

# Irrigation Water Management In Rice Crop to Meet the Environmentally Minimum River Flow

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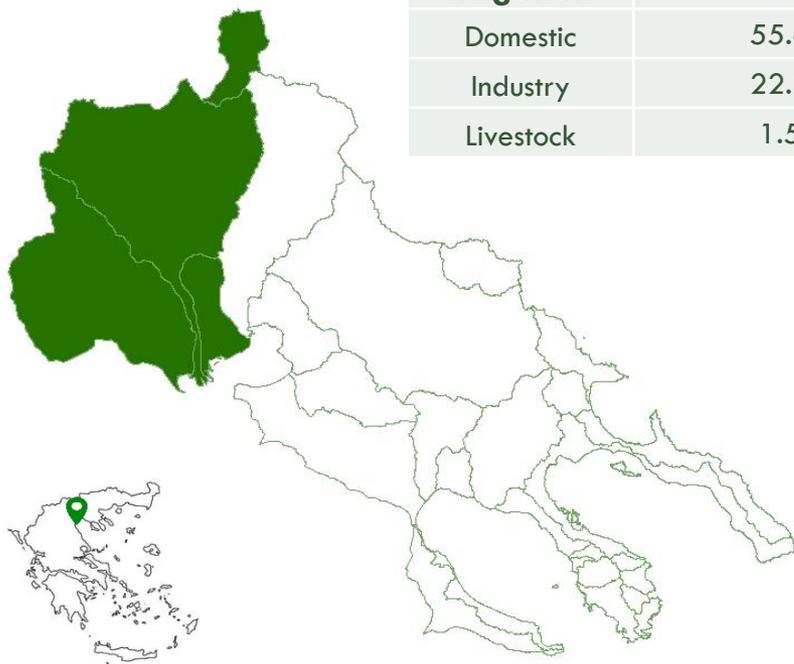


- Region: Central Macedonia, Greece
- Duration: 2.5 years (Feb 2023 – July 2025)
- Partners (5):
  - A Research Institute
  - A Farm Holder
  - Two Agricultural Cooperatives
  - An Environmental Organization
- Funder: Rural Development Programme (Greece)
- Website: <https://ricenviflow.gr/>

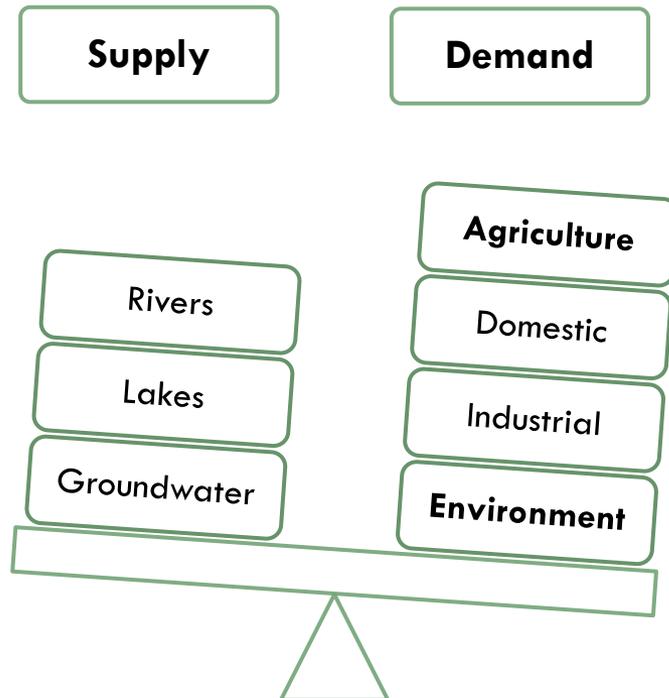
# Axios River Basin

## Total withdrawals of water uses\*

Uses	Withdrawals (hm <sup>3</sup> )
<b>Irrigation</b>	<b>637</b>
Domestic	55.6
Industry	22.3
Livestock	1.5

