

Destruction, Restoration, and Discourse:

Exploring Wetland Restoration in the Southern Marshes of Iraq

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Abstract

The southern marshes of Iraq were once a remote, ecologically diverse environment. The natural environment of the marshes allowed for the indigenous Ma'dan people to center their livelihoods on floating huts and reed boats, while conducting trade through the wetland passages. Beginning in the 1990s, Iraqi leader Saddam Hussein implemented draining efforts to reroute the flow of water away from the marshes, resulting in extreme environmental degradation and subsequent socio-cultural consequences. Today, the region remains under environmental stress due to upstream dam development on the Tigris and Euphrates Rivers, and oil drilling along the wetland extent. Various aid organizations have focused on wetland restoration efforts. I employ a framework of political ecology and techniques from map deconstruction theory and cartographic design to consider who is defining the wetland area? Who exercises authority in the restoration process? How do GIS and remote sensing techniques influence the delineation of a wetland, and how might these outcomes differ from locally constructed knowledge about the marshes? I found restoration efforts to be insufficient, due to an overreliance on remote sensing renderings of the region, and wetland criteria that attempt to apply broad international criteria onto a localized socio-cultural problem. Additionally, I found contemporary geographic representations of the marshes to be incomplete and outdated narratives of wetland loss. I illustrate the ways in which wetland maps have been circulated out of their original context, with little consideration of the socio-cultural relationship between the Ma'dan people and their wetland environment. Finally, I use narrative cartography techniques to create a series of alternative maps that contribute new ways of thinking about the marsh area, environmental destruction, and the rich history of the Ma'dan people.

Structure and Purpose

The environmental destruction that has occurred in the wetlands of southern Iraq is not a commonly known disaster. Saddam Hussein's ability to reroute the flow of river systems away from the marshes, inherently destroying human and non-human communities, demonstrates the fragility of the natural environment, and the ways in which landscapes can be rapidly weaponized. Furthermore, this instance of environmental destruction speaks to the relationship between the natural landscape and the politics, culture, and religion of a place—all of which impact the treatment of the landscape and the power dynamics of a place. The complexity of this destruction is heightened by the number of conservation and restoration projects that have taken place, most often planned and financed from a distance, in order to assess what the original state was. How is it possible to make land use and boundary decisions when there is no agreed upon definition of a wetland? Is it possible that a landscape can resemble its previous form after restoration efforts? While the local Ma'dan indigenous people, who have built their livelihoods around the wetland system, have extensive knowledge about the wetland extent and characteristics, the delineation of wetland boundaries and thoughts on wetland recovery are in the hands of outside actors.

My research stems from a desire to share the story of the destruction of the southern marshes of Iraq. In doing so, I also emphasize two main points. First, all landscapes are highly politicized and any restoration and conservation efforts demand the acknowledgement of the socio-political nature of the landscape. In this instance (and in every other case study of restoration and environmental management) the wetland is not a simple area of water and land, it

includes the human communities and their reliance on the area, and the relationship of this wetlands system to upstream water rights issues. Second, all wetland criteria, maps, and boundaries are socially constructed productions and reflect the agenda of the producing individual or organization. Each definition of a wetland is based on different criteria, established to fit the functionality of a specific organization's needs. By acknowledging and visualizing the lack of homogeneity in wetland boundaries, I contribute an understanding of the political nature of natural environmental representations, and the power dynamics involved in drawing boundaries, especially for restoration and conservation. The complexity of this matter demands a multidimensional approach, utilizing methods in political ecology, remote sensing, and narrative cartography to best understand how the wetlands are represented in the restoration efforts and produced visuals. The development of powerful remote sensing tools and satellite imagery allows people to make claims about land cover without prior landscape knowledge, enabling ecosystem restoration to occur thousands of miles away from the site.

This thesis is structured into four connected chapters, each working together to unpack representations of the southern marshes. To build a holistic understanding of marsh representation, I analyze the ways that wetland boundaries and classifications are considered by international aid agencies in writing and classification, and in the visuals embedded in these reports. In chapter 1—*A Narrative of Destruction*—I first introduce the historical and geographic context of my case study, and then explain the political ecology framework and case studies I utilize in my research. In Chapter 2—*Foreign Actors in a Local Landscape*—I expand on Chapter 1 by introducing the international organizations that work as actors in the Iraqi Marshlands restoration process. Using policy deconstruction, I consider their criteria for delineating wetlands as internationally significant, their position in the restoration and conservation process, and

resulting implications of each groups' involvement. The third chapter—*Deconstructing the Wetland*—focuses on the use of satellite imagery, remote sensing techniques and map data sources and visualization that are utilized to create the existing maps of the southern marshes and their extent. This dual deconstruction of both the map visuals themselves as well as the data methods and sources utilizes traditional methods of map deconstruction and research on database ontology. Finally, Chapter 4—*Narrative Cartography and Expanding the Visual*—draws on new methods in narrative cartography and alternative data sources. This chapter includes my own cartographic representations of the marshes and the purpose of each map. Together, these interwoven chapters combine theory in political ecology, deconstruction, and narrative cartography to expand on the narrative of loss, restoration, and conservation in the Iraqi Marshes.

Chapter 1: A Narrative of Destruction

Study Region



Figure 1: The southern marshes of Iraq fall at the intersection of the Tigris and Euphrates Rivers which then flow into the Shatt al-Arab river and into the Persian Gulf. These marshes are transnational, spanning the southeastern portion of Iraq and across the Iranian border. There are three main wetland areas that together form the Mesopotamian Marshes—the Hammar, the Central, and the Hawizeh Marshes.

Historical Context

The southern marshes of Iraq are wetlands unlike any others. At one point, the marshes were the largest wetland ecosystem in the Middle East, three times the size of the Everglades National Park in Florida. Historical and biblical accounts of the region often consider the marshes to be representative of the Bible's Garden of Eden, adding cultural and religious value to the existing natural beauty of the marshes. In addition to the expansive geography of the wetlands and the variety of native flora and fauna, the civilizations of marsh inhabitants reflect a high level of socio-environment interaction between the marsh people and the wetlands. For centuries the Ma'dan Indigenous people, also known as the Iraqi Marsh Arabs, have inhabited the marshes and structured their livelihoods around the resources of the natural environment. While the communities of the Mesopotamian Marshes were largely undocumented until the 1960s, ethnographic accounts of the area by anthropologists SM Salim in 1962 and Wilfred Thesiger in 1964 are two of the more detailed ethnographic accounts of the geography and Ma'dan culture as told by these visiting British scholars.

Detailed ethnographies and more recent research and writing has revealed unique livelihood components of the Ma'dan people. The Ma'dan people historically utilized boats made out of reed fibers and tar to travel through the marshes and along the river systems. Goods were traded through the marshes, north to Baghdad, and south to Basra in exchange for agricultural products from other cities (Salim 1962). Additionally, many Ma'dan people herded water buffalo for their dairy products. Although agriculture was not the dominant livelihood in most marsh communities, some Millet is grown in the wetland soil (Salim 1962).

The Ma'dan indigenous people flourished in the marshes in a way that is not historically common. In many places around the world, wetlands have been viewed as unproductive

landscapes, leading to human intervention in the form of draining and filling for urbanization and agriculture. In the 1600s and 1700s, colonizers in North America drained coastal and inland wetlands for other land use (Russi 2013). Since the 1990s, about half of the world's wetland species have been drained and altered to better suit human use (Scaramelli 2020). In the Mesopotamian Marshes, the Ma'dan people showcased the ways that communities can adapt their lives to the flow and extent of the wetlands—rather than drain the wetlands for new use.

The Draining of the Mesopotamian Marshes

Gradual diversion of water away from the Mesopotamian Marshes began in the 1950s with the creation of the Main Outfall Drain in 1953 (United Nations Environmental Program 2001). At this time, the diversion of water was seen as an opportunity to increase the agricultural potential in the marshes. Despite this initial focus on economic and agricultural growth, this mindset shifted in the early 1990s when the draining of the marshes became a more aggressive, pointed attack on the marshes. Saddam Hussein began to increase draining efforts in order to station Iraqi troops in the south of the state closer to Iran, and the marsh communities that displayed acts of opposition to Saddam and his government regime. Saddam Hussein's attack on the marsh communities was further propelled by the predominance of Shi'a Muslims, a religious group under attack by the Iraqi Government regime, and Iranian Shi'a muslim refugees who also stood in opposition to Iraq Government forces.

Extensive draining projects began in 1993, with the creation of four main draining canals: the al-Qadisiyya River, the Umm al-Ma'arik (Mother of All Battles) River, the al-'Izz (Prosperity) River, and the Taj al-Ma'arij (Crown of All Battles) River (Human Rights Watch 2002). While the Iraqi government continuously justified these projects as important

developments for Iraqi economic and social development, the hostility and forced displacement of the Marsh inhabitants reveals the underlying narrative. Extensive draining efforts, Iraqi military occupation of marsh communities, and forced displacement of the Marsh Arabs led to only 40,000 of the original 260,000 residents remaining in the Marsh communities, with an estimated 100,000 Marsh Arabs in Iraq (Human Rights Watch 2002).

A Period of Restoration and Change

Following the draining of the marshes, a number of foreign nations, aid agencies, and conservation groups spoke out about the tragedies of the wetlands destruction. Restoration and development projects by international aid organizations and foreign nations resulted in a partial reflooding of the wetland environment, however ongoing socio-political and climate problems continue to make the region vulnerable to future disaster. The southern marshes continue to be threatened by transnational damming projects upstream on the Tigres and Euphrates Rivers, particularly in Turkey and Syria, which continue to alter the water levels flowing into the southern marshes. Additionally, the discovery of oil deposits outside of Basra and along the wetland extent has led to the development of large oil rigs, most notably the Majnoon oil field which is considered one of the richest oil deposits in the world (Ramsar 2016). Chibayish, historically the center of Marsh Arab livelihood and culture, has continued to urbanize and expand. In the process of urbanization, the growing urban area experiences ongoing problems of sanitation, sewage, and electricity shortages (UNEP 2007).

Despite modern climate vulnerabilities, reflooding projects in the marshes are often considered successful. While the water levels and wetland extent have increased from 1993-1995 levels, the region remains a vulnerable area for future socio-political problems. Instead of

focusing on continued resilience and capacity building, media sources often share a story that the marshes were fixed and restored, due to increased water levels and the more recent Ramsar and UNESCO designations given to the marshes (BBC Earth 2018). In the context of this overall assumption of successful restoration, I consider the role of international aid and conservation groups in wetland restoration and the ways in which each organization defines the wetlands and their geographic extent.

Regional Interest

I chose this region as a focus area because the deliberate environmental destruction that has occurred in the southern marshes illuminates the ways that the environment serves as a political tool. Furthermore, a notable commonality of restoration projects in the marshes is a distanced approach to restoration, as agencies relied on satellite imagery and remotely sensed classifications of wetland areas as their perception of the wetland extent. Mapping the wetlands and the surrounding communities continues to be a challenge to cartographers, as there is limited travel access to gather data and conduct participatory interviews. As international actors attempt to restore and conserve the wetlands through distanced practices, the socio-political dimension of the landscape is inadequately acknowledged, leading to potential harm and a lack of voice for local indigenous groups who have suffered displacement and livelihood loss.

Additionally, this study region provides a context for exploring questions of how to classify a wetland, and what criteria is used to define this landscape. How specifically can someone classify wetland loss and regrowth when the area changes significantly between the wet and dry seasons, and temporally due to climate variation from precipitation cycles? Despite the complexity, the narrative of wetland desiccation by Saddam Hussein and the Iraq Government as

a way of maintaining political power is a necessary story to tell. As a highly politicized landscape receiving attention in the international restoration and development sphere, the marshes of Southern Iraq serve as a unique and important case study to consider representations of wetlands in boundary delineation and map construction. The implications of this work can be directly applied to other case studies of wetland destruction, as well as more broadly to any landscape facing environmental conflict.

Utilizing a Framework of Political Ecology

This research is built utilizing a framework of political ecology, which is necessary to adequately address the complexity and political nature of the marshland destruction. Throughout this paper, political ecology theory acts as a connecting thread, a guide for how to analyze representations of the wetland ecosystem in the form of reports, imagery, or maps. Political ecology theory, in its broad sense, supports the idea that “politics is inevitably ecological and that ecology is inherently political” (Robbins 2011, pg 3). With this, there is no such thing as an a-political landscape. Political ecology works to understand the complex relations between nature and society, also referred to as socio-nature theory, by considering questions of access, control, and how exerting power and control has implications for environmental and livelihood wellbeing (Watts 2000, Robbins 2011). The components of political ecology that are most useful for reframing and deconstructing representations of the Iraqi marshes and their environmental destruction are (1) the study of environmental conflict and (2) the importance of challenging single perspective environmental representations in exchange for a multi-lens view of any landscape.

