

# Equitable Water Rights Allocation: A holistic perspective on eco-cultural restoration to sustain biodiversity, ecosystem functions and social justice in the Tigris Euphrates Watershed



Dr. Michelle Stevens  
Executive Director  
Hima Mesopotamia  
[stevensm@csus.edu](mailto:stevensm@csus.edu)

[www.hima-mesopotamia.org](http://www.hima-mesopotamia.org)

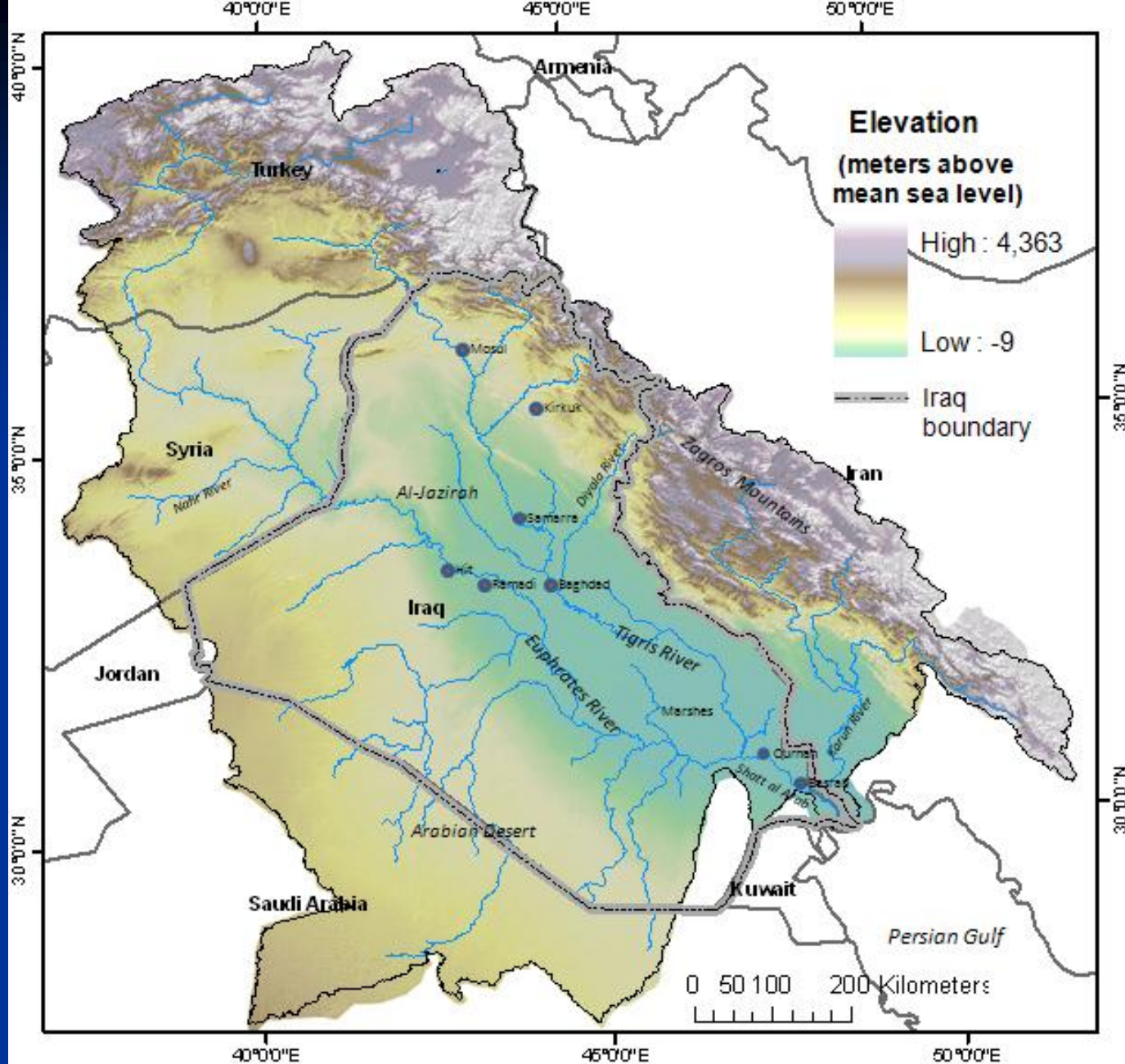


Figure 1. Map of Tigris Euphrates River System, including country boundaries and elevation.

# Outline of talk

- I. World Congress for Middle Eastern Studies, Barcelona, Spain 2010 and formation of Hima Mesopotamia
- II. Technical, legal and regional barriers to successful water cooperation in Tigris Euphrates basin
- III. Climate Change data for the watershed
- IV. Recent dam construction developments in Turkey
- V. Conditions of biodiversity and human welfare in lower watershed

# Hima Mesopotamia

## Our Vision:

The restoration and maintenance of the ecology and cultural heritage of the Tigris Euphrates watershed

