

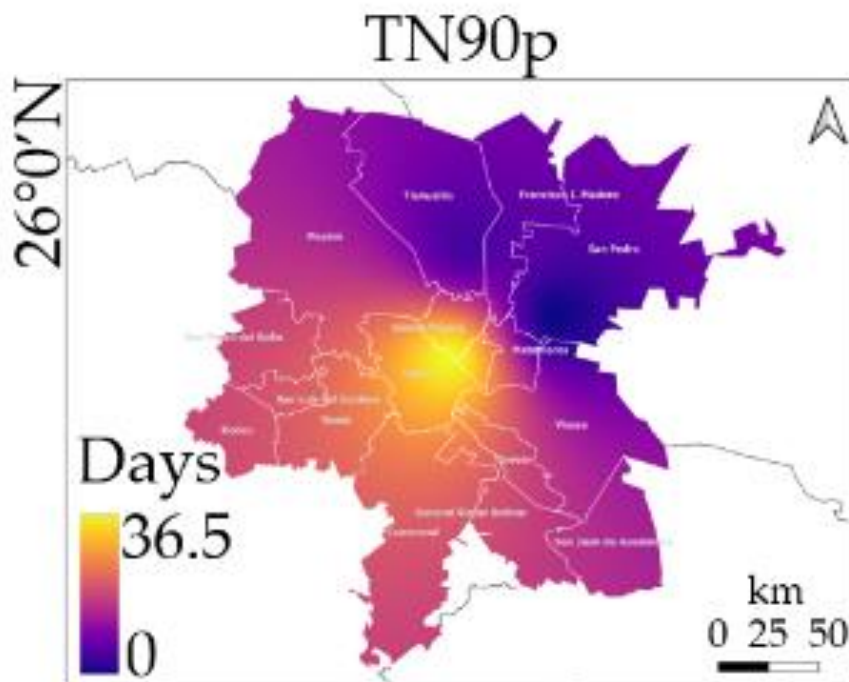


**AGRICULTURA**  
SECRETARÍA DE AGRICULTURA Y DESARROLLO RURAL



Technical Sheet Human Resources Development Program under the Global Strategic Partnership between Mexico and Japan (Nichiboku)

# Evaluation of Agricultural Water Availability under Climate Change Scenarios



**INIFAP CENID – RASPA, Gómez Palacio,  
Durango.**

**Program period:**  
September 22 – 28, 2026

# **I. Background**

## **Course Title**

Training Course: Evaluation of Agricultural Water Availability under Climate Change Scenarios

## **Objective**

To strengthen participants' capacities in analyzing climate variability and climate change and their impacts on agricultural water availability, through training in the use of ETCCDI climate indices, estimation of crop water requirements, and agricultural water balance analysis, while promoting knowledge exchange and academic cooperation between Mexico and Japan.

## **Goal**

To train three Japanese students through an intensive two-week course on methodologies for detecting climate change signals using ETCCDI climate indices, as well as on estimating crop water requirements and analyzing agricultural water balances, thereby strengthening their capacity to assess agricultural water availability under conditions of climate variability and climate change.

## **Expected Results**

- Specialized training of Japanese students in the analysis of climate variability and climate change and their relationship with agricultural water availability.
- Strengthened technical capacities of participants in the use of ETCCDI climate indices for detecting climate change signals.
- Practical application of methodologies for estimating crop water requirements and analyzing agricultural water balances using meteorological data.
- Development of practical exercises and case studies aimed at evaluating agricultural water availability under climate variability conditions.
- Generation of technical and teaching materials derived from the course that may be used in future training or academic activities.
- Strengthening academic cooperation between Mexico and Japan through

the exchange of knowledge and experiences between specialists and students from both countries.

- Identification of potential academic or research collaboration opportunities related to agricultural climatology, climate change, and water management.

### **Target Participants**

Undergraduate students, master's, or doctoral students in fields related to agriculture, environmental sciences, climatology, hydrology, agricultural engineering, or related disciplines.