The study of environmental conflict allows us to consider the political influences on the environment, and furthermore, the ways that the landscape can be manipulated as a way of exerting control or power by state authorities, private firms, or social elites (Robbins 2011). While lack of access and opportunities to the landscape and resources are key components of environmental conflict problems, landscape conflict is also concerned with the idea of who controls what, who is allowed to make decisions, and the discourse and narrative surrounding the landscape. In the context of environmental conflict in the Iraqi marshes, this orients my research through questions of who controls the landscape (historically and today) by decision making and planning, and what are the dominant narratives in Iraqi marsh restoration.

To form my methods and guiding questions, I turn to three classic political ecology case studies that all challenge environmental initiatives that view the environment through a single lens. These include the work of Paul Robbins in Rajasthan, India, Roderick P. Neumann in Mount Meru, Tanzania, and Fairhead and Leach in Kissidougou, Guinea. All three case studies are concerned with representations of landscape change and development, and the ways in which western conservation and environmental ideologies influence representation. In each example, there exists multiple conflicting representations of the environment and subsequent land cover change, when the information produced about one landscape is solely created through technological methodologies and distanced from the landscape in question. Western scientific methods and fields of thought have led to specific representations of the environment, curated by foreign groups and remote methods. These case studies not only challenge policies based on singular perspectives and remote sensing technologies, they also challenge the power and authority of these organizations more broadly. In each case study, the political ecology

researchers observe environmental discourses dominated by outside institutions and technology, and counter this by uncovering alternative local knowledge.

In *Imposing Wilderness*, Roderick P. Neumann (1998) conveys the ways in which nature preservation around Arusha National Park is motivated by colonial, Anglo-american representations of rural Africa, with a disregard for local participation in land use planning. Conservation efforts in Arusha National Park were influenced by a vision of Africa as an untouched, harmonious landscape, wild and natural in comparison to the modernization of Europe (Neumann 1998). As conservationists began to structure preservation efforts of the natural landscape, Neumann argues that they were ultimately motivated by socio-political factors embedded in the restoration process (Neumann 1998). These western, outside preservation efforts, crafted by international authorities and not the local residents of Mount Meru, disregard the ways that Mount Meru residents were already sustainably maintaining their local environment through indigenous land use practices. With the creation of the national park comes the existence of greater state control and land use decision making, and a loss of land freedom for local residents. State control of the national park has also led to increased conflict and hostilities between the Mount Meru residents and park officials (Neumann 1998). Local residents no longer have access to significant ancestral lands, and there are restrictions placed on customary land use practices (Neumann 1998 pg 2). As protected areas and national parks continue to develop in Africa, and other environmental areas of interest globally, policies must begin to acknowledge the harmful outcomes of restricting local land use practices and access to ancestral land for the sake of land preservation.

While there have been increased efforts in climate and development literature to incorporate local participation in the restoration and development process (Kronik 2015,

Nightingale 2015), global aid groups continue to dominate environmental management (Neumann 1998). Oftentimes, management decisions are made by individuals distantly removed from the site of the restoration, with a list of criteria and predetermined processes to follow. Large international aid organizations and environmental groups like the UNEP, Ramsar, and UNESCO utilize their own criteria for identifying necessary management steps, as well as where funding should be focused.

In a second case study example, Paul Robbins examines how remote sensing imagery was misused by foresters, leading to land cover classifications and land use planning that had harmful impacts on the local populations of Rajasthan, India (Robbins 2001). In this study, a satellite derived image of land cover was read as a success story by professional foresters, based on their preconceived definitions of “forests” and the limited knowledge they had of this specific region. To better understand the ways that local people perceived the landscape, researchers asked locals to identify land cover as seen in a set of georeferenced photographs. This process revealed that the forester identified tree growth was actually the expansion of the *Prosopis juliflora* tree, an invasive species. When professional forester classifications were compared to participatory classifications conducted through interviews with local people, the foresters classified the *Prosopis juliflora* tree as forest growth, while the local people classified it in a “wasteland” or “no classification” group (Robbins 2001). This instance of accidental misrepresentation by remote sensing imagery reveals the political nature of technology, and the ways in which landscapes are portable and codified depending on the context, source of information, and study region. Furthermore, this misuse of satellite imagery reveals another instance of local people suffering from foreign perceptions of local landscapes. As foresters produced a narrative of tree growth and forest expansion, this subsequently led to increased

planting of the invasive tree, and malinformed land use recommendations. Not only were local people unheard, they began to suffer the destruction of their local environment from the spread of an invasive tree.

Similar problems of misrepresentation are present in Fairhead and Leach's study, *Misreading the African Landscape*. In this study, Fairhead and Leach apply political ecology and theories of power, representation, and landscape history to understand the savannisation of Kissidougou, Guinea. Similar to the Mount Meru case study, western scientific viewpoints of the past have perceived local land use as maltreatment of the landscape, in need of conservation and environmental protection (Fairhead and Leach 1996). This narrative of land mistreatment has led to repressive policies against locals, such as the criminalization of bush fires, a traditional part of local landscape management practices. Beyond the direct negative impacts of policy implementation, this narrative of landscape loss has created a misconception that local people do not know how to care for their landscape, and that the landscape needs to be conserved utilizing western conservation practices. By focusing on the circulation of local, experience-grounded landscape readings and environmental histories of the land, Fairhead and Leach push back on a claim that indigenous land use has negatively impacted Kissidougou. Beyond the specific study of forest-savana dynamics, this case study contributes to a greater discourse of policy and power. Within Kissidougou we see a common trend of environmental narratives and policies developed by outside technology and foreign organizations (Fairhead and Leach 1996). With this, stewardship is placed in the hands of a "technical and managerial elite" (Fairhead and Leach 1996 pg 292).

Beyond *Misreading the African Landscape* specifically, the existence of a "technical and managerial elite" controlling environmental management is evident in all three of the described

case studies. In each instance, the local populations are disregarded as knowledgeable sources, and beyond this, they face direct negative consequences of foreign management and control. By utilizing these case studies as context for my research, I exemplify ways in which the local marsh inhabitants in southern Iraq are vulnerable to similar consequences of foreign environmental management. By deconstructing policy and visuals I convey ways that a technical and managerial elite *has* been established in the marsh restoration process.

Expanding into the field of political ecology more broadly, my research is guided by the overarching role of political ecology for expanding and reshaping international restoration and development efforts. Expanding beyond the theory of political ecology, Paul Robbins identifies two ways in which political ecology theory can be utilized in research and across disciplines to be socially and environmentally impactful. These two interconnected processes are coined by Robbins as the two powers of political ecology (Robbins 2011). The first—which considers political ecology to be a hatchet—works to expose flaws in dominant approaches to the environment, often used by corporate, state, and international authorities. In this paper political ecology exists as a hatchet to shape the process of deconstruction, working to reveal the different stories, methods, and politics that have created the social and environmental outcomes that exist in the marshes today (Robbins 2011). While the hatchet tool is essential for identifying shortcomings in development work and restoration efforts, political ecology cannot only serve a retrospective purpose (Robbins 2011). The second power of political ecology is the role of political ecology as a seed. As a seed, political ecology helps to create equitable and sustainable development and response. This is a call for alternative ways of addressing environmental problems, including proposed solutions and the incorporation of a multi-lens representation of a space. In this research, I combine political ecology with principles from narrative cartography to

create alternative maps of the marsh area that oppose the maps presented in the deconstruction section. In this process, I work towards expanding the narrative of marsh history, socio-cultural destruction, and boundary delineation to expand ways of thinking about life in the wetlands. By utilizing both deconstructing and cartographic creation, I am not attempting to make my own claims about how the wetlands should be represented, rather, I hope to expand the narrative to share new components.

Chapter 2: Foreign Actors in a Local Landscape

Wetland Representations in Aid Reports

To understand the implications of a map and a wetland boundary, it is essential to consider who is creating these boundaries and why. In addition to the political ecology case studies I introduced previously, my research is also informed by anthropologist Bridget Guarasci's work tracing the different actors involved with marsh restoration (Guarasci 2021). Through focusing on the restoration project and the degree of foreign involvement stemming from conferences and remote sensing technical trainings, Guarasci reveals problems associated with foreign restoration and conservation of the marshes. While her dissertation goes into further detail about the dynamics of conservation conventions and the wartime political climate of Iraq, I draw on her analysis of the involved international conservation groups, and the ways that their work codifies the marsh as an area of environmental significance (Guarasci 2021). In my review of wetland representations I ask three main questions, which are all motivated by the outcomes of my reviewed literature (Neumann 1998, Fairhead and Leach 1996, Robbins 2011).

First, I consider the priorities of the actor (in this instance an organization), in their environmental work broadly. Reviewing the priorities of the actor, whether it be an aid organization, government, or local group, helps to contextualize the work being done, especially through questions of scale, depth, and power. For example, in *Misreading the African Landscape*, it was the Guinée administrators following the French occupation that first thought that local residents were converting the forest into a derived savanna (Fairhead and Leach 1996, pg 1). By thinking critically about the major actors enforcing a malinformed narrative of

deforestation, it is probable that an imperialist, outside governing body would lack the landscape knowledge to accurately identify the causes for change. Here, the priority of the administrators was to protect the remaining forest land against further risk of tree loss. This priority was centered around responding to alleged current threats in the ecosystem to create policy. However, prioritizing the creation of new policy meant that understanding landscape histories was deprioritized, and sacrificed for a reliance on pre-established conceptions of landscape threats.

In a second example, it was professional foresters who influenced narratives and land cover policies in the Godwar Region of India (Robbins 2011). These foresters had received technical training from forest research institutes and colleges, and oftentimes had participated in retraining workshops. By participating in traditional means of forestry education, this reinforces the naming and identification of landscapes as an institutionalized practice, blocking out curiosity, memory, and uncertainty—all factors that would otherwise naturally exist in classifying a complex landscape (Robbins 2011). Because these forestry groups were focused on identifying and reinforcing established forest classes, there is no room for local knowledge in an institutionalized land cover classification, (especially one that is largely derived from satellite imagery). Here, the priorities are to solidify classes with clear, “fixed” categories in the landscape. In both instances, asking questions about the dominant actor’s proximity and power helps to gain insight into how the dominant narrative has been formulated.

Next, I consider the ways that local communities are acknowledged, and engaged with in the environmental management work. While local people often have rich knowledge about a place and its environmental history, foreign environmental management plans commonly disregard this knowledge source in favor of pre-established opinions about the environment. In Neumann’s (1998) case study of land conservation around Mount Meru, and Fairhead and

Leach's (1996) case study of Kissidougou, local people are viewed as harmful to the landscape, and therefore, there is an alleged need for foreign actors and policy response. In Rajasthan, India, the local people were not viewed as knowledgeable about the landscape, and forest classifications were derived from institutionalized definitions of forest cover alone (Robbins 2011). Within the Iraqi marshes, there is no indication that local people have been perceived by restoration organizations to be harmful to the landscape, however, outside actors have established a focus on ecological components of the wetland landscape due to organizational priorities.

Lastly, I consider the influence and power of these actors, the services that they are providing, and to whom these services are being allocated. Ultimately the organization with the most power will contribute to narratives of wetland restoration most dominantly. However, some organizations may appear influential through a global status, while providing minimal support for on the ground restoration. This question is motivated by Guarasci's (2021) analysis of Ramsar and UNESCO as political actors in the wetland conservation space. In Guarasci's analysis, she writes that "treaties like the Ramsar Convention for the protection of wetlands and the UNESCO World Heritage sites were necessary pursuits in order to legitimize the project of marshland restoration to international investors" (Guarasci 2011, pg 128). Additionally, she notes that international treaties were essential actors in order to "maintain and attract additional funding." Through this analysis, Ramsar and UNESCO's role in the wetland space is for legitimizing the marshes on an internationally significant scale. To expand on this concept, I analyze the specific services that international actors are providing through their involvement in wetland management, to reveal shortcomings of international restoration for achieving sustainability in the marshes.

Methods

In this chapter I analyze the organizations that have been involved in the restoration and conservation of the marshes to convey the dynamics of international forces performing restoration efforts from a distance. Various aid organizations have dedicated funds and attention towards restoration and future protection of the Iraqi marshes. While there are a number of actors involved in wetland restoration and conservation efforts including government agencies, NGOs, and international aid groups, all functioning at various scales, degrees, and focuses, I focus on large international aid groups that operate globally, because they tended to have more public management plans and reports that were essential for assessment. I also focused on large international aid groups because through my guiding questions I was interested in the services and priorities of these powerful, global groups.

