

Atmosphere Monitoring of the Marsh Zones in Iraq to Support the Sustainable Development

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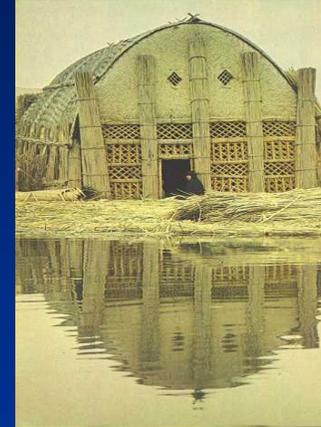


Marsh History

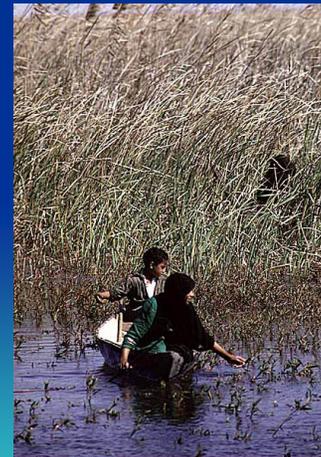
- The marshes of southern Iraq were the heart of the old kingdom of Sumer, the earliest civilization in the world. Sumer
- The recorded history of the Arab Marshlands region and the world begins with the history of Sumer which documents the reed houses (mudhif) and the long canoe (mashuf) for over 5,000 years.



The reed houses (mudhif)



The long canoe (mashuf)

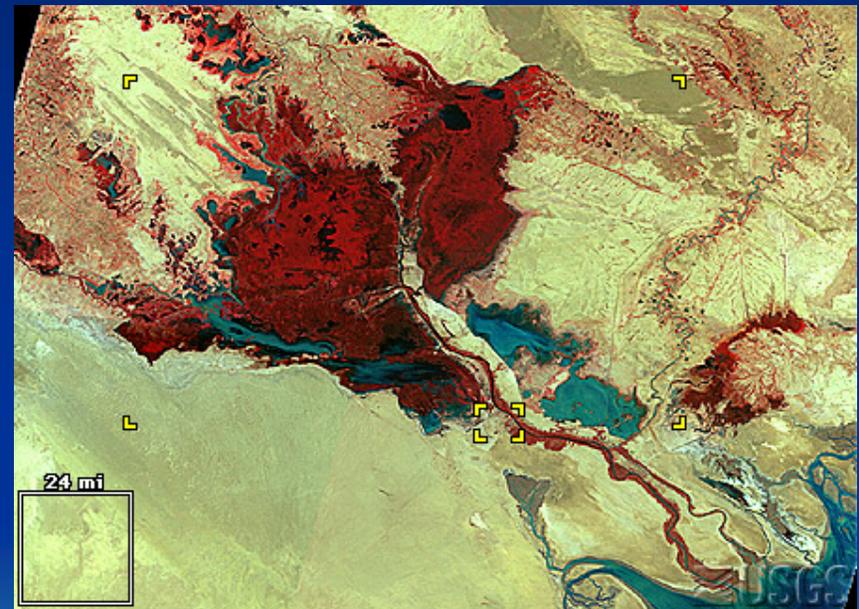


Aerial view of a Ma'dan ("Marsh Arab") floating village near Nasiriyah



The marsh events

- *The Land sat image of marsh area at 1-2 August 1972, [Read and dark red shows areas where the marshes] , NORMAL MARSH*



The marsh events

- *Land sat image of marsh area at 1990, [Red and dark red shows areas where the marshes], the first draining*



The marsh events

- *NASA/MODIS satellite image taken August 27, 2001 , nearly complete draining*



The marsh events

- *NASA/MODIS satellite image taken March 25, 2004 [Green shows areas where the marshes have regenerated. The brown streak is smoke from a burning oil fire]*



The marsh events

- *The totally drained marsh near Chibayish in June 2003*



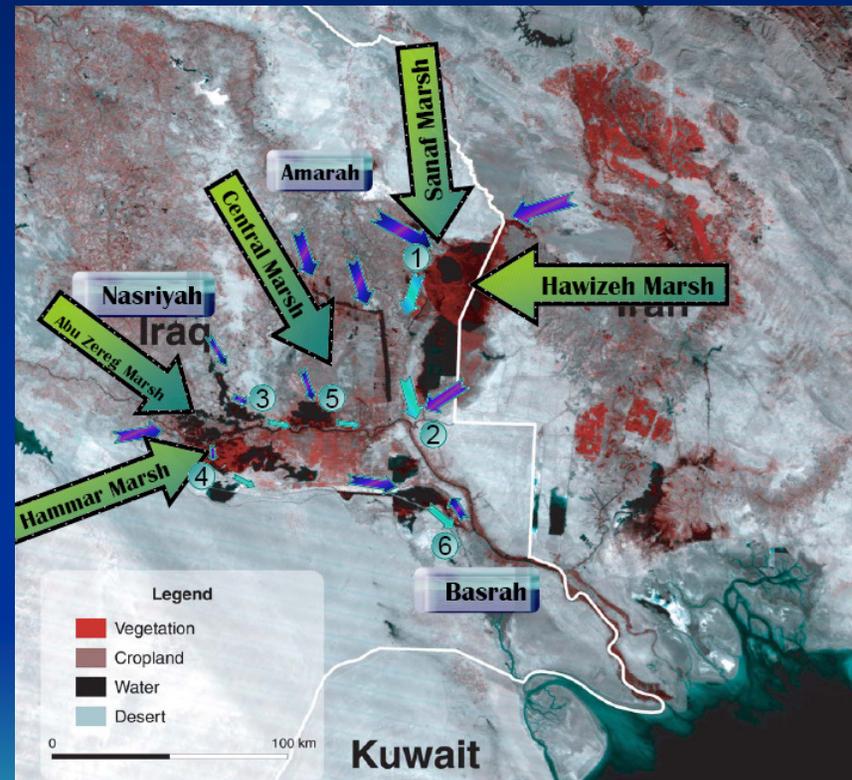
Marsh Distribution in Iraq

- The Marshes form a large triangular region bounded by three major southern cities: Nasiriyah to the west, Amarah to the northeast, and Basrah to the south.



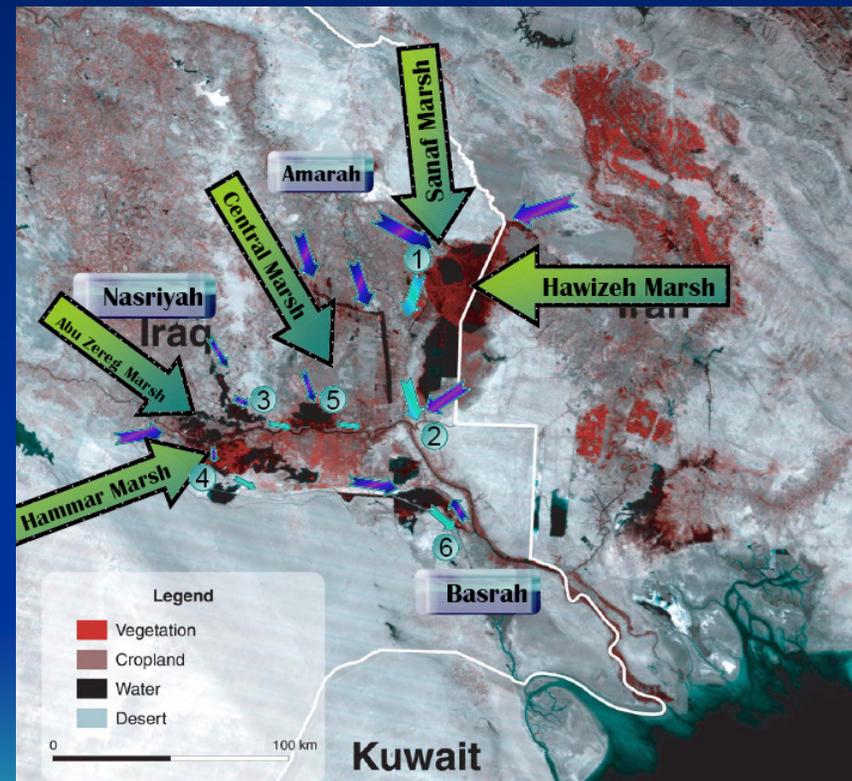
Marsh Distribution

- **Eastern part, Al shwaiche, Al sinaf, and Al hawiza** they are fed by rainfall flows coming from Iranian western Mountains and from Kahlah - Mshrah branch's of Tigris River also the common Iraqi-Iranian Rivers, such as Teeb, Dwariage, and mainly Karkha, during the rainfall season, from November to May



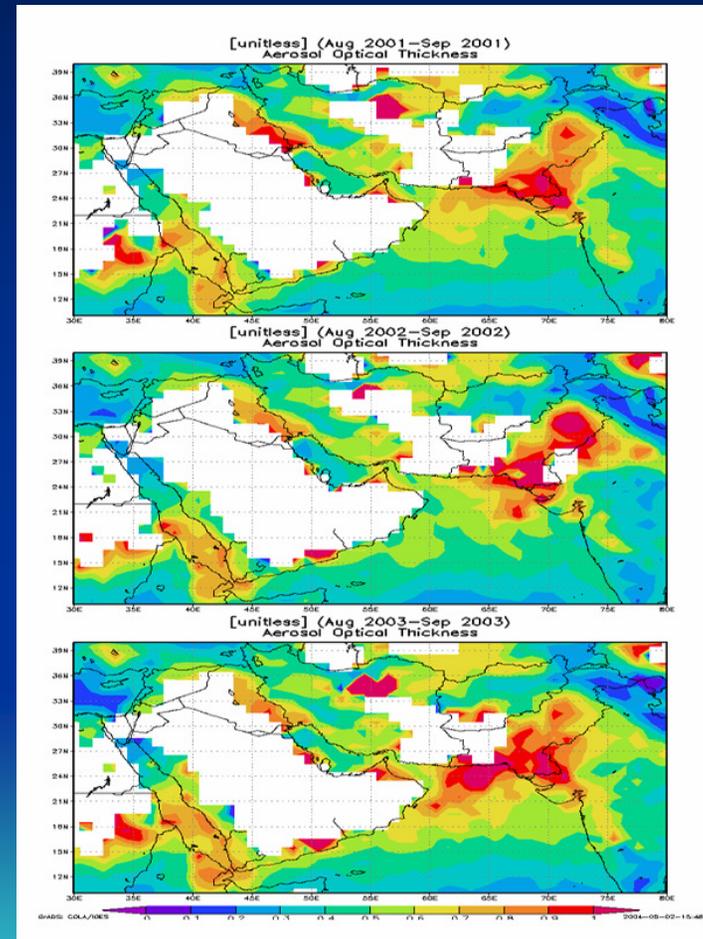
Marsh Distribution

- **The Western Part** , Abu Zarag, Central and Al Hammar marshes. The *Abu Zarag* marsh fed from Al-Gharaf canal and some out flows from Euphrates river, the central marshes fed from the western canal of lower Tigress river, The main canals are, Butaira, Al-Araithand Al Majir Al-Kabir, the *Al-Hammar* marsh fed from Euphrates southern part D/S Sug Al-Shyokh and some canals from D/S Qurna Tigress river also its affected by tide action from Shatt Al-Arab river.



Marsh Atmosphere

- The Arabian Gulf's meteorology is extremely complicated, with variable sea surface temperatures, enormous latent heat fluxes, abrupt topography, intense land-sea gradients and strong mesoscale circulations. *MODIS level 3 climatology for 2001, 2002, and 2003 for the Arabian Gulf region. Image obtained from MODIS MOVAS mean August and September optical depths for the southern of Iraq, Arabian Gulf and Arabian Sea region for the years 2001, 2002 and 2003.*



Marsh areas have suffered from severe pollution/damage during the past several decades.

- The existence of nearby oil fields burning gases into the atmosphere
- The neighboring desert land which brings dust storms during spring and summer
- The declining water level during summer which causes many areas of the marshes to dry causing the spread of organic compounds in the atmosphere, an in depth investigation is required which is the topic of the proposed research



Atmosphere Monitoring in Iraq

- A number of institutes in Iraq engage in the systematic observation of elements of the meteorology and climate system. **Iraqi Meteorological Organization (IMO)** authorized to monitor the climate and the atmosphere in Iraq. IMO has program to develop the infrastructure of the distributed monitoring system.



Atmosphere Monitoring in Iraq

- Ministry of Science and Technology (MoST), creating research groups interested in environments and pollutions is one of tasks for MoST. The responsibility of this task was given to the directorate of aeronautics & space technology which began its work by defining the objectives of the task. The objectives of the environment and pollutions are to provide a wide spectrum of monitoring instruments supports by advance software. A plan to establish modern central observatory **contain (GPS based Radiosonde system, Microwave Profiler, SODAR and RASS system)** for monitoring the atmosphere. This centre supported by direct broadcast ground station for the, reception, processing, and visualisation of MODIS data from the EOS Aqua and Terra satellites.



Atmosphere Monitoring in Iraq

- **Ministry of Environment (MOEn), which is responsible authority for air quality monitoring in Iraq, has limited capacity in term of monitoring equipments (CO2 analyzer SO2 analyzer and 5 High Volume Sampler for the whole of Iraq) and relatively lacking human capacity in air quality monitoring.**
- **Ministry of Environment (MOEn) have been planed to establish air quality monitoring program in the cities of Baghdad, Basra and Mosul. The main objective of the monitoring program is to provide information on pollutant concentrations**



*The types and distribution of air quality monitoring stations
across Iraq*

City Stations	Baghdad	Basrah	Mosul	Total
Fixes	9	3	3	15
Mobile stations	3	0	0	3
Total	12	3	3	18

Air quality monitoring configuration, The fixed monitoring station network measures a wide range of pollutants:

- Nitrogen oxides (NO_x)
- Ozone (O₃)
- Sulphur dioxide (SO₂)
- Total Suspended Particulate matter, TSP (PM₁₀)
- Total Suspended Particulate matter, TSP (PM_{2.5})
- Volatile Organic Compounds (Benzene, toluene including xylene (BTX))
- Carbon monoxide (CO)
- Low volume sampler
- High volume sampler
- The mobile stations contain additional monitoring systems
- Ammonia (NH₃) monitor
- Hydrogen Sulphide (H₂S) / Sulphur dioxide (SO₂) converter
- Each station consists meteorological sensors for measuring wind speed, wind direction, relative humidity, pressure, precipitation and solar radiation in earth surface.



Conclusions and Recommendations

Marshes refreshing after exsiccating can be considered as a unique event which has a grate effect on the Middle East weather; hence an international attention and support must take place to this issue. From our continuation for the international and local activities through independent researches, we at the ministry of science and technology pay attentions to benefit these activities in monitoring marsh's atmosphere by collecting the space images and related data. Based on these observations, I would be inclined to make the following inexpensive recommendations for space weather activities in Iraq:



Conclusions and Recommendations

- Clean environments of atmosphere are basic right to all people and should be promoted to reach the national standard level.
- Provision of Sustainable Development by Monitoring Marsh Atmosphere in the south of Iraq requires continuous field measurements of the atmosphere with qualified workers.
- A study of Research center and universities conditions, capabilities, and requirements in the south of Iraq is very important to pin point their shortages and needs of staff, equipment, and space images and archive data. A plan should then be put to promote the level of environment services.
- Both theoretical and experimental investigations are encouraged. Modelling of the existing marsh atmosphere in comparison to the wetland atmospheres of the other regions and also in terms of its response to varying amounts of marsh vegetarians would be an integral activity of this focus work. Analysis of existing archive data or new internet space observations of the marsh land could be used to help establish the baseline structure of the marsh upper atmosphere and to look for the effects of Arabian Gulf zone.



Conclusions and Recommendations

- about the marsh atmosphere up to troposphere height. Satellite communication is required to transfer measuring data in the selected points in the marshland to the research center is strongly needed.
- Iraq has important needs to open channels for collaboration with the outside world being organizations, regional and international in the field of meteorology for the benefits of all.
- Iraq needs for support in funds, scholarships, training, education...etc to reconstruct its environment sector.
- Coordination between Iraq ministry of environment, MoST, OOSA, and appropriate regional organizations is believed to be instrumental in planning and success of wetland restoration in Iraq.



WHAT WE LOOK TO

- Monitoring ozone by distributing ultraviolet sensors in secondary schools in Iraq with one Brewer observation system
- We want turnkey offer to build GPS meteorology network with provisional software to monitor, visualize the atmospheric meteorological parameter with height along Iraq map



THANKS