## **II. Description of the Training Course**

The course "**Evaluation of Agricultural Water Availability under Climate Change Scenarios**" aims to provide participants with theoretical and practical knowledge on the relationship between climate, water availability, and agricultural production. In particular, the course will address methodologies for analyzing climate variability and climate change, as well as tools to evaluate their potential impacts on water resources used in agriculture.

During the course, fundamental concepts of agricultural climatology will be introduced, and methods for detecting climate change signals using ETCCDI climate indices will be presented. In addition, methodologies for estimating crop water requirements and analyzing agricultural water balance will be reviewed using meteorological and agroclimatic information.

The training will last two weeks and will be conducted through theoretical and practical sessions. Activities will include lectures, applied exercises using climate data, case study analyses, and technical discussions focused on understanding the impacts of climate variability and climate change on water availability for agriculture.

The course will follow a theoretical-practical and participatory teaching approach, designed to facilitate understanding of key concepts and their application in the analysis of agricultural water availability under climate variability and climate change conditions.

Theoretical sessions will introduce fundamental concepts related to agricultural climatology, climate variability, climate change, and water management in agriculture. These sessions will provide the conceptual basis needed to understand the methodologies used to evaluate water availability in agricultural systems.

Complementary practical sessions will allow participants to work with meteorological and agroclimatic data to apply specific methodologies such as:

- calculation of climate indices for detecting climate change signals
- estimation of crop water requirements
- analysis of agricultural water balances

The course will also include case study analysis, technical discussions, and applied exercises that will allow participants to reflect on the potential impacts of climate change on water resources for agriculture, particularly in water-limited regions.

Finally, learning will be reinforced through discussion and exchange activities, encouraging active participation and academic dialogue between participants and the instructor. This approach aims to consolidate the knowledge acquired and stimulate the development of analytical skills applicable to real agricultural contexts.

Through this training activity, the course seeks to strengthen participants' analytical capacities for evaluating agricultural water availability while also promoting knowledge exchange and academic cooperation between Mexico and Japan in the fields of agriculture and sustainable water management.

### **III. General Information**

#### **Course Period**

September 22 – 28, 2026

#### **Location**

INIFAP CENID – RASPA ubicado en Km 6.5 al margen derecho del Canal del Sacramento en Gómez Palacio, Durango.

## **Language**

English

## **Modality**

Face-to-face

## **Maximum number of participants**

3 participants

# **IV. Eligibility**

## **1. Expectations for Participants**

Participants are expected to demonstrate academic interest in topics related to agricultural climatology, climate change, water resource management, and their relationship with agricultural production.

During the course, participants are expected to:

- Actively participate in theoretical and practical sessions.
- Complete exercises and applied activities related to climate data analysis, calculation of climate indices, and estimation of crop water requirements.
- Contribute to technical discussions and academic exchange activities.
- Present the results of exercises or analyses developed during the course.
- Share the knowledge gained in their home institutions after completing the training.

## **2. Requirements for Candidates**

Applicants should preferably meet the following requirements:

- Be undergraduate (advanced level), master's, or doctoral students in fields related to agriculture, climatology, environmental sciences, agricultural engineering, hydrology, or related disciplines.
- Have academic interest in climate change, agricultural climatology, or water management in agriculture.
- Have basic knowledge of climate or meteorological data analysis (desirable).
- Candidates interested in developing research or academic activities related to climate analysis, climate change, and water management in agricultural systems will be prioritized.
- Health: Applicants must be in good physical and mental health to participate in the program.
- Language: English proficiency.
- Participants must bring a laptop computer and USB storage device.
- Computer skills: proficiency in MS Word, Excel, PowerPoint, etc.
- Gender consideration: INIFAP promotes gender equality and encourages women to apply.

## **3. Conditions for Participation**

Participants must:

- Have received an official acceptance notice.
- Strictly follow the course schedule.
- Remain in the state of Durango during the training period unless prior authorization is granted by the organizers.
- Not bring or invite additional persons not officially registered in the program.
- Respect and comply with all instructions and conditions established by the organizers.