First I introduce the major international actors that are involved in wetland delineations, and the structure and goals of each organization. I focus on three global organizations: Ramsar, UNESCO, and UNEP. All three global organizations became involved in the restoration and monitoring of the Iraqi Marshes following Saddam Hussein's wetland attack and remain stakeholders today. While they function as different organizations, they have degrees of connectedness to each other that influence the ways in which certain wetlands receive international resources and attention. In determining the representations of wetlands, I consider the criteria that is utilized to become a designated site of importance (for Ramsar and UNESCO) as well as the implications of this designation for the ways that the marshes receive aid and management support. For the UNEP report, I focus on the ways that wetlands are defined, the delineation of services and funds, and the scale of operation.

Context

Ramsar is a global convention of contracting parties (typically states with some additional international organizations) concerned with the “conservation and wise use of wetlands through local and national actions and international cooperation” (Ramsar 2022). Countries can sign on to be a part of the Ramsar convention, which entails that they also designate at least one wetland as a wetland of international importance. Iraq currently has four Ramsar designated wetlands of international importance, three of which are the Central, Haziweh, and Hammar Marshes, and the fourth being the Sawa Lake, located west of the marshes along the border of the western desert (Ramsar 2022).

The Ramsar Convention and the signing of the Ramsar treaty in 1975 was organized by the United Nations Educational, Scientific, and Cultural Organization (UNESCO), and while the organizations are formally separate entities they share many resources and overlapping sites of importance. Unlike Ramsar, UNESCO protects identified sites because of their cultural value, environmental value, or educational value (UNESCO 2022). UNESCO also exists as an agency of the U.N. while Ramsar does not. Within the marsh area there are four UNESCO protected wetland marsh areas, similar in location to the Ramsar sites (divided into four areas instead of the typical three.) Both Ramsar and UNESCO require that nations abide by their respective treaties to have intentionally designated sites of importance, and site designation is based on a set of global criteria.

Diverging from the roles of Ramsar and UNESCO in identifying areas of significant value, the United Nations Environmental Program (UNEP) is a global organization (still part of the United Nations sphere) focused on response to global environmental issues. Involvement varies depending on the specific situation, however in many instances UNEP produces

environmental reports that outline current environmental emergencies, and proposed management plans for restoration and further aid. The UNEP's role in Iraq is concerned with the environmental impact of conflict, including the environmental impact of the Iran-Iraq war in the 1980s, the 1991 Gulf War, and "environmental mismanagement by the former Iraqi regime" (UNEP 2022). With this specialized interest in post-conflict environmental impact, UNEP approaches wetland representation and management differently than Ramsar and UNESCO. Because UNEP has produced a series of reports in response to the environmental destruction of the southern marshes, I focus on the two reports that are highlighted on the UNEP in Iraq page: *A Remote Sensing Desk Study of Environmental Destruction in the Marshes and a Marshlands Observation and Management Plan* (UNEP 2001).

While I describe Ramsar, UNESCO, and UNEP as three separate international actors influencing restoration and wetland use in the southern marshes, it is important to acknowledge the overlapping work that links these three, large, environmental organizations. As organizations, Ramsar and UNESCO have frequent overlap in the identification of internationally significant wetlands. Both UNESCO and UNEP are United Nations affiliated groups. As a result of this, all three organizations exist within overlapping actor-networks that share information, resources, and identify similar components of conflict and regional needs. A sharing of information between these groups is evident in the outlined management and nomination forms. Ramsar site analysis information cites UNESCO and UNEP management plans for the marshes, and all three organizations are working with federal environmental positions, such as the Iraqi Ministry for the Environment.

Ramsar

By reviewing Ramsar designation criteria and the boundaries of Ramsar wetlands, we can consider the impact of Ramsar policy and perspectives of wetlands in the marshes. In order for a site to receive the designation of “wetlands of international importance” it must qualify in one of the following nine categories.

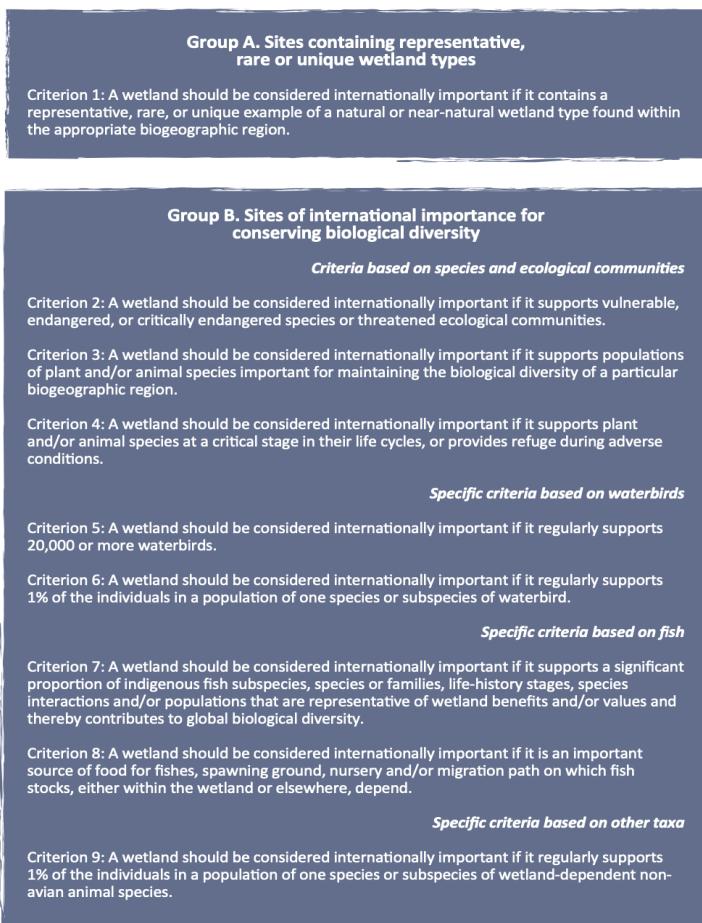


Figure 2: Ramsar criteria for considering wetlands to be internationally significant (Ramsar 2016).

From this criteria (figure 2), it is evident that the Ramsar classification of wetlands is most focused on the conservation of an “internationally important” wetland for the protection of vulnerable ecological communities and biological diversity. More specifically, this includes

wetland water birds or indigenous fish subspecies (Ramsar 2022). None of these criteria focus on the socio-cultural significance of wetlands and the subsequent reasons for conservation, although the socio-cultural value is acknowledged more directly in the site evaluation forms.

This representation of the marshes as mainly significant for their wetland habitat services is further made evident in the Ramsar nomination reports. Each nomination form, submitted by the specific nation's federal government and reviewed and approved by Ramsar officials, outlines the ways that the proposed site can fit into the nine criteria. Additionally, the form includes questions about the overall character, social and cultural values, wetland features, and ecosystem services. In considering Ramsar form questions and responses for the Iraqi wetlands, the forms do not more specifically outline the significance of the marsh as valuable for indigenous tradition, livelihood, and way of life. While each form response does acknowledge the existence of the Marsh Arab people, the tone and form of these statements reveals that the focus remains on the ecological components. When asked "why is the site important?" (section 3.1) and "What is the site like?" (section 4.1), none of these answers acknowledged the presence of the Marsh Arabs. The Marsh Arabs are referenced in the socio-cultural values section of the report, but more so to provide additional context of the study region.

The way in which Ramsar designation criteria focus on the ecological character of the marshes portrays an idea that the marshes are important because of their beauty and diversity. Furthermore, this designation applies globally broad wetlands criteria onto a complex, suffering, community. The international designation of the three wetland areas in theory protects the wetlands from further environmental harm, however this statement comes with no real ground level changes or local support. To adequately evaluate the influences of the Ramsar designation on the local marshes themselves, it is necessary to consider what changes, if any, are occurring in

response to this designation. Even when a nation signs the Ramsar treaty, pledging to work towards “wide use and management of wetlands,” they are left to independently make decisions on the management of the Ramsar designated sites.

United Nations Educational, Scientific, and Cultural Organization (UNESCO)

Similar to Ramsar, UNESCO is focused on the identification of sites with “outstanding universal value” that will be inscribed onto the World Heritage List (UNESCO 2022). Benefits of this recognition as outlined by the UNESCO web page include the potential for accessing World Heritage Fund money, management plans and monitoring mechanisms implemented by UNESCO staff, and an increase in the potential for site tourism. It is evident that UNESCO views the World Heritage Site nomination as a significant and high level act of environmental recognition, as joining the conventions provides a sense of “belonging to an international community” (UNESCO 2022). By using phrases like “prestige,” and “a magnet for international cooperation” UNESCO World Heritage Sites are almost entirely benefiting from the status that comes with UNESCO. With the status and power of UNESCO, we can consider how their understanding of the marshes’ value and assets influence conservation projects and management.

Currently, UNESCO World Heritage List Nominations are based on a set of ten criteria where sites must meet at least one of the ten criteria. Unlike the Ramsar criteria, the UNESCO qualifications include both natural *and* cultural criteria. The first six criteria focus on culture in the built environment, while the latter four focus on components of the natural world and scientific value. The Southern Marshes are recognized by UNESCO for their natural value, specifically noting their “internationally significant ecological succession processes” (criterion ix), and “highly important and significant habitats for in-situ conservation” of threatened species

(criterion x) (UNESCO 2016). In these defining criteria, we again see a focus on the natural components of a wetland in defining the boundaries. Additionally, the marshes are deemed significant because of their unique structure and ecological components, without recognition of past environmental conflict in the area. In the description of the wetlands, the region is a-politicized, and more simply viewed as a habitat for species of importance.

A major problem with the UNESCO management plans is the division of labor and distribution of voices in the decision making process, which solely include representation from the international (UNESCO) level and Federal positions from the Iraqi Government. This “top-down” broad conservation approach is insufficient for achieving transformative management of the marshes that protect local communities from socio-environmental problems. Chapters 5 (Protection and Management) and 6 (Monitoring) of the UNESCO Nomination Text outline the major actors in the UNESCO management plans. In section 5a, *Ownership of the Property*, it is noted that the UNESCO properties are owned by the Iraqi Treasury and managed by the federal government (UNESCO 2014). While local tribal groups are allowed to use the land and resources within the protected boundaries, the Iraqi government has the right to change property land tenure without permission (UNESCO 2014). Similar to Paul Neumann’s case study of land conservation around Mount Meru, western conservation ideals—as determined by UNESCO— are applied to the marsh wetland extent, reducing the power of the indigenous groups (Neumann 1989). In addition to the delineation of management power to international groups, the development of UNESCO management plans only involve international and federal level actors. Monitoring of the conservation progress and protection of the marshes falls under the primary responsibility of the Ministry of the Environment and the Ministry of Water Resources, both located in Baghdad.

It is important to note that throughout the UNESCO report there are acknowledgements of the importance of local knowledge for capacity building, conservation, and proper management of the marshes. In one instance, UNESCO mentions the revival and utilization of traditional boat building techniques for local sustainability—an important cultural practice that became nearly extinct with the decrease in marsh water extent and the migration of many locals during the draining events. Unfortunately, references to local knowledge and customs are not common through the management plans, and oftentimes reflect a focus on increasing regional tourism through the sharing of traditional practices. In figure 3 (below), UNESCO describes the revival of traditional tools and techniques as a way of positively impacting “local awareness” and “sustainable utilization of the natural resources” (UNESCO 2014). This statement misrepresents the fact that local groups are acutely aware of marsh destruction, and have been practicing sustainable utilization of wetland natural resources for centuries.

5	The revival and utilization of traditional tools and techniques (e.g. <i>Mudhif</i> guesthouse and <i>Mashhuf</i> traditional boat)	The revival of such traditional structures, tools and techniques have great impact on raising local awareness by fostering sustainable utilization of the natural resources. It is also a very attractive tool of tourism promotion and experience enhancement.	Piloted, and more plans are conceived
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Figure 3: Portion of 2014 UNESCO Report that reveals the focus on using traditional techniques for tourism enhancement (UNESCO 2014).

With UNESCO, we see clearly that the organization’s involvement helps to establish the Iraqi wetlands as a landscape of international importance, therefore institutionalizing and politicizing

the wetland environment. In this process of gaining international status, local indigenous people and their needs have been reduced to attractive tourist components of the landscape, with limited attention towards indigenous environmental and socio-economic needs.