*Translation: Protection of the land between two rivers*

World Congress for Middle Eastern Studies  
Barcelona, Spain 2010





**Hima's Mission:** To nurture the eco-cultural heritage of the Tigris-Euphrates watershed through

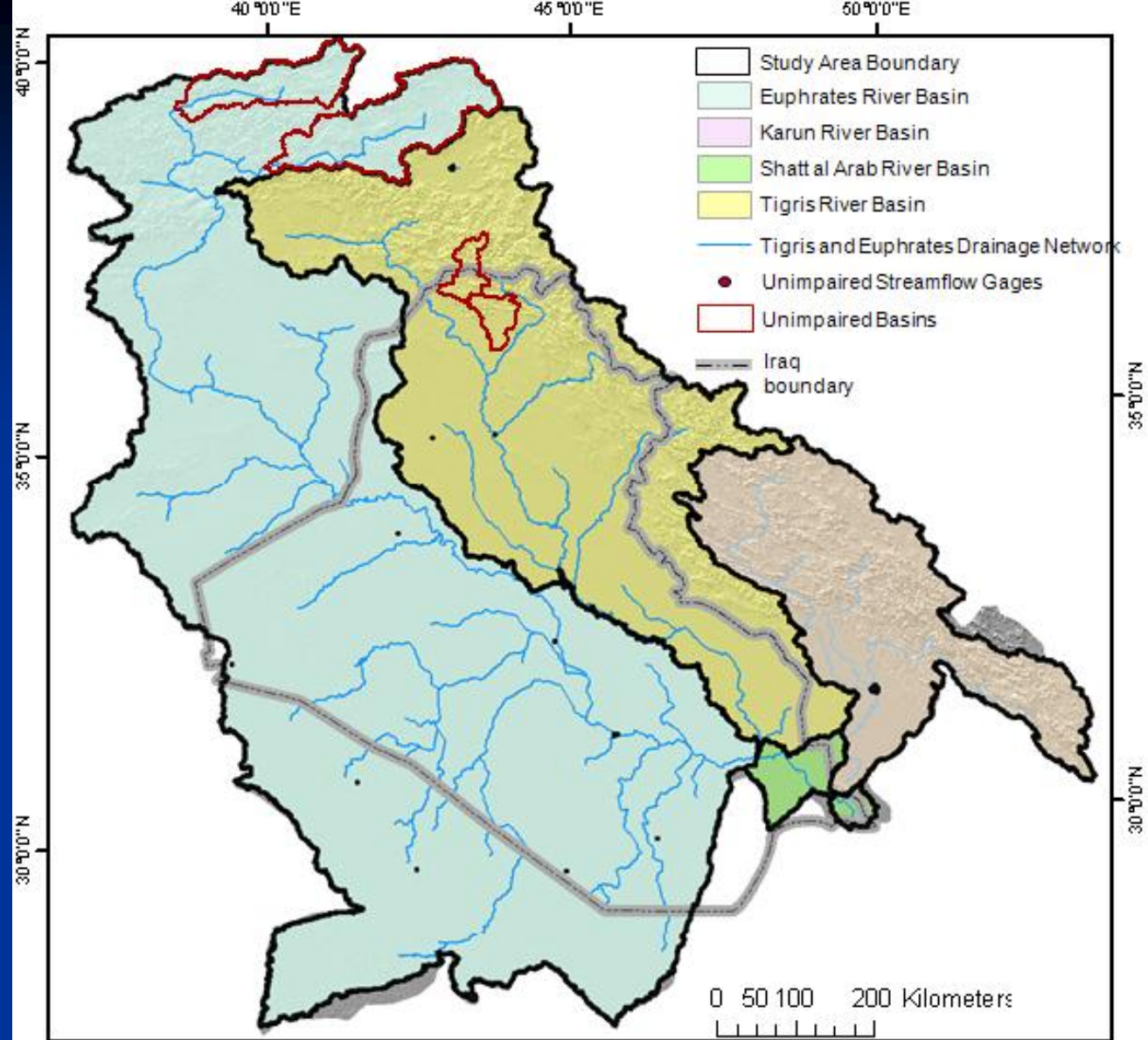
- Outreach, coordination and capacity building.
- Synthesis of scientific information, traditional and local knowledge.
- Providing a forum for cultural and environmental information exchange between individuals, local, national, and international groups via art, media, public speaking and scientific conferences.

# Outline

1. No binding water agreements – Turkey, Syria, Iraq, Iran, Kuwait
2. Climate Change = less available water downstream
3. Turkey plans to build 1,783 dams and hydro-electric power plants (HEPP) by 2023 in addition to over 2,000 existing facilities, which may affect up to two million people
4. Major dams on Tigris River (Ilusu Dam) underway
5. “The continuing water crisis has directly contributed to rising levels of food deprivation, displacement and poverty in Iraq” – UNESCO, 2011

# Conflict over water rights

- Arab countries have accused Turkey of violating international water laws – Euphrates River
- Iraq and Syria consider river to be international watercourse – an integrated entity for all riparian users
- Turkey regards Euphrates as a transboundary river, under Turkey's exclusive sovereignty until it flows across the border
- Agreement between Turkey and Syria for minimum flow of  $500 \text{ m}^3/\text{sec}$  throughout the year



Flint et al, 1011, USGS, A Preliminary Water Balance Model for the Tigris and Euphrates River System

Figure 2. Map of Tigris Euphrates River System (TERS), study area boundary, major river basins and subbasins, calibration basins, and unimpaired streamflow gages.



# Climate

- Average annual precipitation ranges from 50 mm/year in the south to over 1,000 mm/year in higher elevations, with most of the annual rainfall occurring between November and April.
- Potential evapotranspiration ranges from 800-1,400 mm/year, with little to no precipitation in June, July and August
- Because of high rates of evapotranspiration, agricultural crops could not survive without extensive irrigation.

