

Objectives of the ICCAP

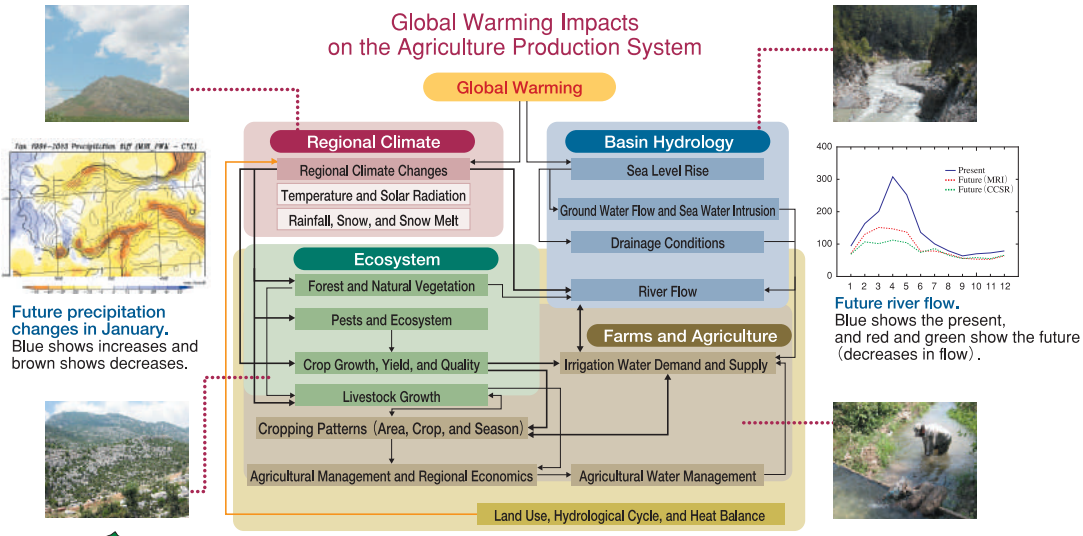
## Climate change and agriculture

The project ICCAP assessed the impacts of global warming on regional climate and on regional hydrology and agriculture.

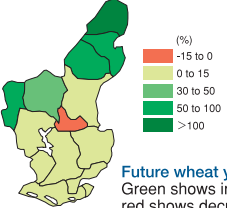
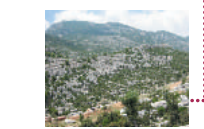
The directions and dimensions of the potential impacts of climate change on agricultural production systems were identified in the Seyhan River Basin, located on the eastern coast of the Mediterranean Sea.

Possible problems were assessed by projecting impacts such as rises in temperature and sea level and decreases in precipitation.

Overall, the research sought to comprehend agriculture as an interface between human and natural systems.



**Future precipitation changes in January.** Blue shows increases and brown shows decreases.



**Future wheat yield changes.** Green shows increases and red shows decreases.



**Future river flow.** Blue shows the present, and red and green show the future (decreases in flow).



**Changes in the average groundwater table in the lower delta.** Blue shows rises and red shows declines.

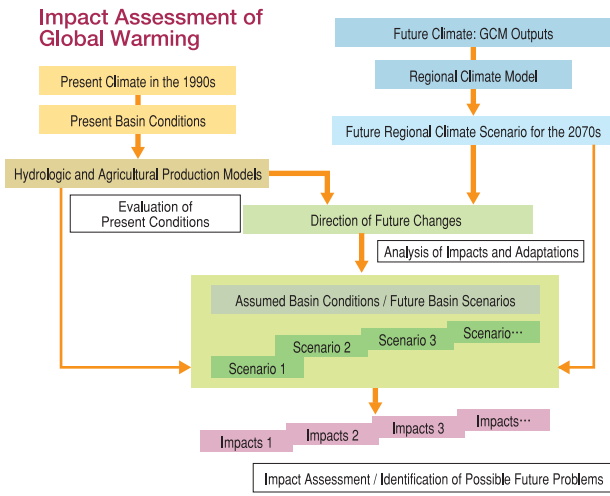
### Scope of Impact Assessment in the ICCAP

The path of climate change impacts on agricultural production in the Seyhan Basin was depicted by a framework of associated components, critical factors, and relations. The reciprocal relationships between crops and livestock, pests and diseases, and ecosystem transitions were not direct objects of the assessment.

Scenarios and Models

## Approach of the climate change impact assessment

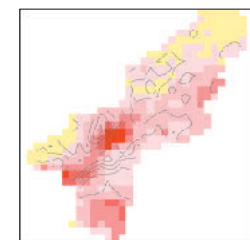
- Two GCMs for the future (2070s) were dynamically downscaled using a regional climate model with approximately 8.3-km spatial resolution. The future regional climate scenarios were generated with these downscaled data.
- Basin hydrology models and agriculture production models were driven using present-day (1990s) climate data to simulate the current conditions.
- Possible problems in agriculture and water use were estimated under the current basin conditions and future regional climate scenarios.
- Some future basin conditions in land and water management were supposed, since it is impossible to predict the exact features of future agricultural production such as land use, cropping patterns, and farm prices. The possible future changes predicted by the basin-condition scenarios were analyzed comparatively.
- The future basin scenarios cover the cropping patterns and the management of land and water uses.



Project Outcomes

## What will happen in the case of higher temperature and less precipitation?

- State-of-the-art General Circulation Models (GCMs) and pseudo-global warming experiments for the 2070s indicate temperature increases of 2 to 3°C in all seasons and precipitation decreases of approximately 20%, except in the summer season.
- Field experiments and crop models demonstrated that future wheat yields could increase in some regions but decrease in others. Specifically, the wheat yield may increase due to higher air temperatures and CO<sub>2</sub> concentrations, but decrease due to less precipitation.
- Climate changes would also affect natural vegetation. In the 2070s, the areas covered by steppe and evergreen broadleaved forest may increase, while sub-alpine plant areas may decrease.
- Decreases in snow and rainfall will reduce available water resources. However, the greater cultivation of highly profitable crops such as vegetables and fruits would increase irrigation demands, possibly resulting in water shortages and lower yields in irrigated areas.



**Changes in annual runoff.** Blue shows increases and red shows decreases.

• These projections and predictions are presented for discussion and should be recognized as inferences based on probable conditions and available information. An adaptive management approach will be essential in the future to adjust to the conditions of global warming.

Outcomes and Publications

## Guide to detailed project outcomes

- The project outcomes have been distributed through books, lectures, and reports both inside and outside Japan. Many scientific papers have been published in academic journals and presented at international conferences.
- Reports have also been published in the Turkish language. In addition, researchers participated in an international symposium on sustainable agriculture held in Adana, Turkey, in 2006. Project outcomes were also disseminated through television programs broadcasted in Turkey.
- The outcomes will help in efforts to combat global warming. The methodologies developed and the results are available to other researchers and have been disseminated to international organizations such as the International Committee on Irrigation and Drainage (ICID).



The Final Report, which summarizes the project outcomes, can be downloaded from the RIHN homepage at <http://www.chikyu.ac.jp/iccap/>