

**Impacts of Climate Change on Agricultural Production in Arid Areas: Economic Analysis of
Climate Changes on Agricultural Production Systems and Identification of Policy and
Institutional Measures in Cukurova and Central Anatolia Regions.**

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1. Introduction

The latest unforecasted events in the climate show that the world's climate is most probably changing. The floods in Germany, in Hungary and in Turkey in 2002 have killed many people and set off alarm bells among the people in these countries. The scientific evidence on global climate change and especially on global warming is now stronger than ever. The forecast studies in relation to global warming show that the temperature of the world will rise between 1.4 to 5.8 degrees Celsius over the next century. High temperatures will be accompanied by rising sea levels and more frequent occurrence of extreme weather events such as floods, droughts and storms. We are now experiencing these extreme weather events in many countries. These events might occur more frequently and hazardous in the coming years.

The changes in climate will also affect agriculture. Although scientists are uncertain about the impact of the climate changes on agriculture, they agree on some likely effects. Some scientists claim that global warming could increase water supply in some water-scarce areas and hence increase crop yields in temperate and in some subtropical zones. It is claimed that higher crop yields could result from the carbon dioxide fertilizer effect. However, to get this positive effect, the existence of a certain amount of water or nitrogen in the soil is necessary.

On the other hand the United Nations' Intergovernmental Panel on Climate Change (IPCC) forecasts that crop yields will decrease and flooding risk will increase in most tropical and subtropical regions.

Rising temperatures and frequent extreme weather events will cause damages to agricultural production but agriculture will also suffer from increased pests and diseases. And also soil is expected to erode and degrade due to heavy rains and storms. Moreover livestock and fish production systems will also suffer from rising temperatures and extreme weather events.

We are expecting climate changes in the coming years. But we are not certain about the type of changes. Will this climatic changes be permanent or fluctuating? Nobody knows...

It is almost clear that the impact of climatic changes will be different in different geographic regions. For example 2⁰ C temperature increase will result different impacts on continental and subtropical climatic zones. Presently scientists from different disciplines are conducting researches in different parts of the world in order to better understand the impact of climate changes on agriculture and the role of agriculture on climate changes. A multidisciplinary research is needed to explore the interrelations between climatic events and their impact on soil structure, irrigation sources, plant yields and quality, livestock yields, farm structure and income etc. in different agroclimatic zones of the world. This subproject which covers the

socio-economic aspects of the impact of climate change on agriculture is a part of multidisciplinary research.

The purposes of this subproject are:

- a) to identify the effect of global warming on economic structure and economic results of farms,
- b) to determine the impact of global warming on soil fertility, crop yields, cropping patterns, water availability/use/conservation, new technology,
- c) to understand farmers' perception and behaviour concerning natural resources and agricultural production.
- d) to identify necessary policies and institutional measures to cope with global warming.

2. Material and Method

2.1. Material

The main material that will be used in this research will be obtained from the questionnaire that will be applied to the farmers by the research team. The questionnaire will be pretested in the two research provinces before its application to sample farmers. Also some secondary data such as reports and statistics will be used to facilitate and to support the research.

2.2. Method

Primary data will be collected from two different geographic zones: the first zone is subtropical zone which covers the Çukurova region that is in the east Mediterranean region. The second region is selected from Central Anatolia which represents the continental climate.

Adana province was selected to represent the subtropical zone and Konya province was selected to represent continental climate.

2.2.1. Selection of Villages

Two irrigated and two rainfed villages were selected from the plain part of Adana province to represent subtropical zone. One irrigated and one rainfed village were selected from the plain part of Konya province in the Central Anatolia.

The "judgement sampling" method was used in selecting the villages. Soil classes, cropping pattern, livestock situation, agricultural production techniques, economic structure and distribution of farms were taken into consideration as criteria in representing the zones.

The names of irrigated and rainfed villages from two provinces are given below:

Village Name	Province Name	I/R
Kadıköy	Adana	I
Taşcı	Adana	I
Yeniyayla	Adana	R
Çiçekli	Adana	R
Okcu	Konya	I
Meydan	Konya	R

I: Irrigated R: Rainfed

2.2.2. Selection of Farmers

The farms in the villages will be stratified according to farm size groups. From each group a representative number of farmers will be interviewed. The farmers will be selected randomly and those who are willingly and voluntarily cooperate with the researches will be interviewed.

2.2.3. Analysis of Data

Appropriate computer programs such as SPSS will be used in the analysis of the data. A Regional Agricultural Production Model (RAPM) for Adana will be developed. The RAPM will use primary data that are collected from the farmers and data from the regional offices of DSİ (State Water Affairs), General Directorate of Rural Services (Tarsus) and studies conducted at the Cukurova University.