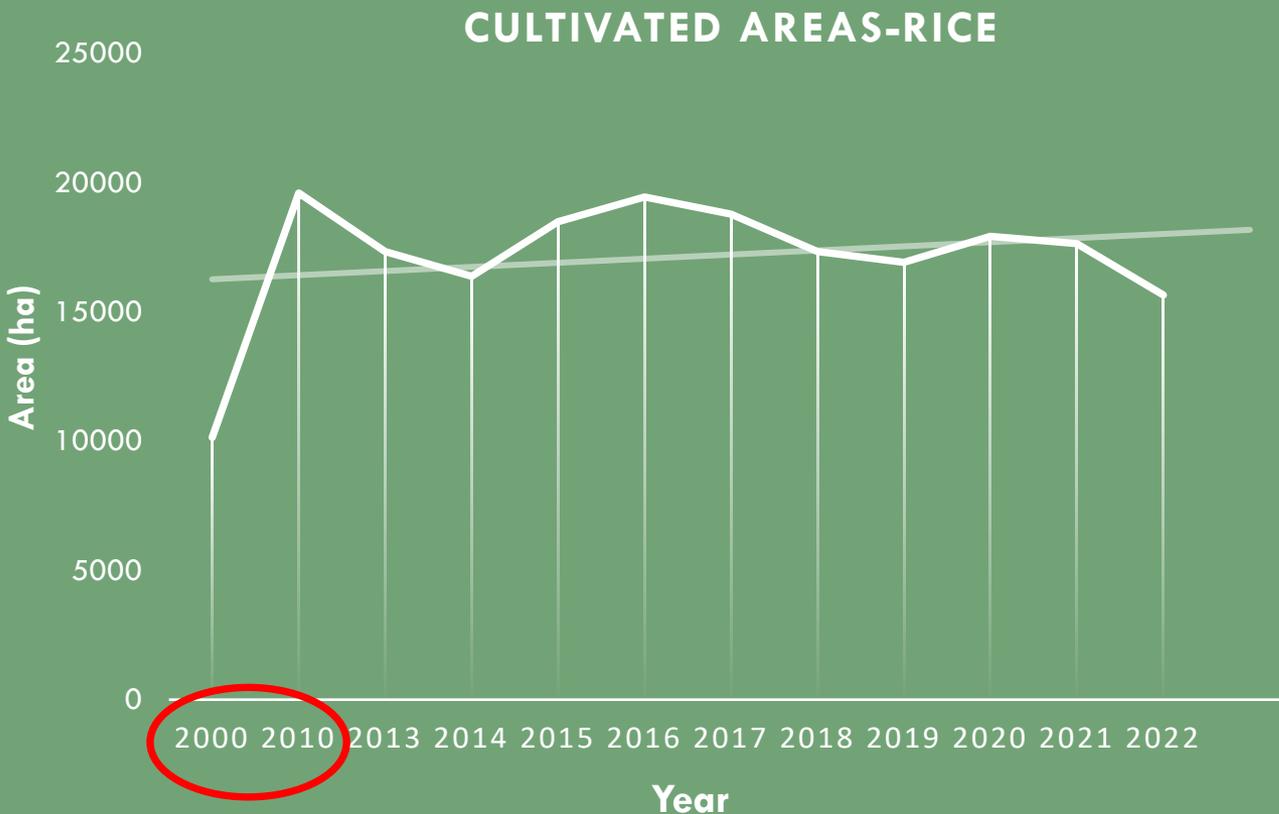


## Water Resources Management



\*Water Resources Management Plan, Water Directorates & Ministry of Environment (2024)

# Rice area evolution in Axios Collective Irrigation Systems (CIS)



## Crops in Axios CIS

- cotton, corn, etc.
- Rice (~65%)

Rice areas doubled in 10 years (2000-2010)

Rice requires almost twice water than other crops

Rice expansion exerts pressure on the water resources

# Rice pilot field



Irrigation experiment  
in rice crop

m<sup>3</sup>/ha  
21.000 (2023)  
25.000 (2024)

**A: 100%**

**B: 75%**

**C: 50%**



## Monitoring pilot field

Irrigation, m <sup>3</sup> (2023)	Subplot A	Subplot B	Subplot C
31/5	2.202	2.172	2.400
2-12/6	119	155	97
13/6-2/7	6.750	4.301	6.886
3-7/7	2.063	1.601	1.535
08-14/7	3.476	2.579	3.742
15-25/7	5.731	4.253	13.269
26/7-1/8	3.589	4.117	1.456
02-28/08	17.104	11.574	884
29/8-8/9	5.866	4.773	2.127
9/9-20/9	5.614	5.980	3.318
<b>Sum</b>	<b>52.514</b>	<b>41.505</b>	<b>35.714</b>