## **V. Information about the Training Center**

The National Research Center for Water–Soil–Plant–Atmosphere Relationships (CENID-RASPA) conducts research focused on crop water requirements of major grass, horticultural, forage, and industrial crops of national importance. Research activities also include evaluation and optimization of water management in agricultural fields and the study of global climate change impacts, particularly on precipitation, runoff, vegetation, soils, and forest fire dynamics.

CENID-RASPA hosts a GIS Laboratory for Water and Soil, which conducts research aimed at providing solutions to various environmental and agricultural challenges. The laboratory's research line focuses on water resource studies and has made significant contributions at the national level in both scientific and technological knowledge. Its work contributes to a better understanding of the interactions between productive activities—especially agricultural, livestock, and forestry—and natural resources, with particular emphasis on water availability and quality.

### **Additional Information**

- Participants should bring appropriate footwear for field visits.
- The climate in the Comarca Lagunera region is very warm, so appropriate clothing is recommended.
- Participants are advised to bring any personal medications needed for their health care.



**SECRETARIAT OF AGRICULTURE AND RURAL DEVELOPMENT**

**MEXICAN AGENCY FOR INTERNATIONAL DEVELOPMENT COOPERATION**

**NATIONAL FORESTRY, AGRICULTURAL AND LIVESTOCK RESEARCH INSTITUTE**

**BILATERAL COOPERATION PROJECT:**

Cooperation Program for Human Resources Training in the Mexico-Japan Strategic  
Global Partnership (Nichiboku Program)

**MEXICO - JAPAN**

**TRAINING AND TECHNICAL ASSISTANCE:**

Evaluation of Agricultural Water Availability under Climate Change Scenarios

**EXECUTING INSTITUTION:**

**NATIONAL INSTITUTE OF FORESTRY, AGRICULTURAL AND LIVESTOCK RESEARCH (INIFAP)**

**MODALITY AND LOCATION OF THE TRAINING:**

On-site INIFAP CENID - RASPA (Mexico-Japan)

PERIOD: SEPTEMBER 22-28, 2026

## WORK PLAN

### Evaluation of Agricultural Water Availability under Climate Change Scenarios

#### INTRODUCTION

Agriculture in semi-arid regions faces increasing challenges associated with climate variability and the reduction in water resource availability. In this context, strengthening technical capacities to evaluate water availability in agricultural systems and to analyze the potential impacts of climate change on agricultural production is essential.

Mexico has extensive semi-arid agricultural regions where efficient water management represents a strategic priority. Academic exchange with students from Japan will provide an opportunity to share methodological approaches, agroclimatic analysis tools, and experiences related to water management in agriculture.

This intensive course aims to provide both theoretical and practical knowledge on the evaluation of agricultural water availability under climate change scenarios, contributing to the strengthening of technical capacities and to the development of academic cooperation links between Mexico and Japan.

#### TRAINING OBJECTIVES

Objective 1. To provide training in methods for detecting climate change signals using ETCCDI climate indices, as well as in the estimation of crop water requirements and the analysis of agricultural water balance.

Objective 2. To analyze the effects of climate variability and climate change on the availability of water resources for agriculture.

Objective 3. To promote international cooperation between Mexico and Japan in the field of agriculture by encouraging knowledge transfer and collaboration among specialists from both countries.

## EXPECTED OUTCOMES

By the end of the course, participants are expected to have strengthened their theoretical and practical knowledge in the analysis of climate variability and climate change, as well as in the evaluation of agricultural water availability. In particular, participants are expected to develop skills in applying climate indices aimed at detecting climate change signals, estimating crop water requirements, and conducting water balance analyses in agricultural systems.

Participants are also expected to gain a comprehensive understanding of the challenges faced by agriculture in regions with limited water resources, particularly under climate change scenarios, and to apply the knowledge acquired within their academic or professional contexts. Finally, the course is expected to contribute to strengthening academic and scientific cooperation between Mexico and Japan by promoting knowledge exchange, encouraging the development of future research collaborations, and supporting the creation of international networks in the fields of agricultural climatology and water resource management.

