livestock/household interaction, agroforestry and forest/household economy interaction, soil fertility, crops yield, inputs use and technology, crop damages, livestock diseases and food security. For our plot survey more detail questions about long-run changes in land tenure, land use rule, man/land ratio of the surveyed household, soil/water conservation measures, fertilizer application and crop yield conditions and their changes and farmers' perceptions on weather conditions/natural resources conditions/crops yield and return, and cropping calendar in 2000 and 2001 are surveyed. Consequently the data obtained from our questionnaire can be utilized for the analyses of the farmers' perceptions of climatic changes and weather variations and of the changes in soil fertility and agricultural sustainability, the impacts of these changes on agricultural and food production and farm economy, and farmers' technological, economic, and institutional responses to these changes for each surveyed plot and for the whole surveyed household.

### 3.1.3 Farm Survey Logistics

We plan to conduct our farm surveys during August 18 – September 17, 2002 in Turkey. Thus during the Kick-off meeting in July 2002, Dr. Tsujii with his Turkey counterpart(s) would like to make detailed plan for the survey, the needed modifications of the questionnaire to be applicable to the Turkey conditions, and its field test if possible. Dr. Tsujii with Turkey counterpart(s) also would like to determine three survey areas and survey villages during the Kick-off meeting. During the Kick-off meeting and the time of farm survey Dr. Tsujii would like to ask the Turkey counterpart(s) to finalize the survey areas and survey villages, make the list of all the farm households in each survey village, and random sample 50 farm households

for each survey village.

During this farm surveys, we request help from three Turkey young agricultural economists (10 days for each agricultural economist and for each of the three areas. There are two surveyed villages for each area.) and six Turkey graduate students (27 days for each student and two students for each surveyed area) who can speak English well and who are well experienced in farm survey. Dr. Asami and three graduate students from Graduate School of Agriculture, Kyoto University will participate our farm survey. Dr. Asami will be in Turkey for about 20 days starting from August 18, 2002, and will visit survey villages and participate farm surveys during most of his stay in Turkey. Three Graduate students of Kyoto University, Mr. Motoi Kusadokoro, Mr. Takeshi Maru, and Mrs. Gulnur Muhammad will participate farm surveys from August 17 to September 17, 2002. They have been trained to understand, revise, and print and compile our questionnaire by Dr. Tsujii in Kyoto, Japan during last one month. We ask and hope the young three Turkey agricultural economists and six Turkey graduate students will lead the planned farm surveys, and Dr. Asami and the three Graduate students from Kyoto University will cooperate with and help if possible the Turkey participants for the farm surveys. This will be a very good opportunity for Dr. Asami and three graduate students from Kyoto University to know the real situation of Turkey farm households and agriculture.

### 3.2 A Regional Econometric Study of the Interactions Among Climatic Changes, Agricultural Supply and Demand, and Agricultural Policy:

Dr. Masaru Kagatsume and Dr. Erol H. Cakmak, Professor,

Regional and time series statistical data and such other necessary data as climatic changes, technology changes, policy and institutional changes, foreign exchanges and inflation for the econometric study will be collected. Then model formulation, and parameters' estimation will be done, and simulation analyses for climatic changes and policy and institutional changes will be done. Integrations and syntheses with farm survey analyses, positive mathematical programming analyses, institutional economic analyses of the agricultural commons such as pasture and water will be sought

### 3.3 A Regional Positive Mathematical Programming Analysis of the Interdependences Among Cropping Pattern, Water Use, Agricultural Economy and Policy, and Climatic Change

A formulation of a regional positive mathematical programming model in order to explain interdependences among cropping systems, water use, soil fertility, technology, climatic change, economic and policy conditions.

Dr. Kameyama and Dr. Erol H. Cakmak, Professor.

### 3.4 Institutional Economic Analyses of Management of Commons such as Irrigation Water (with an emphasis on the roles of water users' association), Soil Fertility, Pasture, and Conflicts Between Pastoralists and Farmers.

Dr. Umetsu, Dr. Asami, Dr. Tsujii, and Dr. Onur Erkan.