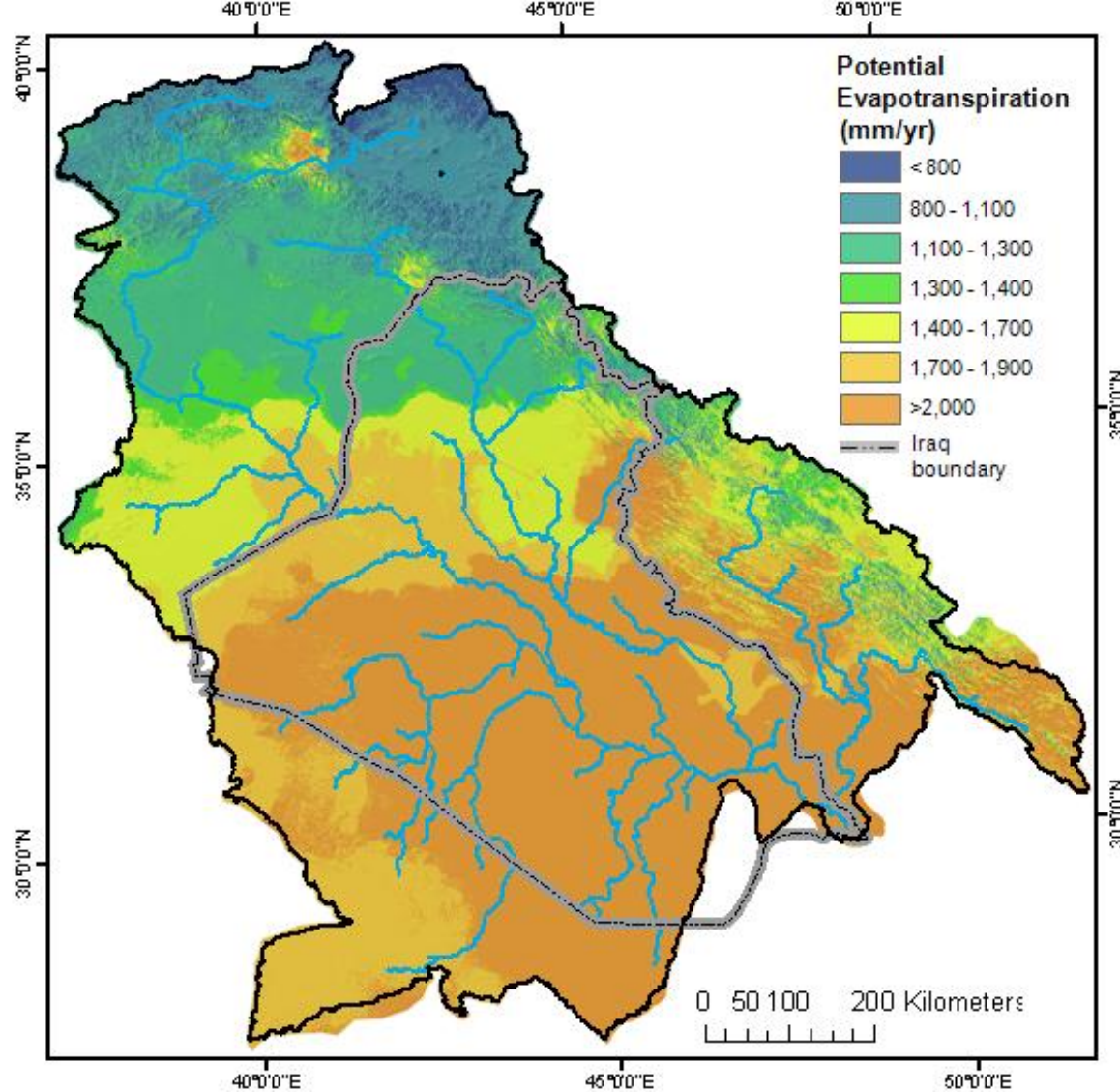


Figure 5. Map of annual potential evapotranspiration for the Tigris Euphrates River System (USGS Early Warning and Environmental Monitoring Program; <http://earlywarning.usgs.gov/fews/middleeast/index.php>).

(Flint et al, 1011, USGS, A Preliminary Water Balance Model for the Tigris and Euphrates River System)

# Precipitation and Recharge

- The majority of precipitation falls in the Tigris River basin, over twice that of the Euphrates River basin, yet the Euphrates has the most loss to potential evapo-transpiration.
- Tigris River also receives the most snowfall and results in about 30 percent more recharge and 3 times more runoff than the Euphrates
- The majority of precipitation and resulting recharge and runoff are in Turkey (Flint et al, 1011, USGS, A Preliminary Water Balance Model for the Tigris and Euphrates River System)

# Climate Change in the Tigris Euphrates River System

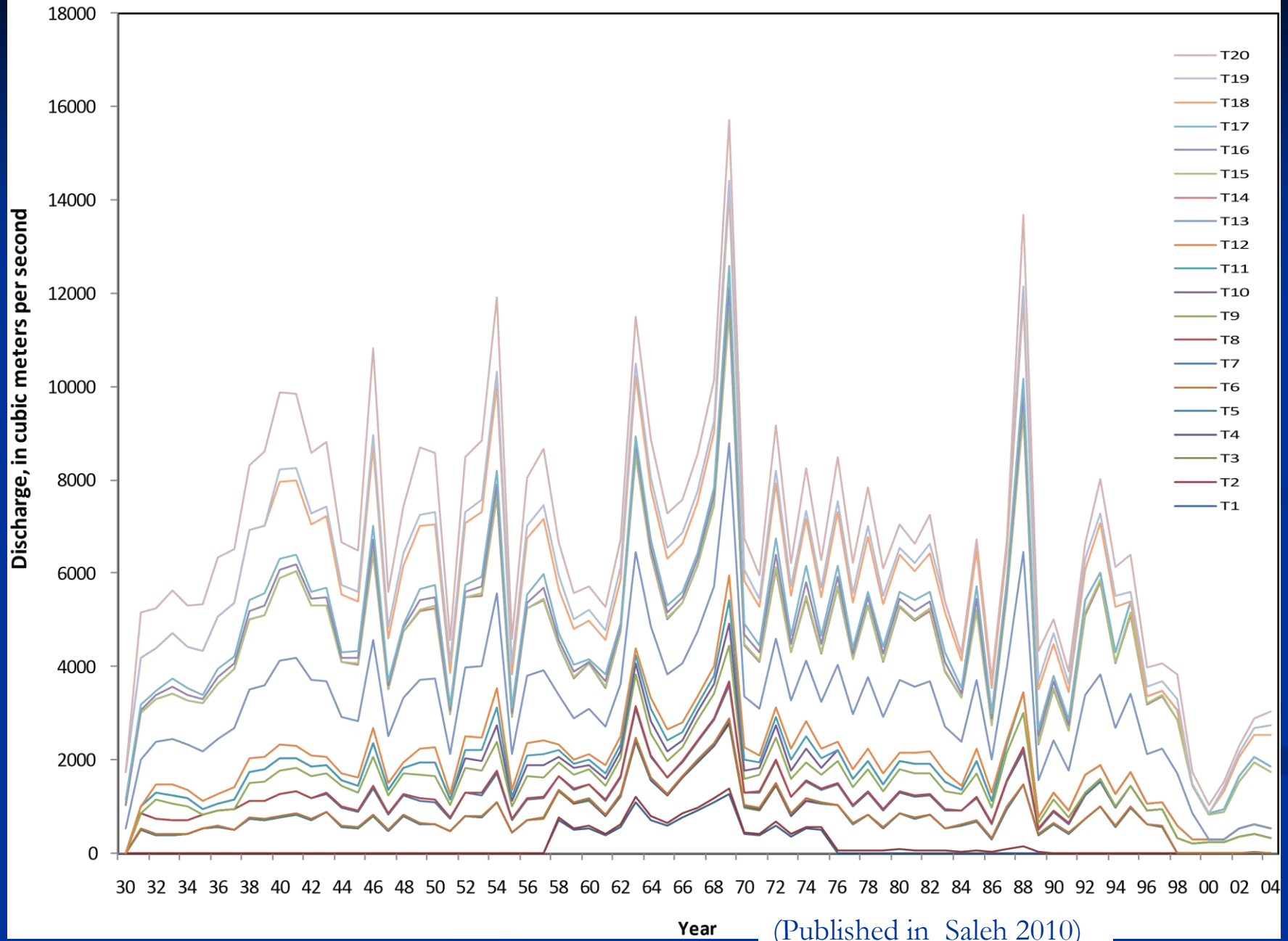
- Difficult to simulate climate change due to high natural inter-annual variability in flows
- High variability in projections of precipitation
- Significant challenges to region's agricultural base, with a longer dry season and changes in timing of rainfall
- Local weather changes are unpredictable, with more frequent and more severe storm events