United Nations Environmental Program (UNEP)

Unlike Ramsar and UNESCO, UNEP is not focused on the identification of important wetlands or natural sites based on a set of criteria, nor do they require the nation to join or sign a specific treaty. The work that UNEP has done for the immediate restoration needs of the Southern Marshes was influential in helping to provide emergency relief and water monitoring systems. Furthermore, the use of satellite imagery to visualize the severity of marsh destruction was significant for increasing humanitarian, conservation, and public interest in the disaster. The extensive work of UNEP programming, however, means that environmental impact assessment and the agenda of conservation work in the marshes has been set by international organizations that have no on-site work being conducted, by professionals with no prior landscape knowledge of the southern marshes. UNEP figures and reports, such as the 2003 Desk Study on the Environment in Iraq, were conducted completely by UNEP officials at the office in Geneva, in attempts to “provide a rapid overview” of the marsh conditions (UNEP 2003). Beyond the concentrated production of landscape knowledge from the UNEP office in Geneva, even in the outlined UNEP plans for environmental monitoring and site assessment, UNEP experts, consultants, and contractors comprise the restoration actors, maintaining UNEP control over the region.

Lastly, considering the scale and scope of the UNEP agenda in Iraq helps to reveal shortcomings in Iraq’s overreliance on UNEP aid and management plans. Because UNEP is a

large international organization focused on environmental conflict assessment, the organization is also concerned with the environmental problems as a result of the Gulf War and Iran-Iraq War throughout the nation. Iraq has struggled with chemical contamination, oil development, and a lack of environmentally focused government programs—all of which UNEP is working to respond to (UNEP 2003). With a large scope of problems to address, UNEP has failed to implement all of the management activities outlined in the primary reports. By embedding the restoration of the marshes into a larger concern for environmental conflict assessment in Iraq, a unique and specialized focus on long term marsh capacity building is not a top concern.

Questions of Priorities, Community Acknowledgement, and Power:

Through my policy deconstruction, I now answer the three main guiding questions I used when reviewing actors in the political ecology case studies.

1. *What priorities does the organization have in their environmental work broadly?*
2. *Does the organization acknowledge the existence of communities in the marshes and their need for agency?*
3. *What influences do these representations have for development and environmental change, and through this influence, what services does the organization provide, and who is receiving these services?*

Priorities:

For Ramsar and UNESCO, the organizations are focused on identifying the wetlands as sites of international significance. Through this designation, the wetlands gain international recognition, and become grouped with other well known sites of international importance. Because both organizations have a globally defined set of criteria that each site must qualify under, the landscape of the Iraq marshes is being placed into globally fixed categories, determined under western ideas of conservation and landscape importance (Neumann 1989, Robbins 2011). With UNEP, the organization is focused on assessing and dealing with the environmental impact of conflict in Iraq, however, UNEP's extent of operation and lack of physical proximity does not create favorable conditions for achieving localized restoration. While some countries have the benefit of a local UNEP country office cultivating strong connections to local organizations, this feature is absent in Iraq.

Acknowledging Local Communities:

Through review of policy and criteria, I found acknowledgement of local communities and their need for increased capacity building to be insufficient. Similarly to my reviewed case studies (Neumann 1989, Fairhead and Leach 1996, Robbins 2011), conceptions of the wetland landscape are driven by the priorities of the major actors, and established by foreign conceptions of restoration needs. In the Ramsar nomination forms, marsh communities are acknowledged as a component of the socio-cultural value of the marshes. In this instance, the indigenous Marsh Arab people and their rich culture have been diminished to an added-on point of interest in designation criteria that has only focused on the ecological components of the landscape. Ultimately, it makes no difference to Ramsar if there are people inhabiting the wetlands or not.

Ramsar's priorities are focused on a narrow reading of the marsh landscape as an apolitical habitat, and site of natural beauty. For UNESCO, the value of Marsh Arabs traditions are mentioned in management documentation with a focus on the value for regional tourism. Again, there is an acknowledgement of marsh indigenous groups as attractive for gathering tourism interest, diminishing the relationship of local communities to the wetland ecosystem to an attractive feature for outsiders. While UNEP does more explicitly state their focus on identifying and addressing immediate and long term consequences to Marsh inhabitants, it is unclear what notable actions are being carried out in response to this statement.

Influence and Services:

Lastly, I consider the influence and services of these three international organizations. A large commonality across the three organizations is that the marshes have gained popularity and status on a global scale by directing attention to the marshes as a site of international importance, or a region in need of restoration and humanitarian attention. By gaining access into a Ramsar network of other affiliated nations, the federal government of Iraq is benefiting from the status of being a treaty member. However, in my review of Ramsar's services, I found that services consist solely of management recommendations for the marshes with minimal impact on the protection of wetlands against anthropogenic threats, or future inherent climate change risks. The management of the wetland areas is left in the hands of the Iraqi federal government to control. Even within the Ramsar boundary, there are oil fields, agricultural developments, and urban settlements.

For UNESCO, the implementation of management plans could be impactful in prohibiting the development of oil exploration within the identified sites of importance. As of 2014, implementation of management plans is inadequate due to staffing problems. Again, we

see the recognition of the marshes as an international landscape, but minimal support occurring for local problems of loss.

Lastly, as the largest humanitarian entity in Iraq, UNEP has the ability to sway Iraqi environmental management plans. The influence here has the potential to be transformational to the landscape, especially considering the funding backed by UNEP. However, UNEP's focus on remote sensing classifications of the landscape and the provision of technical training as a means of capacity building and management reinforces western, fixed categories of land cover and encourages a UNEP reading of the landscape in place of a localized reading (Guarasci 2021).

Through Ramsar, UNESCO, and UNEP involvement in the marshes, Iraq gains status as an environmentally conscious nation, a landscape of international importance, and an intriguing destination for tourists looking to visit an environmental restoration success story. Through this, restoration power is concentrated in the hands of international actors and officials in the federal government, thus delocalizing the problems of wetland destruction even further from the landscape in question.

Identifying the agendas and roles of these three organizations is a necessary step in considering how the wetlands are viewed and influenced by international aid organizations. Across all three agencies, there are commonalities in the ways that international conservation criteria and planning is applied to localized, site specific problems and organization leaders are working with groups at the federal level. While each organization acknowledges the needs for local knowledge and “capacity building” in a broad sense, the lack of site specific research and indigenous knowledge is a barrier to achieving sustainable, long term conservation in the Iraqi Marshes.

Organization	What priorities does the organization have in their work broadly?	How does the organization acknowledge the existence of human communities in the marshes and their need for agency?	What influences do these representations have for development and environmental change?	What services does the organization provide, and who is receiving these services?
Ramsar	Protection of wetland species, guiding nations in the wise use and management of wetlands	Marsh communities are acknowledged as a component of the socio-cultural value of the marshes. No mention of the management of wetlands for community restructuring.	Ramsar requires Iraq to agree to wise use of their wetlands. Management of the wetland areas are left to Iraq to control.	Ramsar works directly with national governments and operates as a treaty and conservation group. The largest service that Iraq receives is the designation statuses themselves, which can promote regional tourism.
UNESCO	Identification and protection of sites with “outstanding cultural value.”	The value of Marsh Arabs traditions are mentioned in management documentation with a focus on the value for regional tourism.	The implementation of UNESCO management and monitoring plans can be impactful in prohibiting the development of oil exploration within the identified sites of importance. Currently, implementation of management plans is inadequate due to staffing problems.	Protection and management is delegated to environmental officials at the Iraqi federal government level.
UNEP	Focused on the environmental impact of conflict in Iraq.	UNEP is concerned with the destruction of the marshes and the immediate and long term consequences to Marsh inhabitants.	As the largest humanitarian entity in Iraq, UNEP has the ability to sway Iraqi environmental management plans. UNEP’s failure to implement in person work prohibits the inclusive use of local knowledge and land use planning.	UNEP Remote sensing work and management plans have comprised the majority of restoration efforts in the marshes. Funding for marsh restoration is congregated at the national level.

Table 1: Overview of findings from review of Ramsar, UNESCO, and UNEP work.

Chapter 3: Deconstructing the Wetland

Background

In the previous chapter, my work focused on the implications of international restoration and management, and international wetland criteria. Now, I transition to a focus on the wetland maps that influence restoration efforts. The process of map creation, specifically drawing lines to indicate what space is inside versus outside a boundary, can have significant implications for how space is understood (Harley 1989). Within my study of the Iraq Marshlands, variation in wetland boundaries can result in misconceptions of wetland regeneration and revitalization. Additionally, the boundaries drawn by Ramsar and UNESCO indicate where spaces are considered to be of significance for international restoration and conservation. Differences in wetland representation are also created by visual hierarchy and map design choices.

In this chapter, I utilize map deconstruction principles to reveal underlying narratives that exist in various wetland maps. I first provide an overview of actor network theory, boundary objects, and database ontology—three concepts that are essential to map and spatial database deconstruction. Next, I discuss the implications of restoration work that rely on remote sensing representations of the landscape that are rendered from a distance. This review of remote sensing is supported by the case studies I first introduced in Chapter One of my thesis. Lastly, I transition into methods of map deconstruction, implementing the dominant strategies of map deconstruction outlined by JB Harvey (1998) in his paper “Deconstructing the Map.” Using these methods, I address the discrepancies in cartographic representations of wetlands. While maps are often seen by readers as correct renderings of a landscape, my work reveals bias, and the political

nature of these tools. Results of this section indicate a need for continued cartographic representations of the region, which incorporate data sources from non-traditional sources.

Actor Network Theory

I draw on the actor-network theory to consider how human and non-human objects contribute to the exchange of information in the context of geographic information systems (GIS) and cartography. In a working definition provided by Harvey (2001), actor networks are defined as “the traces of relationships between people, institutions, and artifacts connected by agreements and exchanges.” This definition acknowledges the inherent collaboration present in the actor networks, as different individuals or groups constantly change and provide new information into the network. Despite the element of collaboration that exists as a result of an actor network, there also exists a series of problems and limitations that are naturally occurring in the field of GIS as a result of actor networks.

A significant limitation is the fact that actor networks produce specific small networks of people and institutions that produce and share information, resulting in the exclusion of others from the production and exchange of data (Harvey 2001). Subsequently, Harvey’s work acknowledges the problem of data standards, which do not exist on a global scale, and instead function within actor networks that consist of people and organizations within the same discipline (Harvey 2001). By adopting a framework of actor-network theory to consider the production of data and maps of the Iraqi wetlands, we can more accurately identify the “context” for which the data and GIS methodologies are used.

Boundary Objects and Database Ethnographies:

Actor-network theory provides a framework for considering the context of data production and circulation. Building off this, contextual deconstruction can be expanded by looking at database ethnography and ontology-based metadata, which reveal data about the data being used. Nadine Schuurman's study of database ethnography utilizes these concepts, as she traces the sources of data and provides contextual information on GIS data utilized in different forms. In order to trace the production and context of data in various forms, Schuurman, and other geographers, turn to the concept of a boundary object (Schuurman 2008, Harvey 1998, Chrisman 1999). For my paper, I will be using Schuurman's definition of a boundary object: objects and concepts used in science and technology study that have different meanings between disciplines, but permit communication among researchers working in different paradigms (Schuurman 2008). The concept of a boundary object is useful in understanding how different objects or data take on new roles depending on the actor network in which they are produced and circulated. Boundary objects that take on different meanings for different disciplines (or actor networks) are present across all fields. For example, physicians and molecular biologists can both refer to cancer, but at the same time understand the cancer in different ways (Fujimura 1992). Alternatively, land cover classifications have a different significance for an ecologist and for a city planner. By linking geographic data to their role within a specific discipline or network, we can contextualize GIS data and methodology to aid in the deconstruction of regional maps.

