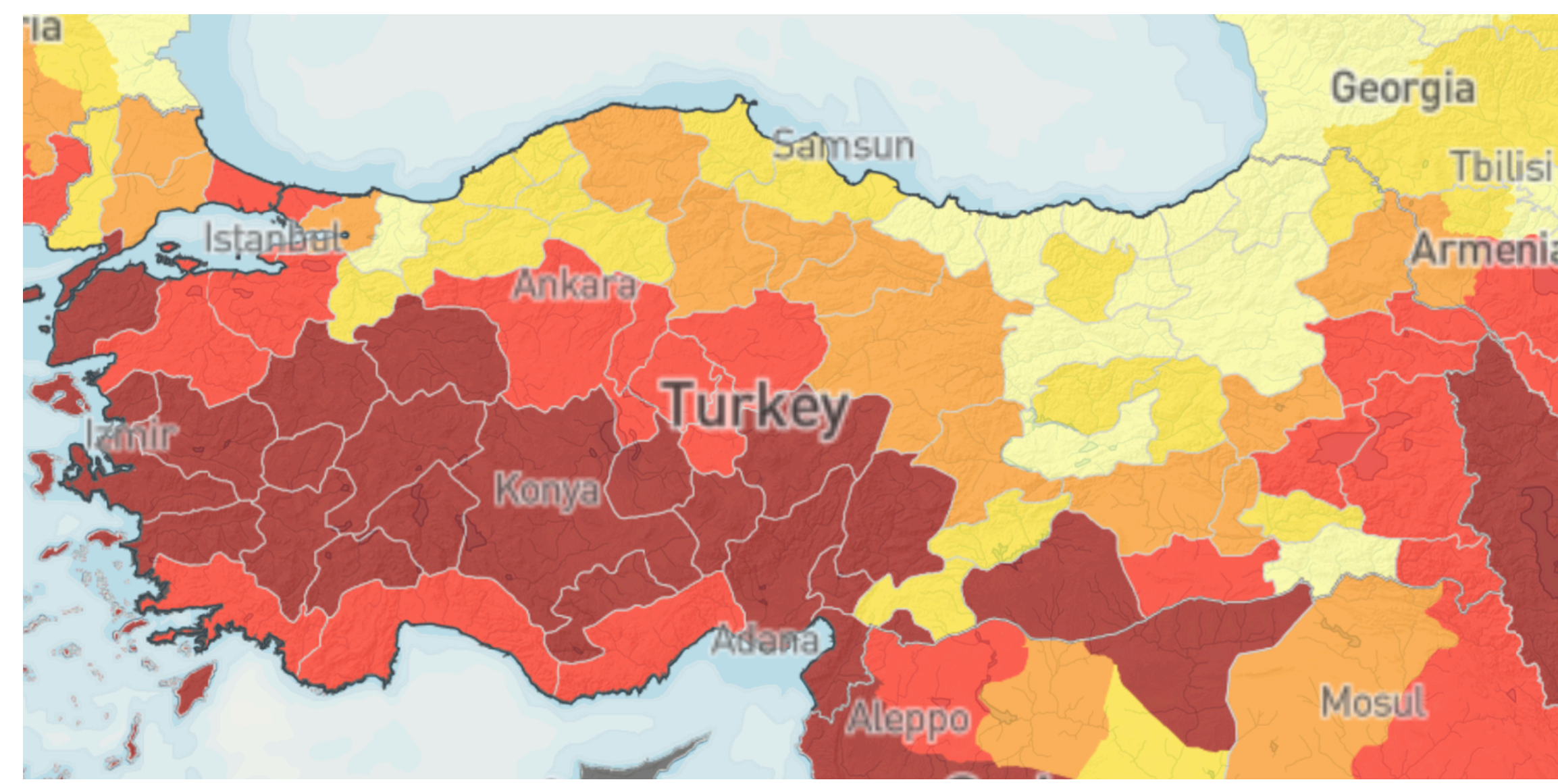
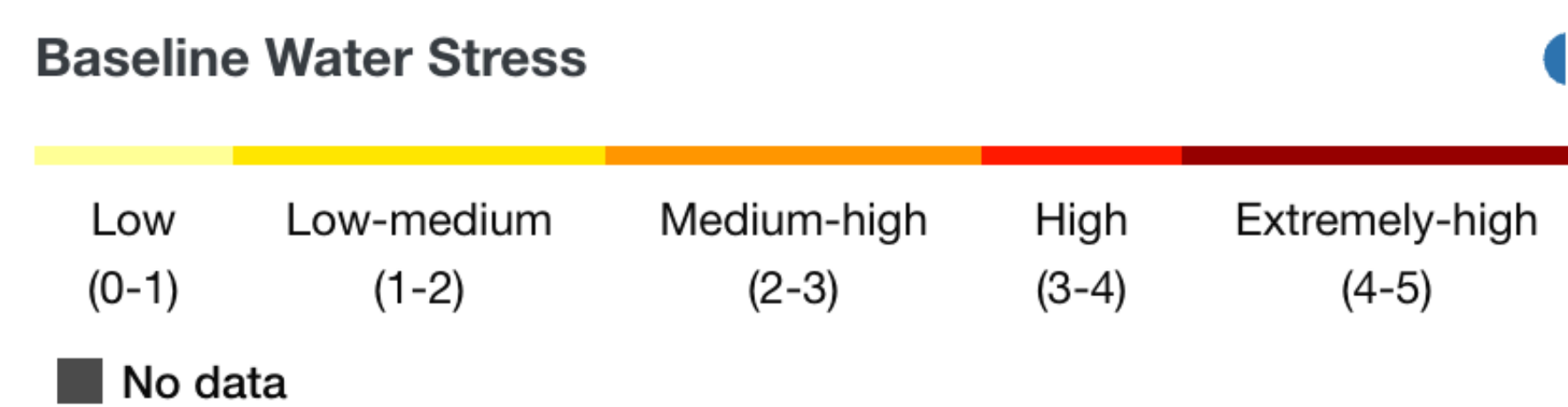