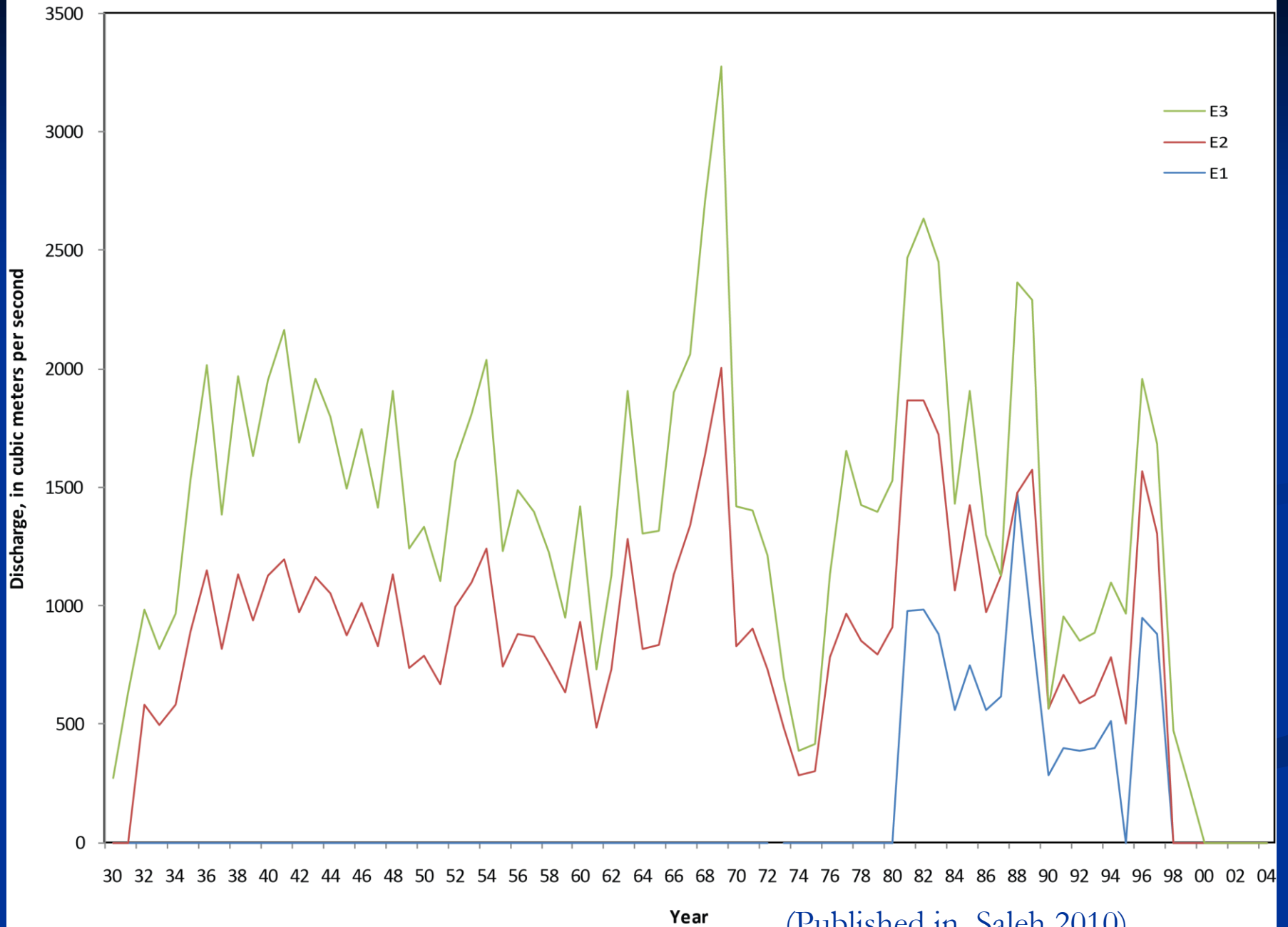
# Climate Trend 1949-1999

1. Downward trend in precipitation for both basins
2. Increases in potential evapotranspiration and air temperature
3. Decline of snowfall over 50-yr period Trends of declining water availability more evident since the 1980s
4. Impact on local climate from marsh drainage is much more significant, rising temperatures and reduced water availability