The concept of a boundary object is especially relevant in our case study, as the classification of a “wetland” is a boundary object that takes on different meanings across disciplines and organizations. The role of wetlands as a boundary object is first discussed by Harvey in his work, “Boundary Objects and the Social Construction of GIS Technology”

(Harvey 1998). While Harvey is focused on definitions of wetlands in the United States alone, his study identifies at least 6 agencies that are involved in wetland mapping through 19 different projects. This number has only increased since the 1998 publication, as wetlands have become more widely discussed as a significant habitat and ecosystem service. In a 1995 study of wetland classifications by Shapiro (1995), 4 datasets that each mapped wetlands for an area of Maryland disagreed on the location of wetlands for 90% of the study area in at least one of the four datasets. Even if the wetland bounds were buffered by 50m in all directions to expand the area, the datasets would still be at a 60% disagreement. These results are unsurprising, given the different contexts in which the delineation of wetland area is meaningful. For ecological groups, defining wetland areas is important as it identifies areas that could be of essential habitat for wetland bird species. In a planning and zoning context, wetlands are important to map because legal restrictions on developing in wetland areas can prohibit certain planning projects and land use plans. Additionally, the use of the term wetland to signify environmental classifications can often over generalize the unique physical structure of a specific habitat. A classification that results in a wetland/non wetland binary oversimplifies a land cover category that actually consists of numerous wetland types (marsh/swamp/bog/fen, etc). Furthermore, differences in the concepts of land-cover versus land-use can lead to misunderstandings in wetland definitions. While land-cover classifications are concerned with the actual composition of the landscape (forests, wetlands, water), land-use classifications reflect the ways that people use the land (conserved, agriculture, mixed use). Within this, land-use and land-cover classifications of wetlands may lead to differences in the ways that this landscape is represented on maps.

Wetlands and Sense of Place:

Beyond the existence of wetlands on a map, determined by different organizations across disciplines, wetlands also exist as a place of “home” and cultural importance, classified not by environmental protection but by the cultural significance of wetlands to the livelihoods of local populations across the world. Wetlands hold stories of deep loss, restriction, change, and cultural history (Scaramelli 2018). Global coverage of wetland loss over-generalizes the components of environmental change into a simplified binary of areas of loss vs areas without loss. In response to binaries of wetland area lost vs areas without loss, local input can be used to shift vague concepts of loss into locally rooted reflections of environmental and socio-cultural change (Scaramelli 2018). This is a call for local input in defining areas that are considered to be part of a wetland system. The classification of a wetland in different scientific disciplines serves a different use than the classification of a wetland provided by someone who has spent their life alongside a wetland in Turkey, or a Marsh Arab who has watched their home community undergo extreme drying. The selection of one single dataset to represent the area of wetlands in the Iraq marshes oversimplifies the importance of this physical environment as a landscape, a home, and a part of culture. A reliance on remote sensing techniques and satellite imagery leaves out local input and reflection about what has been lost alongside the draining of an ecosystem.

A Critique of Remote Sensing:

With remotely sensed classifications—comprised primarily from satellites and aerial photography—dominating representations of marsh destruction and regeneration, it is essential to first consider problems that exist in the data selection process, in land cover classifications, and with the power and authority that is given to remote sensing classification in determining

representations of reality. Advancements in remote sensing technology have given power to a specific map type that has been utilized heavily in analysis of land cover. Multiple case studies have demonstrated the shortcomings of remote sensing imagery as a representation of the environment being documented. This is not to invalidate the work that remote sensing technology has done for humanitarian and conservation efforts, but rather to acknowledge that remote sensing is only one tool, and alone it cannot sufficiently serve as the only source of knowledge. Reliance on remote sensing alone not only leads to an incomplete picture of the landscape, but it further elevates the voice and gives power to the foreign actors who are creating the visual, instead of the Iraqi people living in the Marsh (Gurassi 2021, pg 171).

Returning to the case studies introduced in Chapter 1, I now take a closer look at the various processes utilized to critique traditional remote sensing methods. Each case study utilizes their own methodology, but ultimately work to contribute to a similar goal: revealing the highly politicized nature of remote sensing, and the significance of local knowledge for understanding the landscape. Utilizing deconstructionist methodology for critiquing remote sensing is essential for correcting outcomes that have negatively impacted local populations, and ensuring that conservation does not remain solely driven by foreign forces enacting policy decisions from afar.

In *Misreading the African Landscape*, a case study of forest-savanna land cover changes in Kissidougou, Guinée, political ecologists Fairhead and Leach utilize environmental histories and a wider temporal window to study the changes in vegetation pattern. While most cases that argue that local inhabitants and their traditional land use practices have contributed to the deforestation of Kissidougou, those claims are based on resources from the past 10-15 years (Fairhead and Leach 1996). In contrast, Fairhead and Leach examine air photographs from the past 40 years, as well as written and oral accounts of the land. Comparing aerial images in false

color from the 1950s to images from the 1990s reveals that an increase in forest cover has in fact occurred, paired with historical accounts of savanna description. By expanding the temporal window and incorporating a wide range of sources into their analysis, Fairhead and Leach (1996) open new dialogues for considering narratives of African environmental change.

In the case study of forest cover change in the Godwar region of Rajasthan, India, Robbins utilizes techniques in participatory mapping and imagery analysis to create a contradictory reading of land cover change (Robbins 2001). In order to convey a contradictory reading of the landscape between the professional foresters and the local people, Robbins asked people to label land cover on georeferenced images of the area. When local people looked at the images, they classified the picture of this tree cover as a “wasteland” or “no classification” (Robbins 2001). By utilizing participatory mapping in the form of georeferenced photographs, Robbins allowed local people to convey a completely contradictory narrative about the landscape through the power of an image. There is a common belief that with advancements in GIS comes a more precise representation of the landscape, an accurate reality (Harvey 1989 pg 4). This belief is contradicted with case studies such as this one, that demand the use of local knowledge in truly understanding the landscape.

Acknowledging Temporal Variation

In a similar sense, satellite representations of wetland classifications in the Iraqi marshes will have extreme variation depending on the season, or the status of upstream damming projects on the Tigris and Euphrates. Aerial imagery from October to May will show the landscape during the rainy season, where the marshes are much higher and could be used to tell a narrative of water regeneration and renewal. Outside of this temporal period the region experiences very

little rain (Salim 1962). The impact of climatic extremes on satellite imagery expands past normal seasonal changes in a single year. Periods of extreme drought in the marshes (2007/2008) and periods of extreme precipitation (2018/2019) greatly impact marshland recovery, and can skew the way that we consider the marshes to be restored. The variability in climate and seasonal rain patterns is further reasoning that satellite imagery must be situated in the context of the environment and within socio-political factors. If imagery from an extreme precipitation period is utilized to create a narrative that wetland restoration has succeeded in achieving ecological renewal, then this story is not fully accurate.

I acknowledge temporal variation in the southern marshes of Iraq with the time series plot from Terra MODIS data shown below. Terra—a global satellite operated by NASA—has five onboard sensors for collecting data, one of which is the Moderate-resolution Imaging Spectroradiometer (MODIS). Terra MODIS imagery can be useful for tracing atmospheric changes, including temperature and precipitation trends. While Terra MODIS satellite data can be accessed through a variety of platforms, I assessed Terra MODIS imagery through the Global Agricultural Monitoring System (GIMMS) time series plotter. Through this GIMMS time series plotter, I assessed the normalized difference in vegetation index (NDVI) for Iraq during the time window of 2000-2022. NDVI is a popular and useful metric in remote sensing and land cover research. Higher NDVI values correlate to increased greenness (vegetation quality) whereas lower NDVI values signify dry or bare land, or water. In this instance, years with higher NDVI values correlate with more extreme yearly rainfall. To track temporal differences caused by rainfall pattern alone, I placed organizations on the time series based on when they produced maps or boundaries of the Iraq marshes. Each labeled organization represents a boundary, land cover classification, or map that I reference in my research, helping to contextualize the

boundary with its climate context. Discrepancies in NDVI values alone convey that the southern marshes will change size and form substantially depending on rainfall and water flow. With high NDVI anomaly values concentrated in the window of 2014-2016 and 2019-2022, higher water levels in the marshes can not represent successful restoration alone. An accurate evaluation of wetland health and rural livelihood restructuring demands the use of local input and other sources to consider the current state of the environment.

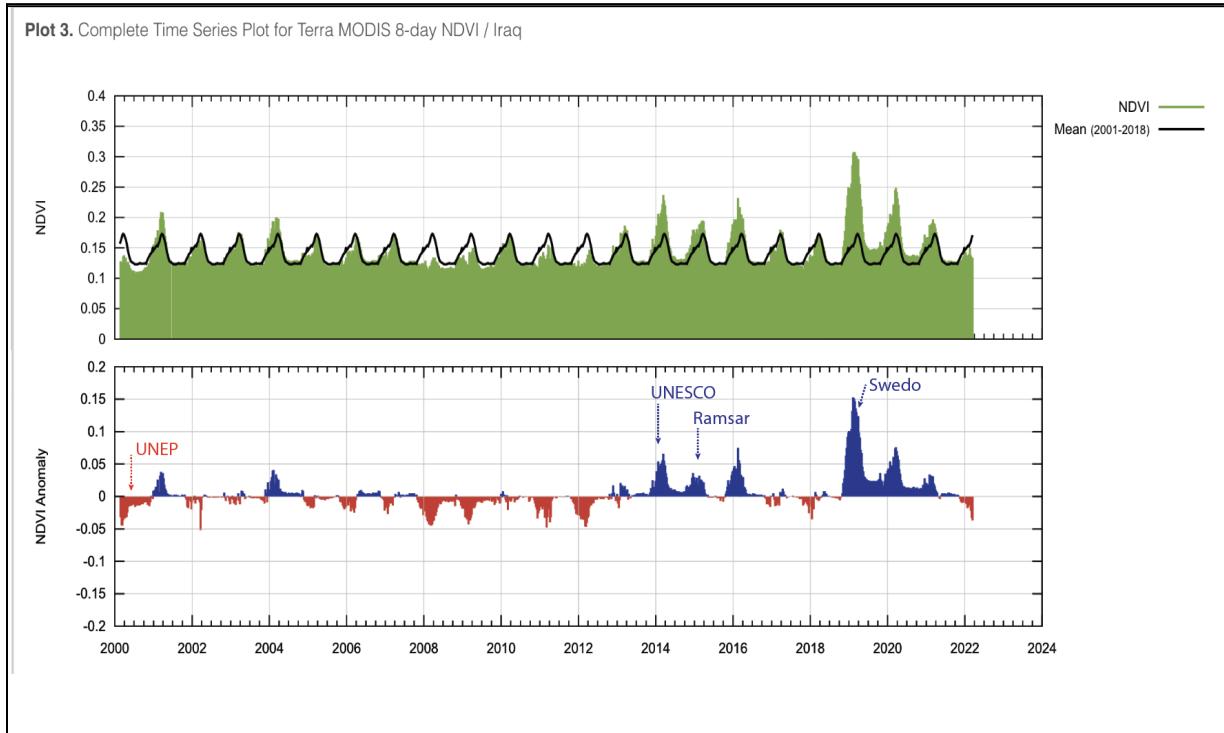


Figure 4: NDVI time series plot, produced by GIMMS, illustrating averages for Iraq over the time window between 2000 and 2022. Year of map/boundary labeled to convey differences in water level due to anomaly.

Qualitative Comparison of Wetland Extent

By deconstructing wetland maps and boundaries, I emphasize a number of reasons why mapping wetlands with remote sensing cannot serve as the only representation of the landscape. With satellite imagery maps, the restoration status of the wetland environment is based entirely on the extent of wetland inundation. In this instance, the wetland landscape is reduced to a measure of water levels—without any consideration for wetland salinity, reed health, or the wellbeing and livelihood capabilities of local groups. This focus on wetland extent as the single measure of success bears similarities to Robbin's (2011) study of the invasive *Prosopis juliflora* tree in India. Just as the satellite depictions of the Godwar landscape told a story of forest growth and success, an over reliance on satellite representations in the Iraq marshes can lead to a misinformed narrative of successful, completed restoration if water levels are the only dimension taken into consideration.

To illustrate the potential for extreme fluctuation in wetland inundation levels, and expand on the information from the GIMMS NDVI time series plot, I create a visual comparison of satellite images of the marshes from Google Earth to reveal that fluctuation in water level can change significantly due to rainfall and temporal changes in wetness. For example, the satellite imagery below is from three years within a five year window, however, the wetland extent is different in each one. Each satellite image was taken in December, which falls in the rainy season in the marshes. In the imagery, the marsh extent shrinks from 2014 to 2016 and then increases again in 2019. This wetland fluctuation is due to the changes in NDVI and wetness between wetter and dryer seasons and years, however, without acknowledgement of temporal variation it could appear as if human involvement is the driving factor in influencing wetland extent. In the

figures below, the 2014 marsh inundation extent is highlighted in red, which can then be visually compared to the extents in 2016 and 2019.



Figure 5: 2014 Google Earth satellite imagery. At the time of the image capture, Iraq was having higher than normal wetness.



Figure 6: 2016 Google Earth satellite imagery. During a dry year, the Central Marsh and bottom of the Hawizeh Marsh have a much lower wetland extent.