## Introduction

- Global water scarcity is becoming one of the most urgent development challenges of the 21st century. In Turkey, falling freshwater availability per capita and rising agricultural demand are creating growing stress on water systems, especially in regions heavily dependent on irrigation.
- Agriculture consumes over 70% of Turkey's water resources, and much of this use is inefficient. The Konya Closed Basin, often referred to as Turkey's "grain silo," is now one of the most water-stressed regions in the country, facing groundwater depletion, land subsidence, and declining crop yields.
- This study investigates how water scarcity—driven primarily by unsustainable irrigation—affects agricultural output and regional GDP.



Turkey's Baseline Water Stress Map



## Case Studies: Two Regions

### Konya Closed Basin

- Known as Turkey's "grain silo," but now one of its most water-stressed regions
- Groundwater levels have dropped >30 meters due to decades of overuse
- Over 75% of farmland is rainfed, and most irrigation is still traditional
- Water-intensive crops like maize and sugar beet dominate despite recurring droughts
- Wheat yields declined -4.2% more than in comparable provinces after 2014
- Economic output remains stable — but signals a disconnect between physical and economic indicators

### Southeastern Anatolia Project (GAP)

- A large-scale regional development project launched in the 1970s
- Expanded irrigation to over 1.8 million hectares, especially for cotton and wheat
- Significant gains in crop yields and diversification, especially in Şanlıurfa
- Still faces unequal growth: 77% of regional exports come from Gaziantep alone
- Energy costs and groundwater pumping are rising — exposing infrastructure limits
- Highlights both the potential and fragility of large irrigation investments