# Annual Discharge on the Tigris River



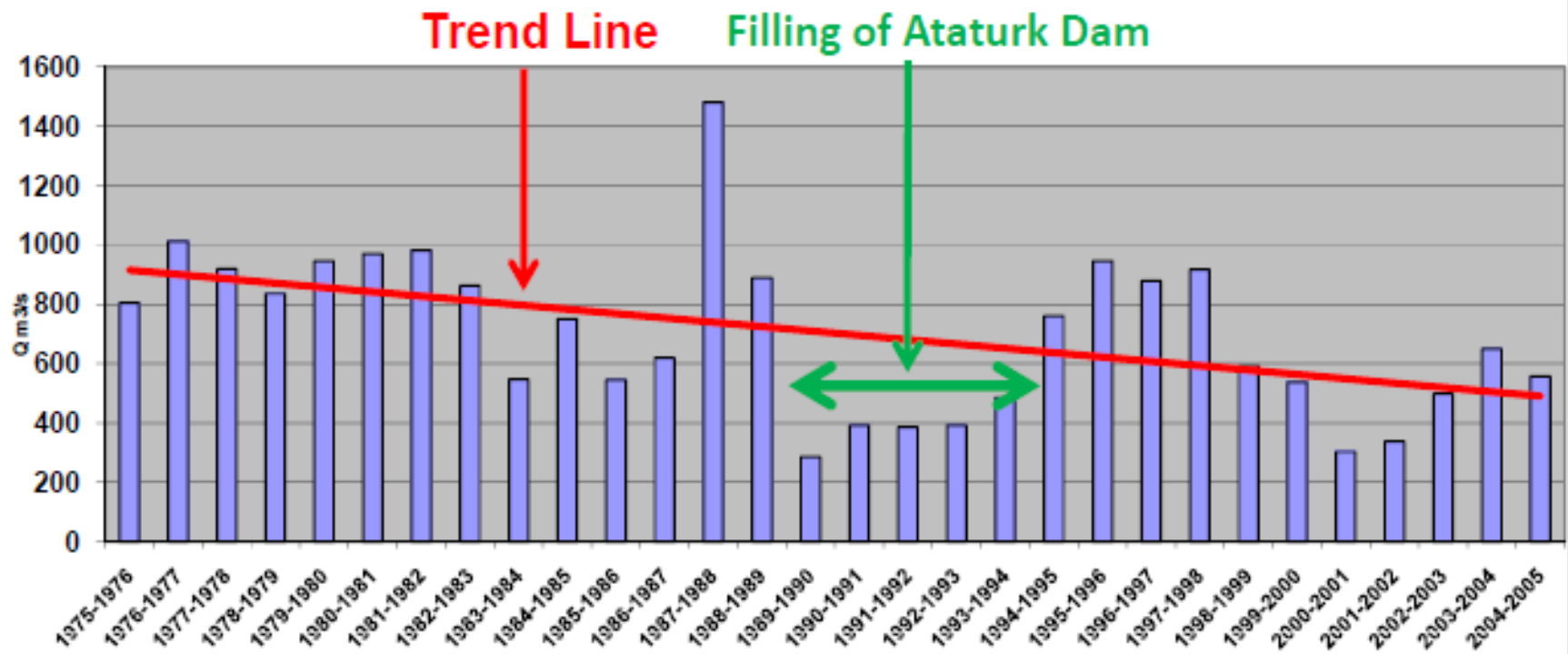
# Annual Discharge on the Euphrates River



(Published in Saleh 2010)

# Declining Inflows

Mean annual discharge in the Euphrates (m<sup>3</sup>/s)  
1975-2005

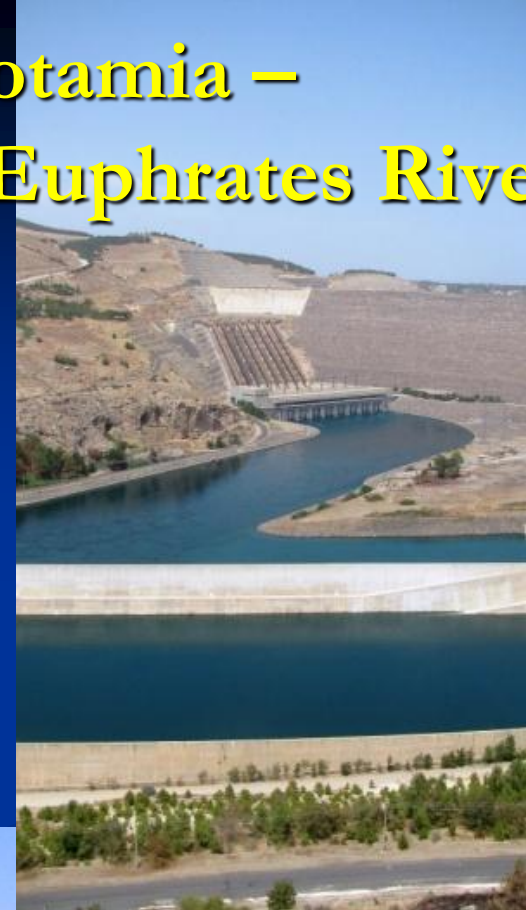




# سدّ في أحواض مياه دجلة والفرات Dams in the Tigris Euphrates River Basins



# Mesopotamia – Ataturk Dam Euphrates River





# 2010 Journey to Turkey

- Over 1,000 dams now proposed in Turkey – big push for hydro-electric development to reduce Greenhouse Gas emissions to join European Union
- Major economic upswing with funding for dam development in Anatolian Region

# Sanliurfa Province



Dr. Stevens met Turkish non profit Doga Dernegi in Istanbul in 2010:  
They facilitated travel and research to the Tigris and Euphrates Rivers in southeaster Anatolia



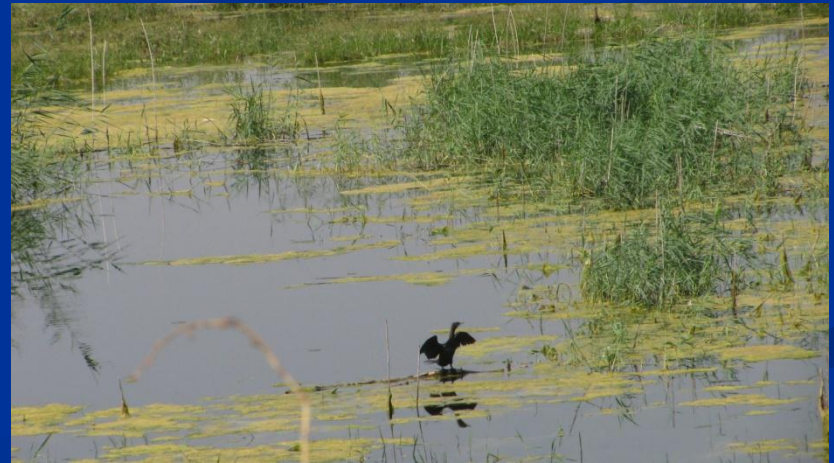
# Bierecek Dam





# Drowned City of Helfiti

## Euphrates River



# Problems with Dam Construction and Operation

- Dams have no mechanism to provide fish passage or to bypass water to maintain in-stream flows for habitat
- Rivers are completely dewatered for 2-5 hours every day
- A 3 m pulse of water then surges downriver, causing erosion and sedimentation
- **Dam operation could be changed to maintain in stream habitat for fish and aquatic life**