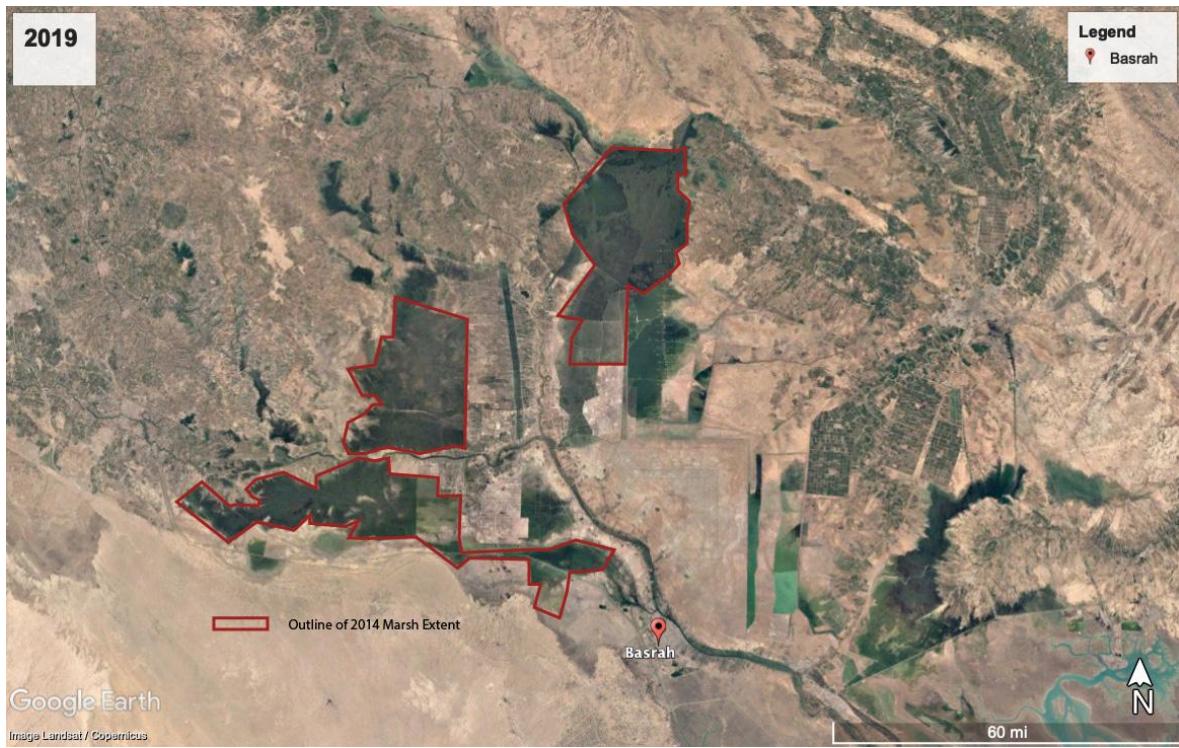


Figure 7: 2019 Google Earth Satellite Imagery. NDVI values in 2019 were the highest they had been in 20 years. The wetland extent is significantly bigger than seen in the 2014 and 2016 satellite imagery.

This basic visual comparison acknowledges the role of seasonal and temporal variation in determining wetland extent, which can impact how wetlands are classified, and what the narrative of conservation appears to be.

Quantitative Wetland Boundary Comparison:

Turning to a more quantitative method for boundary comparison, I compared three wetland boundaries drawn by UNESCO, Ramsar, and Swedo (Swedish Development Aid Organization). UNEP boundaries are not included in this comparison because UNEP produced maps convey estimated marsh extent for 2001, and in this analysis I focus on wetland boundaries from a 5 year temporal window between 2014 and 2019. By focusing on boundaries from within a more recent and comparable time period, I can better compare differences that are not caused by temporal differences. In overlaying these three wetland classifications, I convey conflict in the classifications that ultimately reflect differences in the organization at the wetland criteria and policy level. This analysis expands on my policy deconstruction, but begins to visually convey the differences in the wetland boundaries that have been drawn. As identified in chapter 2, Ramsar has three delineated wetlands of international importance in southern Iraq—the Central, Hammar, and Hawizeh Marshes. UNESCO has four designated marshes of international importance, because they split the Hammar Marsh into two. Lastly, I compare these two wetland boundaries with a remote sensing classification that is used in a SWEDO graphic comparing wetland extent pre and post draining.

The SWEDO wetland classification was created in Google Earth Engine using imagery for the years 2006-2019. Median composite images were created for each year. For the classification, land cover was split into 4 classes, using a series of training and validation points

to inform the classifier. It is unclear what reference information was used in the map making process, or the level of familiarity that SWEDO remote sensing officials had with the wetland region of interest. One significant difference between the SWEDO wetland classification and the UNESCO and Ramsar boundaries is that in this instance SWEDO is focused on defining wetland as a land cover—the exact extent that the wetlands cover according to the satellite imagery. In contrast, Ramsar and UNESCO boundaries are created with wetland extent and satellite imagery, however, these boundaries more so reflect wetlands as a land use. For example, Ramsar's larger wetland boundaries reflect the administrative area that is now under the authority of the Ministry of Water Resources and Center for Restoration of the Iraqi Marshlands and Wetlands (CRIMW) (Ramsar 2016). The four UNESCO boundaries are smaller, and were created using a component area with a surrounding buffer area to reflect the potential existence of wetland related species outside of the core extent (UNESCO 2014). With significant differences between the Ramsar, UNESCO, and SWEDO wetland boundaries, I then compared the spatial extent of each boundary to compare size and overlay.

Comparison Methodology:

To perform a comparison of the wetland boundaries I used a raster file of each boundary and created an overlay. Vector to raster transformation and raster analysis work was done using Google Earth Engine. For the UNESCO wetland boundaries and the Ramsar Hawizeh Marsh I first georeferenced a PDF map of the boundaries in the QGIS Georeferencing tool, as there was no geospatial data file available. My Google Earth Engine code scripts, vector files, georeferenced PDFs, and raster files, can all be found on my github and OSM page for public

access (Laird 22). The results below show the area of agreement between two of the boundaries, and the agreement between all three.

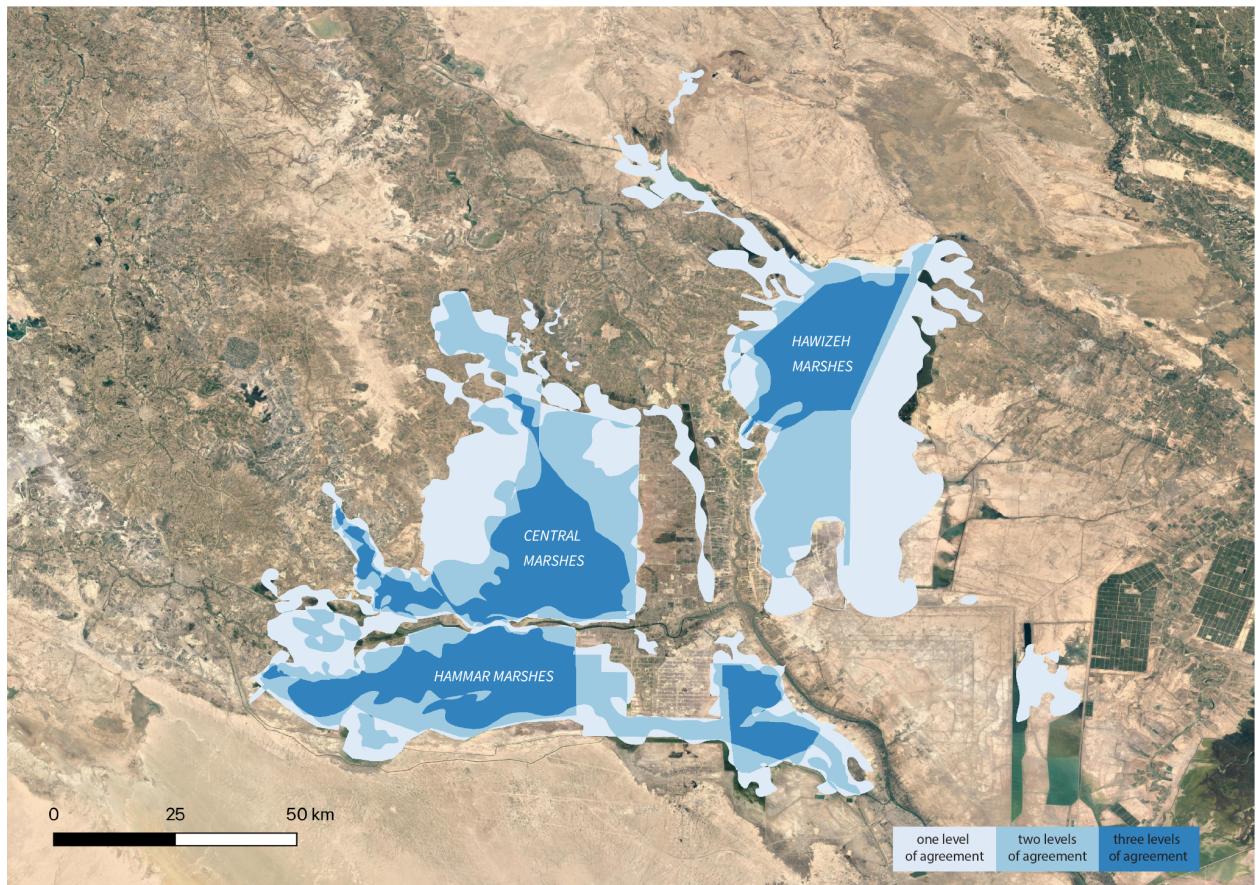


Figure 8: Areas of overlap between each wetland classification. Light blue indicates areas classified by one layer, darker blue is two levels agreement, and darkest blue is three levels.

From this comparison, we can then consider the implications that these boundaries, and their areas of agreement and disagreement, have on marsh restoration and the region as a whole. A notable flaw in the SWEDO classification is that man made drainage canals, that contributed to the draining of the marshes, are misclassified as wetlands based on their similar spectral signatures. The classified line between the Central Marsh and the Haziweh Marsh seen above is not a functioning wetland, but rather a draining canal that works directly against the wetland functions. Another example of the human implications is the sharp boundary of the Hawizeh

Wetland along the Iran border in both the UNESCO and Ramsar boundaries. Because these international organizations are dealing directly with the Iraqi Federal government to assist in management plans for the wetlands, it appears to map viewers that the wetland cuts off on the transnational border. While Ramsar and UNESCO policy is focused on the management of the marshes within their extent in Iraq, this leaves an incomplete narrative for people viewing the Ramsar or UNESCO boundaries that are unfamiliar with the transnational nature of the marshes. It is especially important to note the extent of the Hawizeh Marsh across the border because many Iranian refugees who had traveled across the marshes to seek refuge were targeted and displaced by Hussein's draining efforts.

A final notable feature of the wetland boundaries and their extent is the unaddressed nature of anthropogenic threats within the mapped wetland boundaries. In a land-use map of the Central Marshes included from a Ramsar report, there is an oil field visible in the bottom right corner (land use map included below). This oil field directly touches the identified marsh extent, posing a severe threat to the ecosystems, and the functionality of marsh reliant livelihoods in the area. This detailed land cover map, which is embedded in reports while the wetland designated extent is linked on the Ramsar website, reveals the series of local environmental threats that still persist regardless of a Ramsar designation.