Soil sample collection



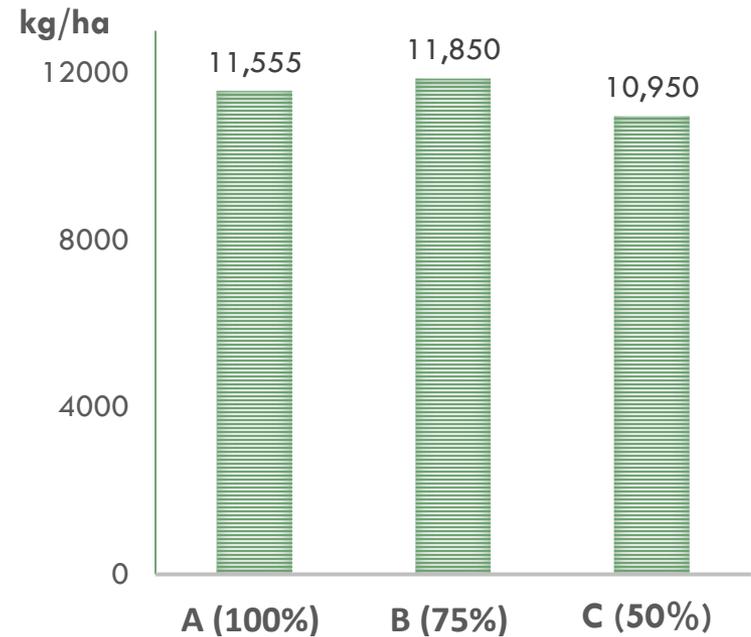
### Common cultivation practices in subplots

- Plowing, preparation for sowing
- Surface fertilization
- Fungicide spraying
- Manual weed destruction
- Harvesting