# Impacts of Ilusu Dam in Turkey

- 12,000 MW hydropower project planned on Tigris River in Southeast Turkey
- 78,000 people impacted in Turkey
- 313 km<sup>2</sup> reservoir will inundate habitat of numerous species, 300 archaeological sites, and the 12,000 year old town of Hasenkeyf
- 400 km of riverine ecosystem
- Manzur Valley in Eastern Turkey is protected nature reserve hosting 1,528 plant species out of which 227 are endemic to Turkey and 55 to the Munzur valley
- Impacts are estimates – no environmental assessment



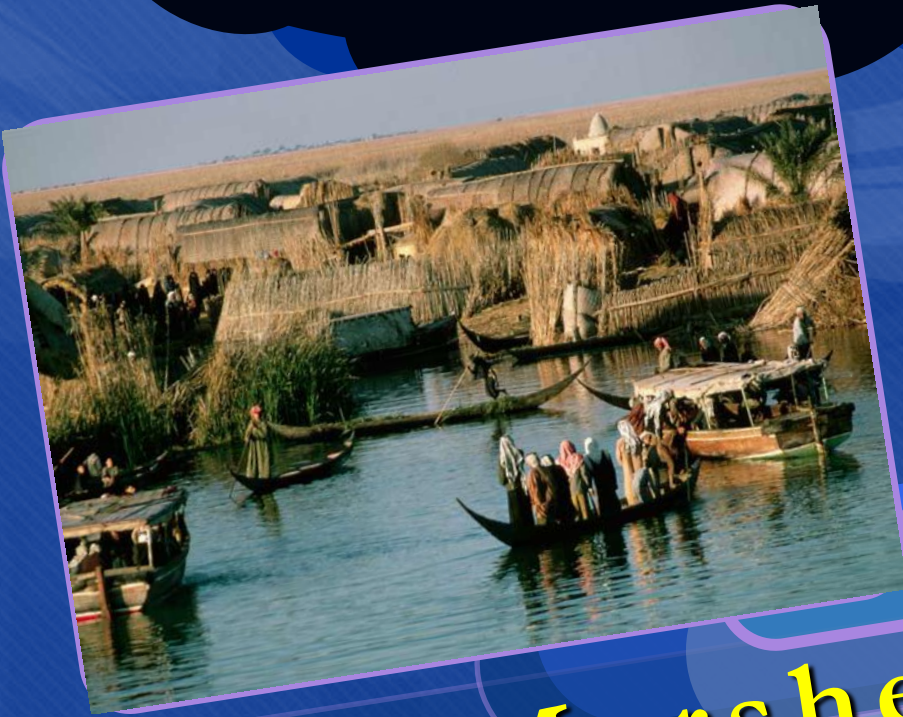
# Ilusu Dam on Tigris River





# Tigris River at Hasenkeyf





# The Marshes

The Marshlands of Mesopotamia, considered by some to be the Biblical location of the Garden of Eden, are disappearing at an alarming rate.



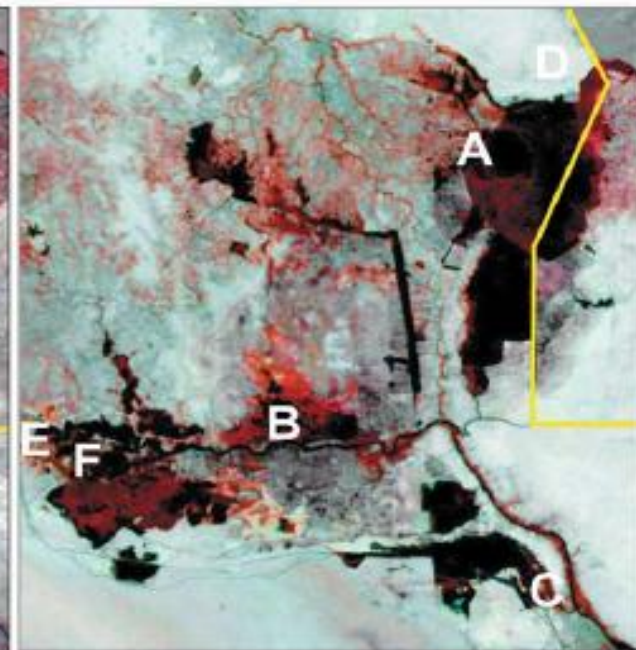
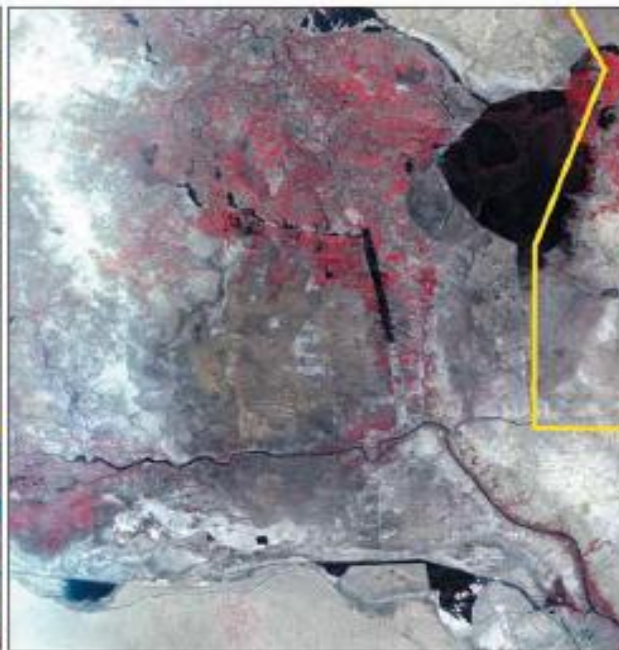
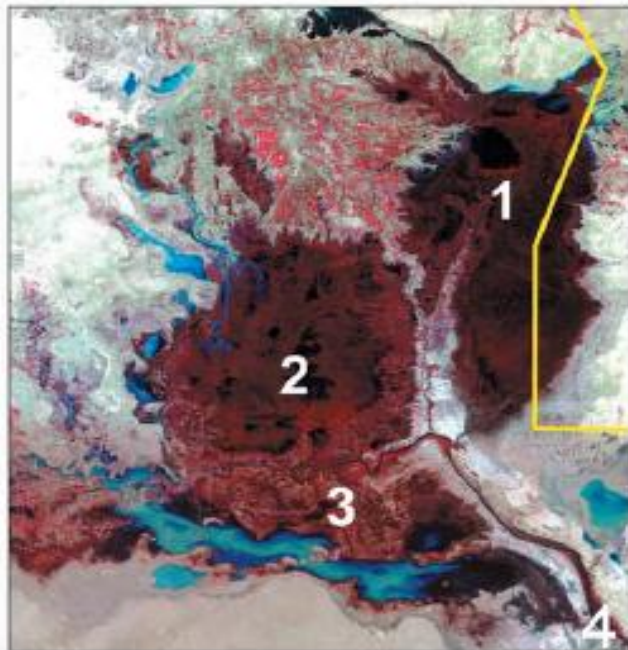
# Ecocide and Genocide

## Saddam Hussein - Baathist Regime

a. 1973

b. 2000

c. 2005







Nik Wheeler, 1977

# 2011 Marsh Aerial Survey



Rob Fitzpatrick, CSIRO Land and Water, 2011



- What had been the third largest wetland in the world just 10 years before
- Reduced to just five percent of its original size,
- Purposely destroyed by Saddam Hussein's regime in the 1990s in retaliation for the Shiite uprising that followed the Gulf War in 1991.

# 2008 Drought (ongoing)

- In 2008 Tigris and Euphrates Rivers experienced a severe drought;
- Dam construction Iran, Turkey – Euphrates and Tigris Rivers (also act of violence against Kurds)
- Predicted Trajectory for Climate Change ↔  
↑drought stress, ↑ evapotranspiration, ↓ water quantity and quality = a salt encrusted wasteland
- Conflicts among riparian water users
- No international vehicle to effectively mediate or enforce equitable water allocation

Marsh Arab settlements  
prior to the drying out of  
the wetlands



Systematic destruction of  
the way of life



# Al-Malha – village in the marshes

(Information from Dr. Nadia Fawzi, 2011)



## ➤ Population

- About 400-500 households, as the chief of the tribe said “we don’t have a piece of paper to prove we own the land, but our blood and sweet is mixed in this land”
- Surrounded by oil fields



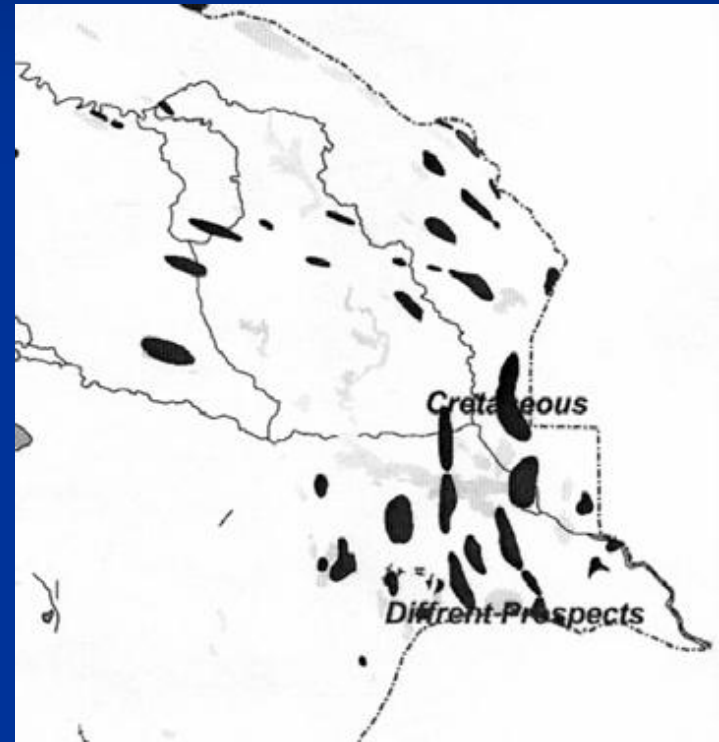
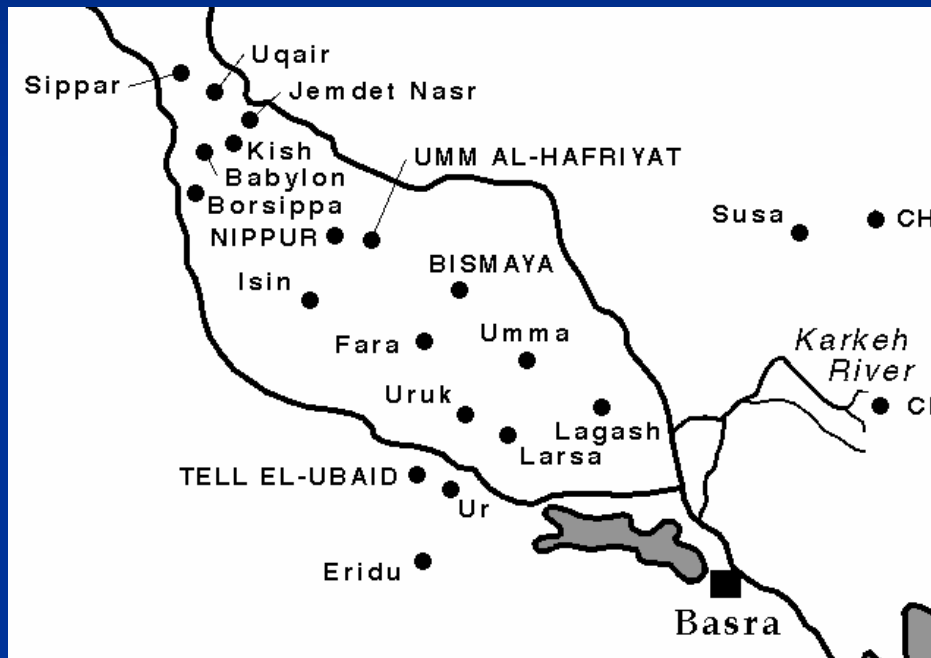








# Known Major Archaeological Sites in Southern Iraq & Oil Fields. From The Oriental Institute (Iraqi Foundation, 2003)



ARCHEOLOGICAL  
RESOURCES

Oil Fields in and around the  
Marshes



# The North- Western Arabian Gulf

# The Shatt Al-Arab



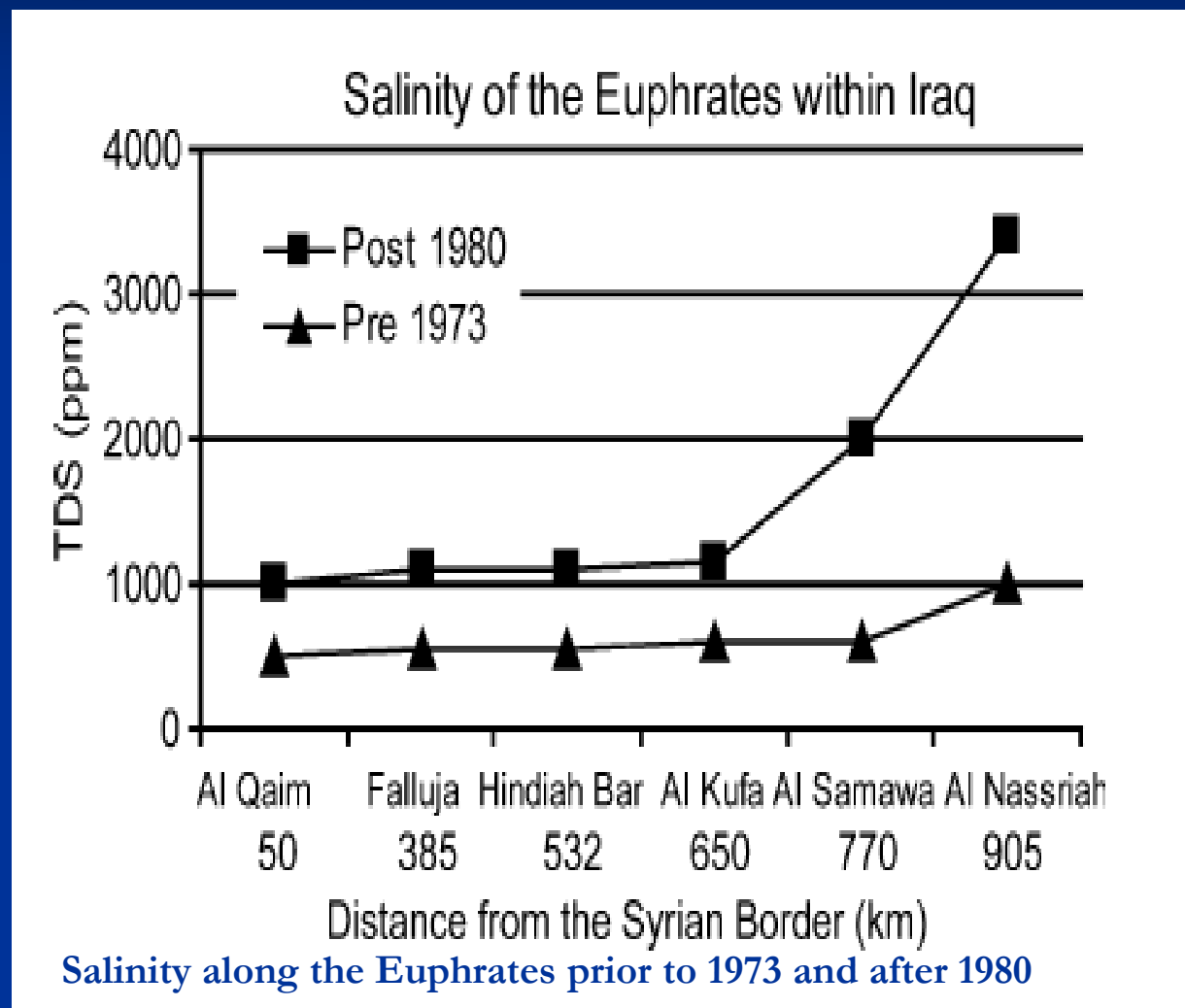
**KUWAIT CITY**



# Environmental Changes in Basrah's waterways

- **Drainage of the al Ahwar Marshes.**
- **Diversion of the Karkeh River, Iran → drainage of Haweizeh Marshes**
- **Decline in water discharge of the Tigris – Euphrates basin**
- **Impaired water quality from salt water intrusion, untreated sewage, and agricultural drainage directly into the water ways.**
- **Susceptibility to climate change**

# Salinity increases at the lower reaches of the Tigris Euphrates



# Marsh desiccation caused:



- Increased the mean annual air temperature by 1 C°
- Increased mean wind velocity by 1 m/sec.,
- Increased annual dust storm by 15 days
- Increased annual evaporation by 317 mm.
- Decreased mean annual relative humidity by 2.5 %  
(Mohammed and Gatie, 2008)

# Recommendations

- 1- Efforts should be intensified with Iran, Turkey and Syria, to release enough water to sustain life throughout the Tigris Euphrates watershed
- 2 – Provide basin wide environmental and social impact assessment
- 3 – Operate and manage dam and HEPP projects to sustain fish passage and bypass flows for fish and aquatic life
- 4 - People are suffering from dam construction and operation activities in the drainage. Tell the stories of the people impacted by these projects.
- 5 - Mitigate for and minimize impacts of water projects on people and ecosystems
- 6 - Adequate water must be maintained to
  - a. protect biodiversity and ecosystem services,
  - b. conserve rare species,
  - c. maintain socioeconomic quality of life for people in the watershed



# Shokran Jazailan

- Thank you so much.
- Please contact me at Michelle Stevens, [stevensm@csus.edu](mailto:stevensm@csus.edu). I would love to talk to you.
- [www.iraqmarshrestoration.blogspot.org](http://www.iraqmarshrestoration.blogspot.org)
- [www.hima-mesopotamia.org](http://www.hima-mesopotamia.org)

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