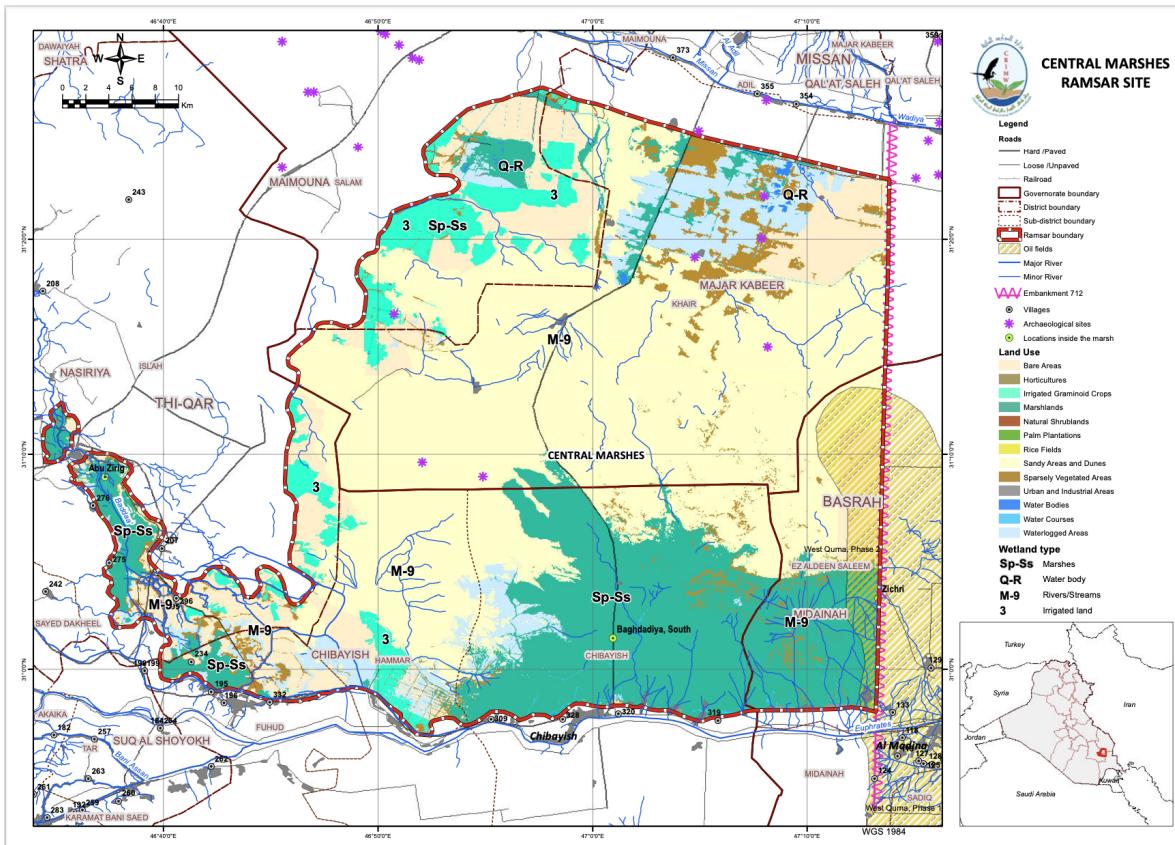


Figure 9: Central Marsh land use map illustrating the existence of an oil field in the bottom right corner along the marsh extent. This oil field still falls within the Ramsar designated wetland (Ramsar 2014).

Deconstructing the Map:

Comparing these boundaries reveals the inequities of a single set of boundaries for delineating the complex extent of the marshes. Next, I transition into deconstructing existing maps of the wetlands in their entirety, including much more than the wetland boundary and extent.

To break down and analyze maps of the marsh extent and the draining events, I utilize JB Harley's theory of deconstruction outlined in his paper "Deconstructing the Map" (Harley 1989). As Harley states, "deconstruction allows us to read between the lines of a map – in the margins of the text –and through its tropes to discover the silences and contradictions that challenge the apparent honesty of an image" (Harvey 1989, pg 3). While the process of map deconstruction utilizes its own methods, it mirrors the same process I took with policy deconstruction. In the deconstruction of Ramsar, UNESCO, and UNEP intentions and policy within the marshes, I challenge the "apparent honesty" of well known conservation and restoration organizations—honesty that often goes uncontested. With map deconstruction, I challenge not only the text and images on a map, but the data sources and producers to understand the power that a map yields. To adequately conduct a map deconstruction I focus on three pillars as outlined in Harley's theory. The first component—the cartographic process and cartography as a discipline—expands on a map's creator, the classification system, and technology access. The second component—reading through the lines of this map—focuses on the visual hierarchy and visual and textual decision making done by the cartographer. The third component assesses the map as a form of powerful knowledge based on the circulation of the map, and who is responsible for the creation and circulation.

Although the deconstruction of these figures uses a critical lens, my goal in this process is not to condemn the work that governments and aid organizations have done to restore the landscape after a period of rapid destruction or their cartographic process. Instead, I hope to isolate and deconstruct the maps embedded within these reports, presenting the problem of using these visuals as a single storyline. Deconstruction is a powerful tool for articulating that maps are

not a simple “mirror of nature” despite the ways that they are often perceived (Harley 1989, pg 5).

Component of Map Deconstruction:	Includes:
Map production	<ul style="list-style-type: none"> - Who produced the map - What data was used - What was the purpose of the map
Map visuals and cartographic text	<ul style="list-style-type: none"> - What is the map telling us - What does the visual hierarchy reveal - What is included in the visual - What is left out of the visual
Map power and circulation	<ul style="list-style-type: none"> - What power does this map hold - What audience is viewing and using this map - How has the map been taken out of its original context of production

Table 2: Outlining the key components of map deconstruction, described above.

Methodology:

To choose the maps I focused on, I used the phrase “Iraq southern marshes” in a Google Image search in November 2021 and looked through the most popular results. I chose to focus on two maps that have repeatedly been cited as reference visuals of the marshes by other reports and research. When comparing these maps upon initial first glance they appear similar in focus and narrative, as they both depict the extent of wetland destruction following the draining of the marshes. Additionally, because the map producers are UNEP and the CIA, both organizations are

well established internationally and have a powerful voice when it comes to publishing reports and figures. Considering the power behind these international actors is a key component in breaking down the role of these visuals as they continuously circulate.

UNEP Produced Map of the Marshes

The first highly circulated map of the Iraqi Marsh area before and after the 1993 draining event was generated by the UNEP in a 2001 report titled “The Mesopotamian Marshlands: The Demise of an Ecosystem” (UNEP 2001). It has been heavily circulated in other UNEP documents, by aid agencies, and in research articles. As time has progressed, these maps have left the context of UNEP documents, now becoming reference images for any type of work focused on the Iraqi marshes as a study area.

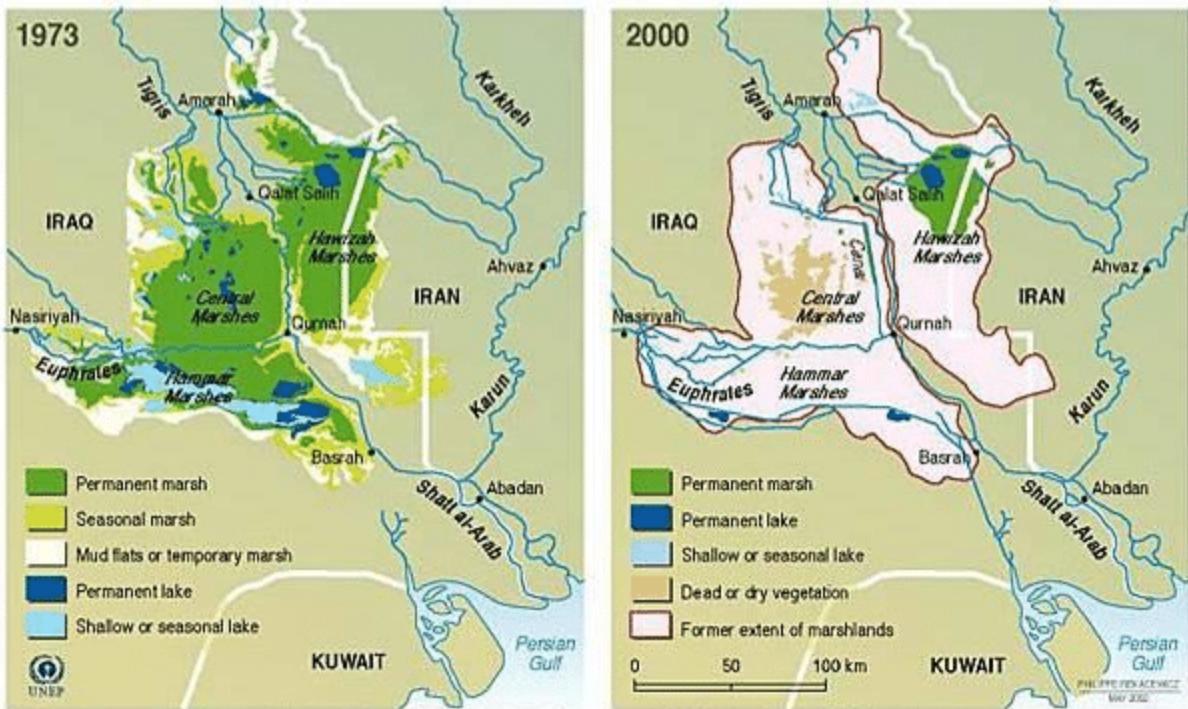


Figure 10: UNEP graphic illustrating the change in wetland extent from 1973 to 2000 (UNEP 2001).

Assessing Map Production

Beginning with methodology, there is limited information provided about the classification steps. It is undocumented which wetland classification method was used. Additionally, the temporal window of the satellite image(s) used in the classification is also unknown. However, in 2001 the year of map publication, the marshes were facing a drier year for rainfall in addition to the flooding effects. As referenced previously in my critique of remote sensing and climate variability across the study region, the temporal window significantly influences the study region, as differences between the wet and dry seasons will result in different levels of wetland inundation.

The UNEP Report that includes this map does state that:

“The statistics derived from the analysis should not be taken as definitive figures, since the results could not be verified with ground-based measurements. Particular difficulty was also experienced in delineating complex ecotonal zones separating marshland types, and the marshland fringe from surrounding desert. The results, however, do provide a reliable indication of the overall magnitude of environmental change.” (UNEP 2001 pg 31)

The document text above helps to reveal the general purpose of the map, which is to provide an “indication” of the “magnitude” of environmental change. Within the actor-network of UNEP officials, scientists, satellite imagery, and GIS tools, the map is seen as an indication of the extremity of the wetland destruction, and not a visual that represents wetland area with a focus on accuracy and precision. In this map, wetlands are a boundary object that represent wetland degradation. This map, and the lack of methodology documentation, strengthens Harvey’s argument that there are a lack of standards across different actor-networks (Harvey 2001). For the UNEP report specifically, this visual is sufficient in portraying an overall message of general environmental destruction of the marshes. Based on the standards common in the discipline of international environmental aid (an actor-network), the technicality and included features are not questioned.

Map Visuals and Hierarchy

After considering the original context for production, I move to consider the map’s visual content. Through considering the map components that are featured and prominent in the map and those that are left out, deconstruction reveals that the map is focused on changes to the natural environment alone. The most highlighted feature in the visual hierarchy is the use of white to signify former extent of marshes. The dominating visual power of the area lost, in

comparison to the previous extent represented in green, creates a visual binary that focuses strictly on lost area and remaining extent. Also, the use of white to represent mud flats on the left map, but area lost on the right map, can contribute to confusion for legend readers. Additionally, the labeling of dead or dry vegetation in the left map, while the rest of the previous extent does not receive a land cover descriptor, leaves out information regarding the current state of the land around the remaining wetland. As map visuals are focused on the set land cover categories defined in the legend, this tells readers that land classes are “fixed” classes of interpretation. In reality, marsh, lake, and vegetation land cover classifications are continuous and constantly in change (Robbins 2011).

Visually, there is no information about human use and occupation in the marshes, except locator points for a few towns along the river (Abdan, Basrah, Nasiriyah.) In this cartographic decision, the UNEP tells a narrative that is centered on destruction of the natural environment alone, specifically a binary of wetland lost versus wetland not lost. The figure does not represent the Marsh indigenous groups who experienced forced migration and livelihood loss associated with the drying of the wetlands. In this map, the silence is the linkage between the marshes and its socio-cultural significance to the Marsh Arabs, an entire narrative that is left out.

Map Circulation and Power

The next phase of deconstruction is the consideration of the map’s power through circulation. By deconstructing map circulation, I acknowledge the problem of this map’s power as it is altered and removed from the initial context it was once created in. This map has been reused by other UNEP reports including the Iraqi Marshland Observation System report and the UNEP Vital Water Graphics Report (UNEP 2002). Beyond UNEP publications, it has been utilized as a land cover map in journal articles: “Iraq’s inland Water Quality and their Impact on

the North-Western Arabian Gulf" (Fawzi 2014), "Physical and Chemical Characterizations of Water from Southern Iraqi Marshlands after Rehabilitation" (Almahood 2010), and, most recently, a local area development report: "Expansion Needs in the Town of Qalat Saleh" Addressing Expansion needs (Soave et al. 2018). In 2005, the map was republished by CNN in the world maps section, with the UNEP stamp removed. In Almahood (2010), we even see a change in the visual where the legend and UNEP stamp are removed, new points are added to indicate water testing sites, and there is no citation and reference of the UNEP as the initial producer.