# Rice Crop Yield



**AVERAGE YIELD 2023-2024**



**Rice yield is almost the same by using half of the water that is commonly applied in the area**

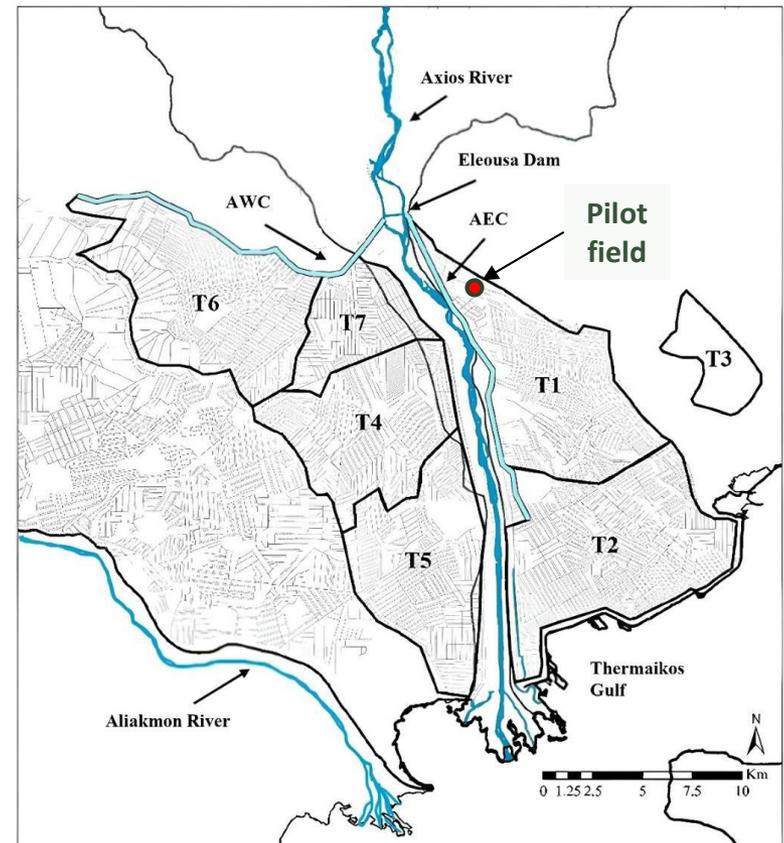
# Upscaling

**River Basin Model:**  
**MIKE HYDRO Basin**  
(irrigation node)

**Simulation period:**  
**Start: 01/01/2019**  
**End: 01/12/2022**



**Time step length:**  
**1 month**



Irrigation Systems (TOEV) in Axios area

# Input Data for agricultural water management



**Climate Data**



**Soil Characteristics**



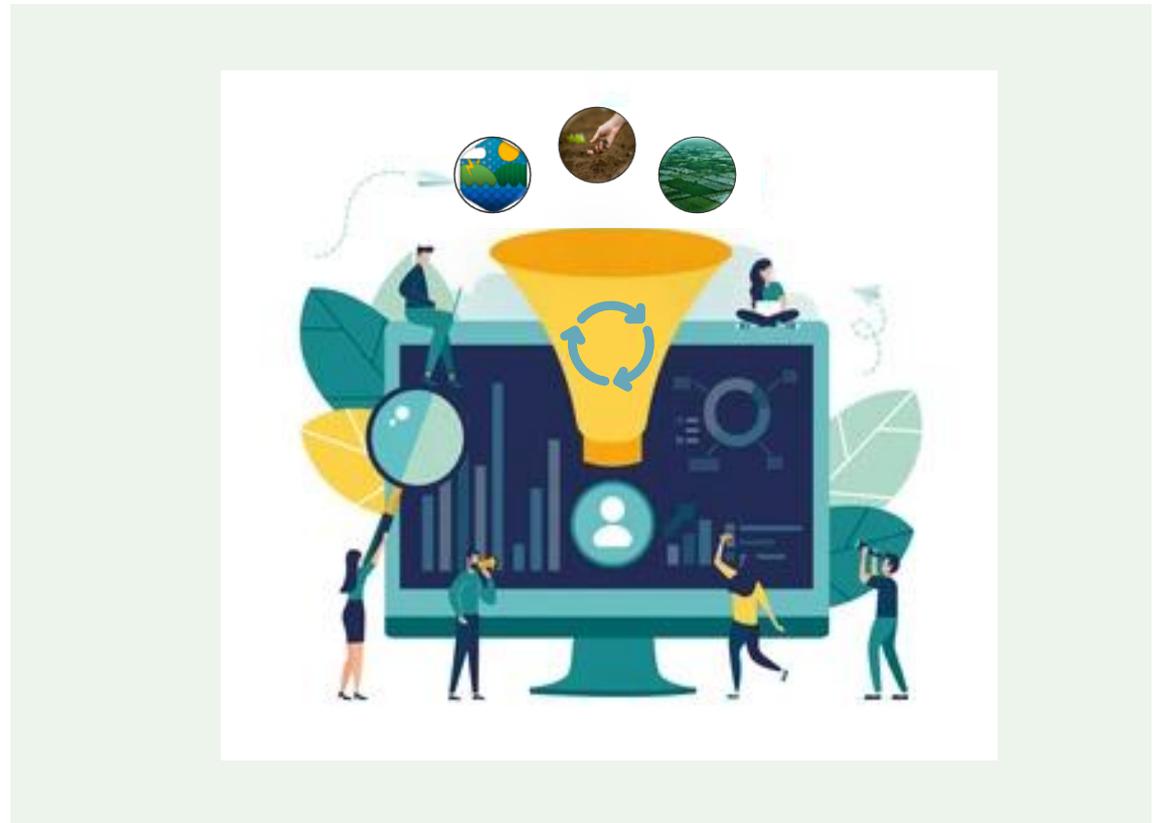
**Crop Characteristics**



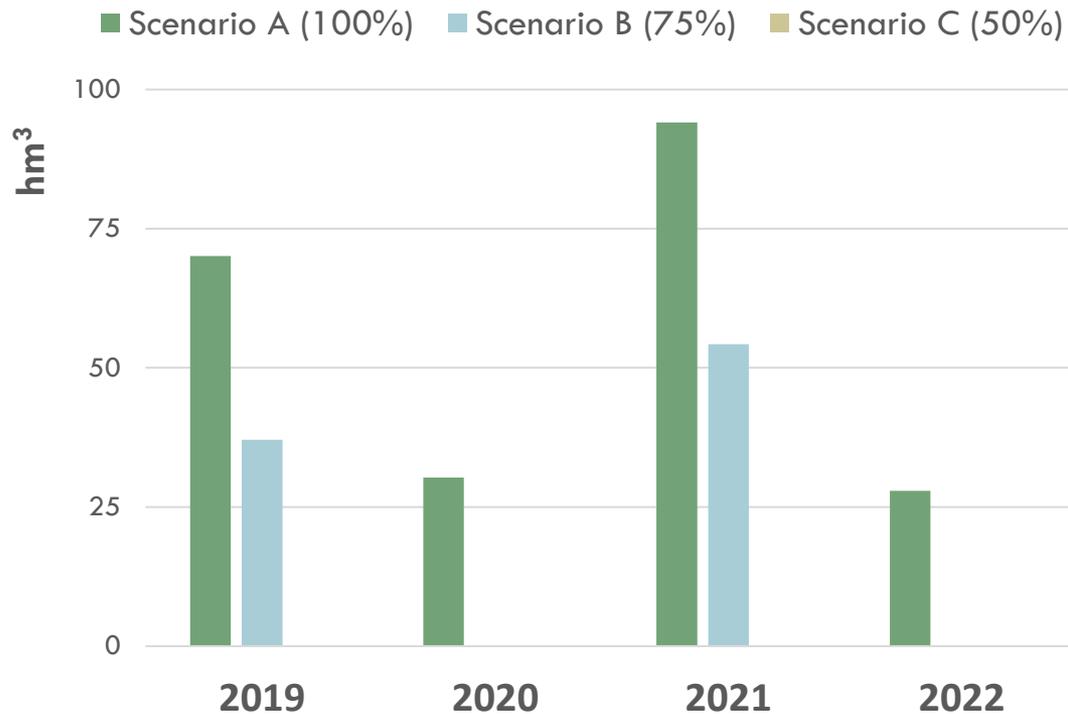
**Crop Distribution**



**Irrigation Method**



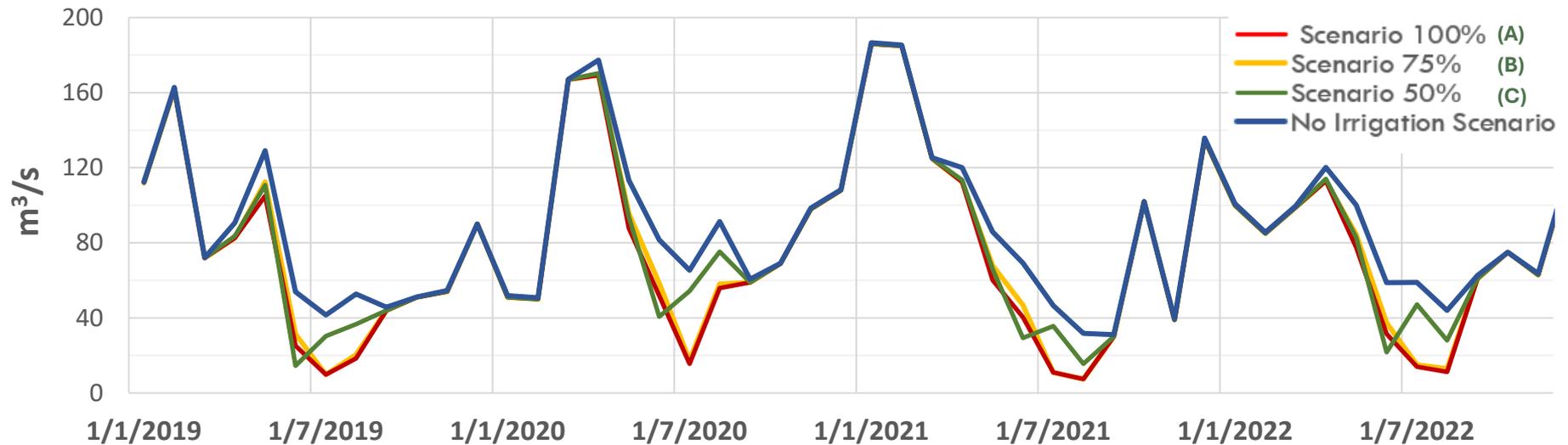
# Irrigation Deficit



- For Scenario A, there is not enough water in Axios river for irrigation; an irrigation deficit appears in each year.
- For Scenario B, the deficit decreased by 60%, compared to scenario A.
- For Scenario C, no irrigation deficit exists.

Modelling results clearly demonstrate that if the commonly used irrigation (100%) is applied, the **Axios River water is not enough for all irrigators.**

## Flow to the Axios river



- The *No Irrigation* Scenario approaches Environmental Flow Requirements at the estuary of Axios River
- For Scenario A and B, the river flow is considerably lower in summer months (peak of irrigation period)
- For Scenario C, the river flow is higher and, in several months, closer to the *No Irrigation* Scenario

**Scenario C promotes environmental sustainability at the Axios River basin**

## Dissemination actions

- ✓ Organise meetings with rice farmers
- ✓ Participate in meetings of other projects
- ✓ Cross-visit in Thessaloniki - EU CAP Network
- ✓ Project website & social media
- ✓ TV interview, newspaper article, layman's report



- ✓ Presentation at national conference
- ✓ Presentation at international conference
- ✓ Article in peer-review journal

## Conclusions – Work in Progress

Rice in Thessaloniki plain can be grown safely with less irrigation water than is used today.

Question remains (for the extra water):

- Either increase rice crop areas, or/and
- Sustain environmental integrity at the estuaries of Axios river (in terms of ecological flow)



Expand and strengthen the legacy of RicEnviFlow to:

- other rice varieties and other soil types
- arsenic contamination and nutrients runoff
- advanced monitoring in rice fields

**THANK YOU**

<https://ricenviflow.gr>

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and the European Union*