## Methodology & Questions

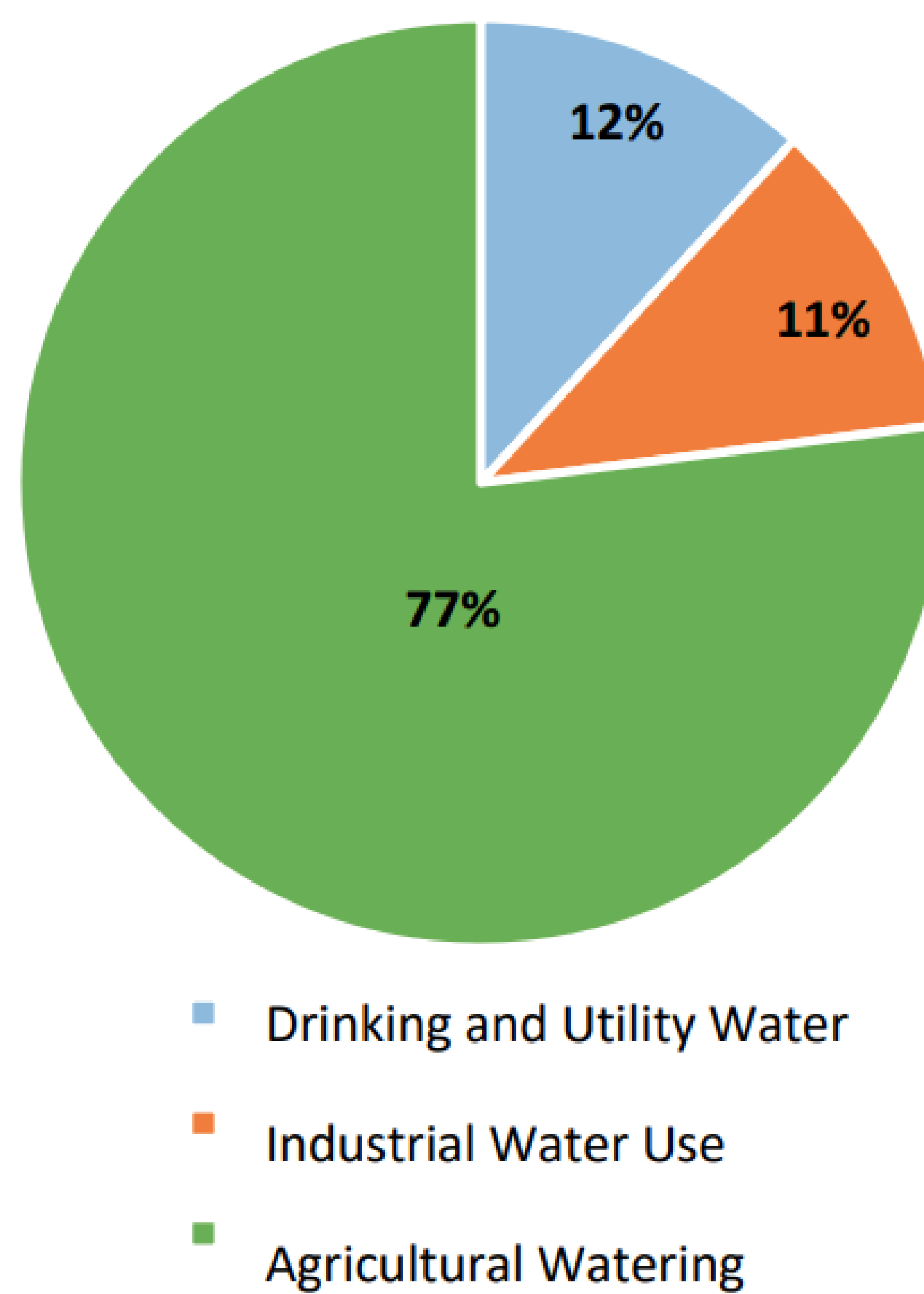
This project uses a mixed-methods approach to examine the economic impacts of water scarcity in Turkey, combining:

- Quantitative analysis using a Difference-in-Differences (DiD) model
- Compares wheat yield and agricultural GDP trends in Konya vs. similar provinces before and after 2014 (onset of severe water stress)
- Case studies of two contrasting regions:
- The Konya Closed Basin, where unregulated groundwater use has driven early yield decline
- The Southeastern Anatolia Project (GAP) region, where large-scale irrigation infrastructure has produced mixed results

### Research Questions:

- How does agricultural water scarcity affect crop yields and regional GDP in Turkey?
- Do early declines in physical productivity serve as warning signals for future economic risks?
- What role can irrigation efficiency and crop planning play in mitigating long-term losses?

## Sectoral Water Uses in Turkey



## Empirical Results

A Difference-in-Differences model shows that:

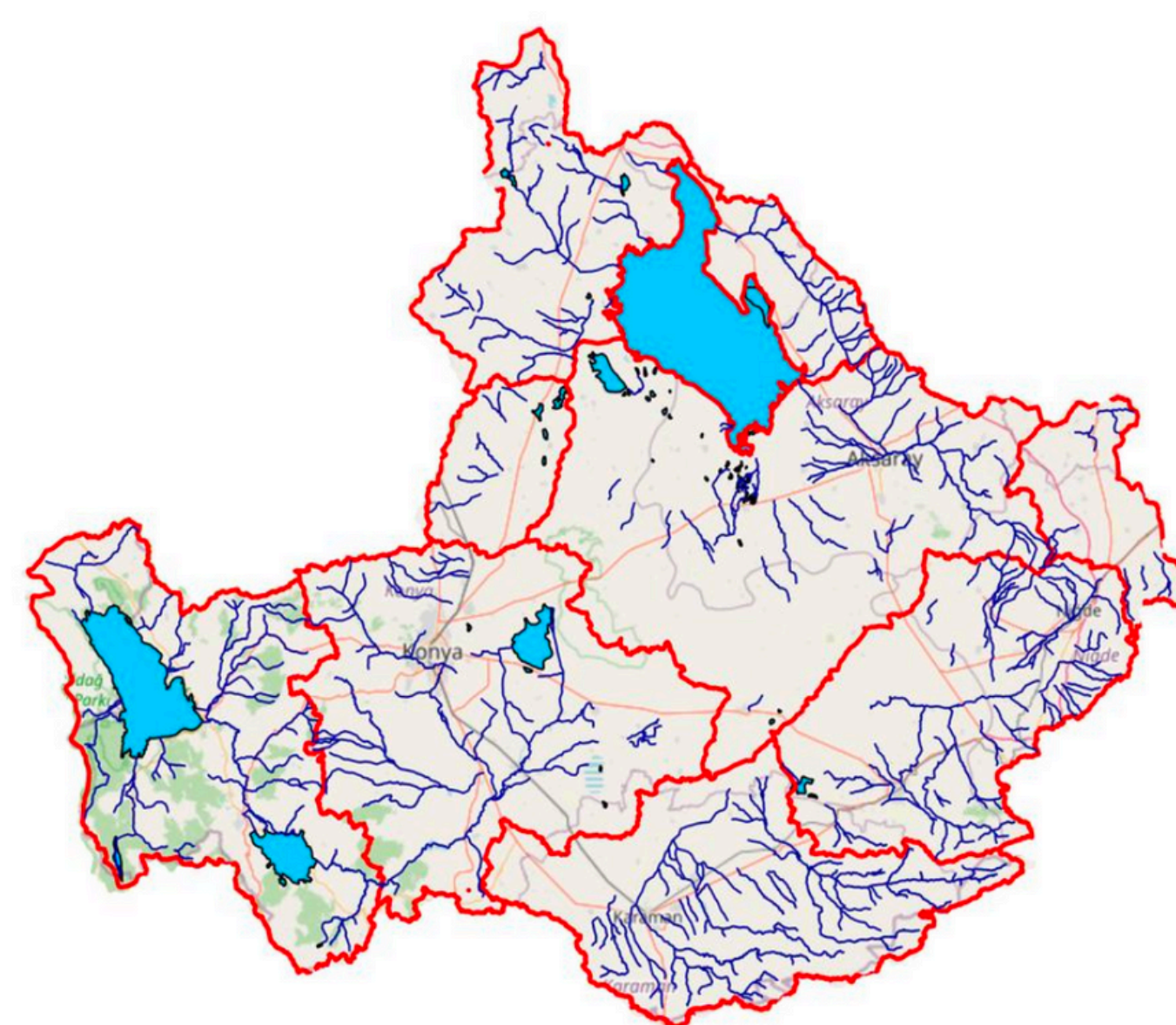
- Wheat yields in Konya declined by -4.2% more than in comparable provinces after 2014
- This effect is marginally significant and reflects early-stage impact of water stress

In contrast, agricultural GDP in Konya showed no significant decline — and may have slightly increased. This yield-GDP disconnect suggests that:

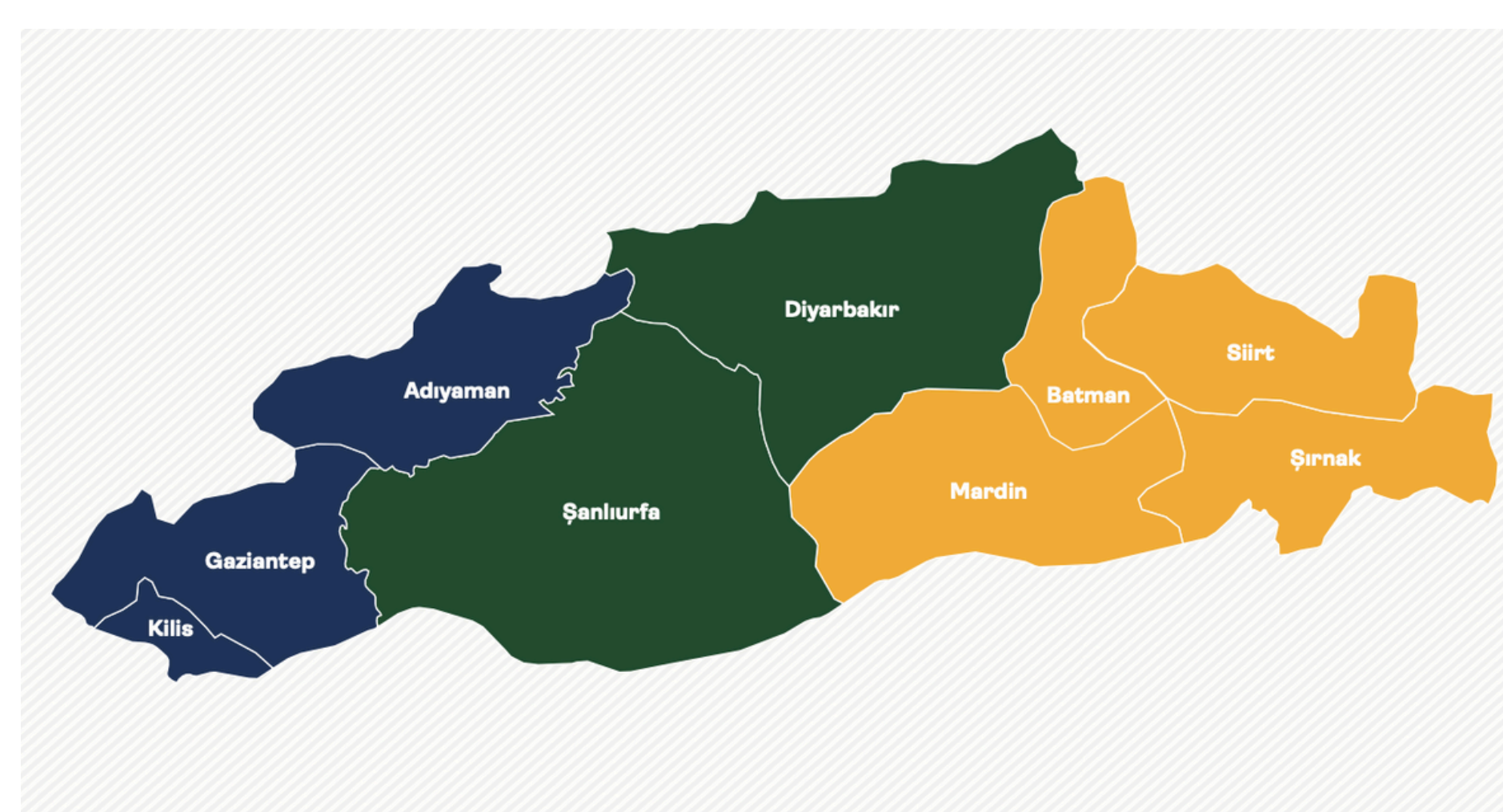
- Short-term economic buffers (subsidies, crop switching, price effects) may be masking deeper structural risks
- Physical productivity losses may precede broader macroeconomic consequences

## Literature Review

- Turkey faces increasing water stress, with per capita renewable water availability falling below 1,313 m<sup>3</sup> — nearing the Falkenmark water scarcity threshold (Koç et al., 2023).
- Agricultural irrigation consumes over 70% of national water use, but traditional methods (like surface and flood irrigation) remain widespread and inefficient (WWF Türkiye, 2021).
- Studies show that groundwater depletion in Konya is among the most severe in the country, leading to land subsidence, wetland loss, and declining crop yields (MGM, 2023; Konya Drought Plan, 2023).
- Infrastructure projects like the Southeastern Anatolia Project (GAP) have improved irrigation access but revealed challenges: unequal development, energy inefficiencies, and vulnerability to drought (Bilgen, 2019).
- Economic analyses suggest that irrigation modernization can yield positive returns within 5–10 years, especially when combined with climate-resilient crop policies (Lehner & Döll, 2020).



Map of the Konya Closed Basin



Map of the Southeastern Anatolia Project (GAP)

## Discussion & Conclusion

- Water scarcity is already reducing agricultural yields, but economic indicators haven't fully caught up
- Konya's case shows early signs of long-term vulnerability hidden behind stable GDP
- GAP region proves that infrastructure helps, but without sustainable planning, gains are uneven and energy-intensive
- Policy implication: Modernizing irrigation and aligning crop choices with water availability are essential for resilience
- Bottom line: Water sustainability is not just an environmental issue it's economic infrastructure

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Bibliography & Full Research Paper:

