

A Spatiotemporal Analysis of Man-Made Ecocide: Saddam Hussein's Reduction of the Southern Iraqi Marshes

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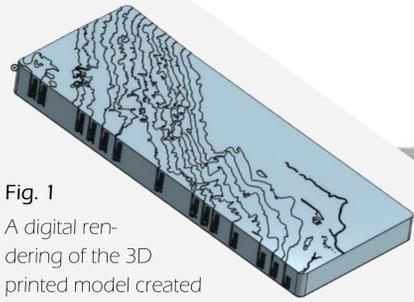
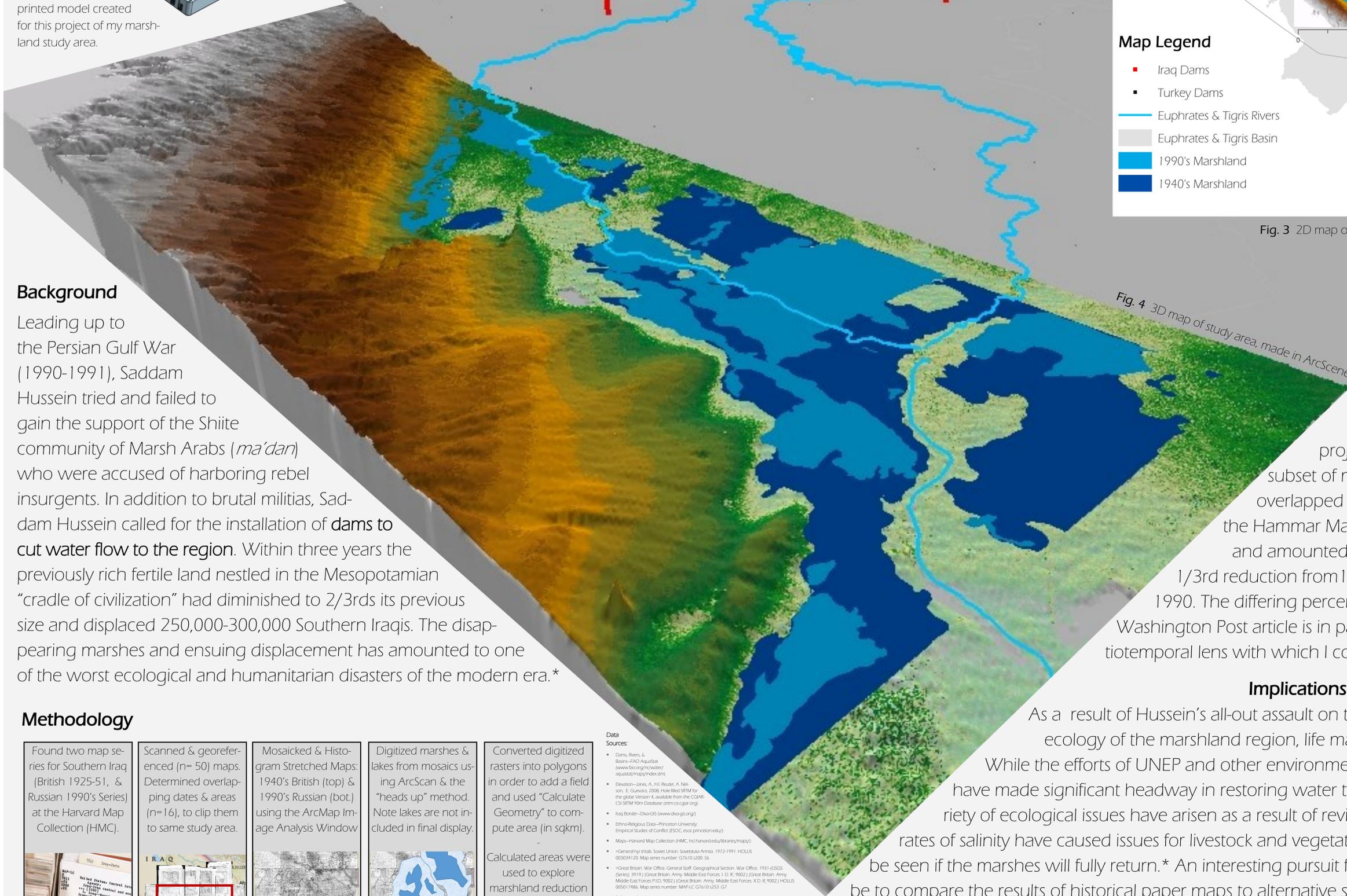


Fig. 1
A digital rendering of the 3D printed model created for this project of my marshland study area.



Background

Leading up to the Persian Gulf War (1990-1991), Saddam Hussein tried and failed to gain the support of the Shiite community of Marsh Arabs (*ma'dan*) who were accused of harboring rebel insurgents. In addition to brutal militias, Saddam Hussein called for the installation of dams to cut water flow to the region. Within three years the previously rich fertile land nestled in the Mesopotamian "cradle of civilization" had diminished to 2/3rds its previous size and displaced 250,000-300,000 Southern Iraqis. The disappearing marshes and ensuing displacement has amounted to one of the worst ecological and humanitarian disasters of the modern era.*

Methodology

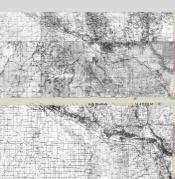
<p>Found two map series for Southern Iraq (British 1925-51, & Russian 1990's Series) at the Harvard Map Collection (HMC).</p> 	<p>Scanned & georeferenced (n= 50) maps. Determined overlapping dates & areas (n=16), to clip them to same study area.</p> 	<p>Mosaicked & Histogram Stretched Maps: 1940's British (top) & 1990's Russian (bot.) using the ArcMap Image Analysis Window</p> 	<p>Digitized marshes & lakes from mosaics using ArcScan & the "heads up" method. Note lakes are not included in final display.</p> 	<p>Converted digitized rasters into polygons in order to add a field and used "Calculate Geometry" to compute area (in sqkm). Calculated areas were used to explore marshland reduction over time (1946-1990), based solely on historical maps.</p>
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Fig. 2 Methodology used to calculate marsh areas for the study region at two time points (1946 & 1990).

Data Sources:

- Dams, Rivers, & Basins—FAO Aqueduct (www.fao.org/nr/water/aqueduct/index.cfm)
- Elevation—Jarvis, A., H.I. Reuter, A. Nelson, E. Guevara, 2008. Hole-filled SRTM for the globe Version 4. Available from the CGIAR-CSI SRTM 90m Database (srtm.csi.cgiar.org/)
- Iraq Border—Diva-GIS (www.diva-gis.org/)
- Ethno-Religious Data—Princeton University Empirical Studies of Conflict (ESOC, esoc.princeton.edu/)
- Maps—Harvard Map Collection (HMC, hmc.harvard.edu/ibaries/maps/)
- *Generalnyi shab. Soviet Union. Sovetskaya Armiya. 1972-1991. HOLLIS 003834120. Map series number: G7610 k200 56
- *Great Britain. War Office. General Staff. Geographical Section. War Office. 1931-1935. (Series: 3919.) (Great Britain. Army. Middle East Forces. I. D. R. 9002.) (Great Britain. Army. Middle East Forces. P.I.D. 9002.) (Great Britain. Army. Middle East Forces. A.D. R. 9002.) HOLLIS 005617486. Map series number: WAFK.C. G7610 k200 54

Reference Articles:

- *Najam, Arel. "Lessons from the Destruction of Iraq's Marshes." *The Washington Post*, WP Com-pany, 17 Aug. 2015. www.washingtonpost.com/news/monk-by-cage/wp/2015/08/17/lessons-from-the-destruction-of-iraqs-marshes/?hpid=hp%3Airaq%3Ahomepage%2Fstory
- *"Iraq's Famed Marshes Are Disappearing Again." *National Geographic*, National Geographic Society, 9 July 2015. news.nationalgeographic.com/2015/07/15/0709-iraq-marsh-arabs-middle-east-water-environment-watery/
- *"Sartons, Marc. "AFTEREFFECTS: SOUTHERN IRAQ. Marsh Arabs Cling to Memories of a Culture Nearly Crushed by Hussein." *The New York Times*, The New York Times, 28 Apr. 2003. www.nytimes.com/2003/04/28/world/aftereffects-southern-iraq-marsh-arabs-cling-to-memories-culture-nearly-crushed.html



Map Legend

- Iraq Dams
- Turkey Dams
- Euphrates & Tigris Rivers
- Euphrates & Tigris Basin
- 1990's Marshland
- 1940's Marshland
- Iraq Border
- Kurdish Majority
- Sunni Arab Majority
- Shia Arab Majority
- High : 400m (Elevation)
- Low : 0m

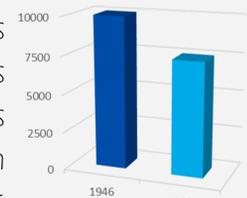
Fig. 3 2D map of study area, made in ArcMap.



Fig. 4 3D map of study area, made in ArcScene.

Results

Hammar Marsh Reduction (Based on Paper Maps)



This project's subset of maps overlapped with the Hammar Marsh* and amounted to a 1/3rd reduction from 1946-1990. The differing percent reduction from the Washington Post article is in part a result of the spatiotemporal lens with which I conducted my analysis.

Fig. 5 Decline in marsh area (in sqkm) from 1946-91.

Implications & Future Directions

As a result of Hussein's all-out assault on those living in and the ecology of the marshland region, life may never be the same. While the efforts of UNEP and other environmental aid organizations have made significant headway in restoring water to the marshland a variety of ecological issues have arisen as a result of revitalization efforts. High rates of salinity have caused issues for livestock and vegetation alike, it remains to be seen if the marshes will fully return.* An interesting pursuit for future work would be to compare the results of historical paper maps to alternative sources of marsh data, e.g. declassified high resolution Corona imagery, ongoing & medium resolution Landsat tiles, and coarse MODIS products such as NDVI & Water Masks thereby exploring differences between ground-based, aerial, & satellite perspectives & spatiotemporal scales.