## PARTICIPATING RESEARCHERS

NAME/EMAIL	SPECIALTY	AFFILIATION	COUNTRY
<b>Dra. Nuria Aide López Hernández</b> Researcher lopez.nuria@inifap.gob.mx	Irrigation Engineering and Climate Change	National Institute for Forestry, Agriculture and Livestock Research (INIFAP) National Disciplinary Research Center on Water-Soil-Plant-Atmosphere Relationships (CENID-RASPA).	Mexico

## WORK PLAN

### Evaluation of Agricultural Water Availability under Climate Change Scenarios

**Objective:** To strengthen participants' technical capacities in the analysis of climate variability and climate change, as well as in the evaluation of agricultural water availability, through the application of climate indices, the estimation of crop water requirements, and the analysis of agricultural water balances.

**Didactic Scope:** The course will follow a theoretical-practical approach, aimed at providing participants with methodological tools to analyze the relationship between climate, water availability, and agricultural production. Throughout the course, students will be introduced to fundamental concepts of agricultural climatology and climate change, with emphasis on the use of climate indices to detect signals of climate variability and change. Additionally, methodologies for estimating crop water requirements using meteorological data will be addressed. The sessions will include theoretical lectures, practical exercises using climate data, case study analyses, and technical discussions aimed at understanding the impacts of climate change on water resources for agriculture. Through this approach, participants are expected to develop skills to apply agroclimatic analysis tools in agricultural systems with water limitations.

**Session 1 – Tuesday, September 22, 2026**

HORARIO	TEMA	DIRIGIDO A	INSTRUCTOR
08:00 - 10:00 (Mexico Time)	1. Introduction to the course and fundamentals of agricultural climatology	Student	<b>Dra. Nuria Aide López Hernández</b>
10:00 - 16:00 (Mexico Time)	2. Climate geoportals and sources of climate information 3. Introduction to the analysis of climate time series of meteorological variables relevant to agriculture 4. Practical exercise using meteorological data	Student	<b>Dra. Nuria Aide López Hernández</b>

**Session 2: Wednesday, September 23, 2026**

HORARIO	TEMA	DIRIGIDO A	INSTRUCTOR
08:00 - 16:00 (Mexico Time)	1. Introduction to quality control and homogenization analysis of climatological time series 2. Installation of the Climatol package (version 4.0.0) in R 3. Practical exercise using meteorological data	Student	<b>Dra. Nuria Aide López Hernández</b>

**Session 3: Thursday, September 24, 2026**

HORARIO	TEMA	DIRIGIDO A	INSTRUCTOR
08:00 - 16:00 (Mexico Time)	1. Introduction to ETCCDI climate indices 2. Identification of trends in climate variables 3. Analysis of extreme events 4. Practical exercise for calculating climate indices	Student	<b>Dra. Nuria Aide López Hernández</b>

**Session 4 – Friday, September 25, 2026**

HORARIO	TEMA	DIRIGIDO A	INSTRUCTOR
08:00 - 16:00 (Mexico Time)	1. Basic concepts of non-parametric trend tests 2. Practical exercises for evaluating climate time series	Student	<b>Dra. Nuria Aide López Hernández</b>

**Session 5 – Saturday, September 26, 2026**

HORARIO	TEMA	DIRIGIDO A	INSTRUCTOR
08:00 - 16:00 (Mexico Time)	1. Importance of crop yield data 2. Agricultural databases and data download 3. Practical exercises for downloading and analyzing crop yield data	Student	<b>Dra. Nuria Aide López Hernández</b>

HORARIO	TEMA	DIRIGIDO A	INSTRUCTOR
08:00 - 16:00 (Mexico Time)	4. Concepts of evapotranspiration 5. Methods for estimating evapotranspiration 6. Determination of crop water requirements 7. Practical exercise for calculating crop water requirements	Student	<b>Dra. Nuria Aide López Hernández</b>

### Session 6 – Monday, September 28, 2026

HORARIO	TEMA	DIRIGIDO A	INSTRUCTOR
08:00 - 16:00 (Mexico Time)	1. Presentation of exercises or analyses conducted by participants 2. Discussion of results 3. Course conclusions 4. Final evaluation and closing session	Student	<b>Dra. Nuria Aide López Hernández</b>