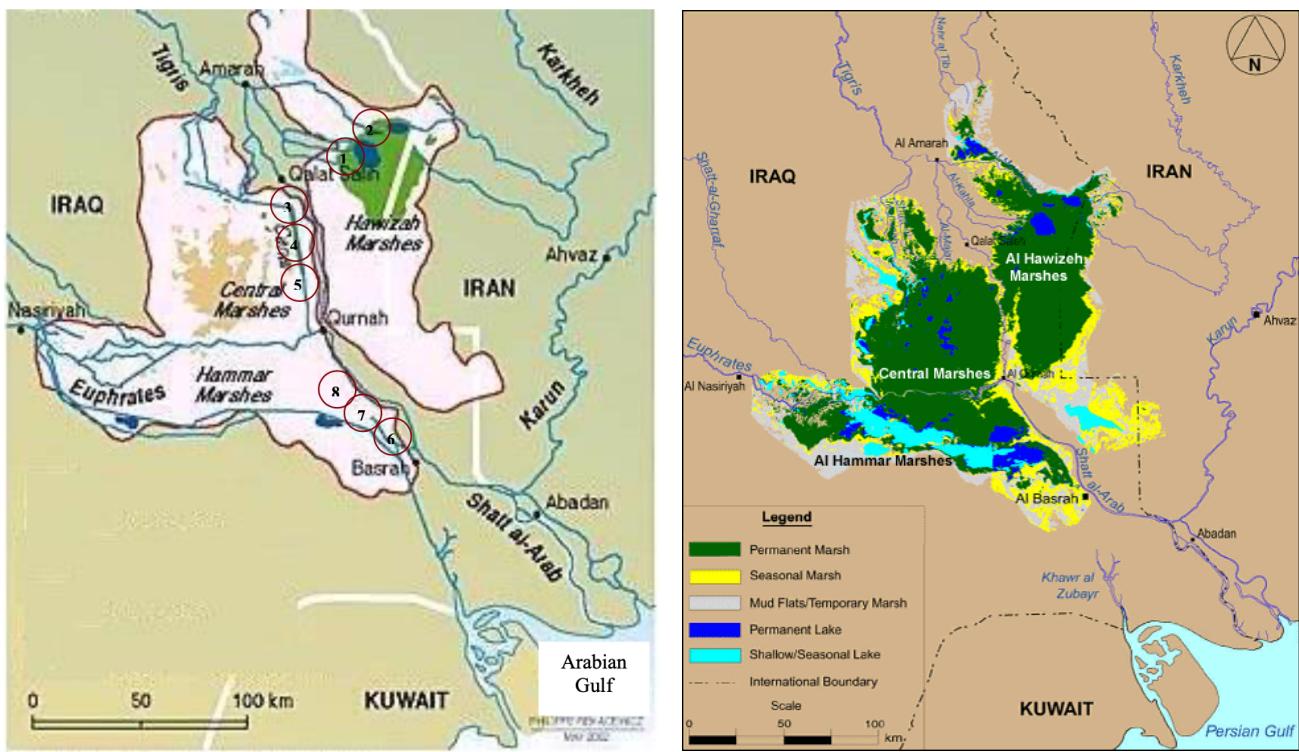


Figure 11 (left): UNEP graphic is altered with no citation of UNEP in the report. Water testing points are labeled, serving a purpose for this specific paper (Source: Almahood 2010). Figure 12 (right): CNN publishes a map of the Iraqi Southern Marshes with slight variation to the initial UNEP figure. UNEP is cited in the graphic (CNN 2005).

This wide circulation reveals the ways in which an organization like the UNEP can produce a figure that individuals feel confident citing without questions of the methods being used. While this visual is useful in revealing the state of the landscape in 1997 and in 2000, the republishing of this visual in articles about the Iraqi Marshlands in 2010, 2014, and 2018 does not convey the state of the wetlands today. By relying heavily on a small collection of Landsat satellite images--potentially only two--these maps freeze the environment of Southern Iraq and its landscape, instead of working to reveal the constant change and flow of the wetlands area.

Lastly, there are limitations associated with the publication of a land cover map like this because they signify a final product, instead of calling for the need to increase data collection and validation points. The 2005 Iraqi Marshland Observation System Report, which cites the original map, outlined the need for continuous data (satellite imagery and ground data) to be gathered to accurately track wetland growth, however the IMOS (Iraqi Marshland Observation System) has not been repeatedly updated. Hyperlinks to data are broken and no newly published reports are available after the initial publication, even though the section on follow up activities stated that the “UNEP should continue to host and maintain the IMOS website” (UNEP 2005).

In addition to the lack of follow up information, the production of these visuals could be strengthened with increased data ground-truthing. The UNEP acknowledges that a barrier to land cover classification is the inability to connect satellite data with accurate ground truth points to assess accuracy of a remote sensing classification. Although the UNEP acknowledged that many of the classifications must be confirmed in follow-up studies, it is unknown if this follow up occurred (UNEP 2005, pg 23).

CIA Produced Map of the Marshes

A second popular map of the wetlands and the destruction events is a 2001 map by the CIA. Although this map can be traced back to a 2001 CIA document titled “The Destruction of Iraq’s Southern Marshes” (CIA 2001). The only available copy of the report publicly accessible online is a scanned black and white high-contrast copy of a paper document, and the maps are displayed in black and white. While the report includes 9 other images of the marshes taken by a Landsat satellite, it is difficult to determine the date of the image, as the report only provides a time window of “summer 1993 through spring 1994.” (CIA 2001).

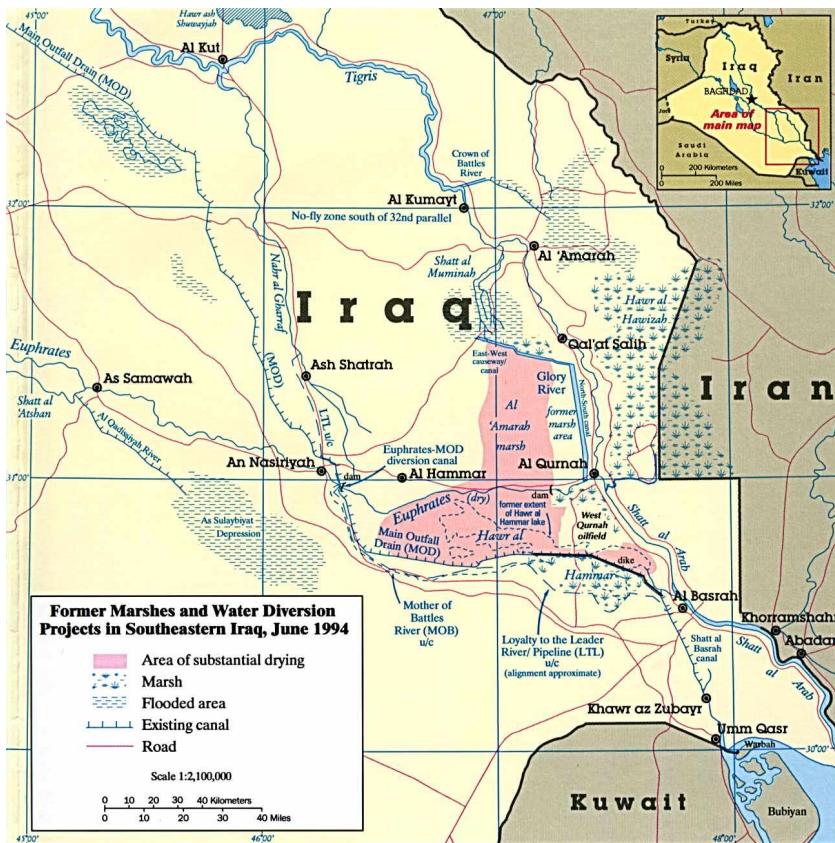


Figure 13: CIA generated map of former marsh extent (CIA 2001).

Assessing Map Production and Context

The original context of this map can be determined from the limited text provided in the scanned online document. While upon first glance the CIA land cover map resembles the visual produced by the UNEP, it is focused on a different narrative of marsh destruction. The report uses satellite imagery to reveal areas of the Southern marshes that could now be more politically vulnerable to attacks from the “Baghdad Regime,” which consists of those working for the president at the time, Sadaam Hussein (CIA 2001). Political attack against communities inhabiting the marshes is a result of regional opposition to the Iraqi government authorities and Hussein, by various groups within the marshes including the ingenious Marsh Arabs, and Arab Bedouins and Irainans seeking refuge (CIA 2001).

While the report introduction does acknowledge the biodiversity and habitat loss associated with draining in the marshes, the satellite imagery captions have a political trend to them. The report identifies numerous political vulnerabilities associated with the draining of the marshes, such as the ability for members of the Baghdad Regime to enter communities in Southern Iraq without needing to use a boat to cross the waterway, and less protection and resources for the Marsh inhabitants (CIA 2001). With the map creator being the CIA, it is not surprising that there is a focus on the politicized nature of the marshes. This narrative is aligned with the discipline and focus of the CIA—the initial producer of this visual. Since the CIA as an organization is focused on global issues of security and political vulnerability, the use of satellite imagery and classifications of wetland loss are boundary objects with specific purposes to this discipline—a private, secure, and highly political actor network.

Map Visuals and Hierarchy

Visually, many of the same themes of politicized landscapes and political vulnerability are present. Similarly to the UNEP image, the most dominant feature in the visual hierarchy is the pink color used to convey the “area of substantial drying.” The phrase “area of substantial drying” is a qualitative and relative phrase that would rarely be used on a land cover map in a science discipline. Unlike many geologic or ecological maps, the features on this map are not primarily focused on changes to the marsh ecological environment. Here, the marsh represents the last remaining areas of political protection, security, and livelihood stability.

The political context of the map also explains the markings of no fly zones, the Loyalty to the Leader Pipeline, and outfall drains along the canals, which all have political implications for how people move across the space. While the UNEP map had limited indicators of human interaction with the environment, this map tells a narrative of human alteration to the environment. Through reading this map in the context of the greater report, it is evident that precision of land cover classes is not the focal layer of the map. In the visual hierarchy of the map, the names of the different marshes are given just as much visual significance as the human created dams and canals, and even less significance than the labeled towns. This map holds power in its ability to identify areas of human impact on the environment, but this meaning becomes lost when cited out of context.

Map Circulation and Power

This map has been viewed by thousands, as the featured image on the Wikipedia page for the “Draining of the Mesopotamian Marshes.” As people learn about the draining of the wetlands and search for a quick overview of the event, the use of this map on the Wikipedia page means that this may be one of the only visuals that readers are exposed to. But with the circulation of

this map, the Wikipedia information page removes the initial context of the report. On the Wikipedia page, the map seems to stand in as a locator image. In the original CIA report, however, this figure was used as a tool to conclude a report highlighting the intricacies of political, social, and environmental destruction in the region. The political nature of this map becomes unnoticed by Wikipedia users, many of whom are just looking at the map as a way to orient themselves to the area and location of the southern marshes.

The other sources that include this map, such as a 2011 research paper, and a report by the Dutch Water Sector (2018) focus on the wetland area and ecological disaster of marshland draining, and not the political vulnerability of the Marsh Arabs in the area of substantial drying. Similar to the circulation of the UNEP maps, the circulation of this figure is using the meaning of a wetland out of its initial context (a political space) and instead using it as a way to represent a biological habitat. While I found fewer instances of the CIA graphic cited by other bodies of work, the circulation of this map through Wikipedia means it may have reached a more broad viewer audience than the UNEP map.

Implications

The wide scope of papers that have utilized these two figures as land cover maps is indicative that they have been taken away from the context provided in the initial reports. While the wetlands were initially serving as an indicator of environmental catastrophe in the UNEP report, their meaning has shifted depending on the new uses of the map. The purpose and function of a wetland has a different meaning for the UNEP than it does for CNN, or water quality reports, however there is no acknowledgement of the different social context that this map has been brought into. The circulation of this map exemplifies the need for database

ethnography and ontology-based metadata research to be more widely adopted, in order to trace the changing uses of one specific dataset (Schuurman 2008).

Additionally, this deconstruction process identifies a severe problem of using an outdated visual to represent the current conditions of the marshlands. Even reports that are less than 3 years old are citing the UNEP and CIA figures, even though the state of the marshes, environmentally and socio-culturally, has changed significantly. There is a need for new visual representations of the Iraqi Southern marshes to be circulated, so that narratives are diversified and updated, and one dataset is not responsible for the sole representation of an intricate and complex environment.

Chapter 4: Expanding the Narrative and Visual

In the previous chapters I revealed shortcomings and problems amongst restoration actors and their produced visuals, without providing many solutions. In this final section, I introduce new maps of the marsh area, along with an overview of non-traditional data sources that can be embedded into counter cartography. I begin with a literature review of counter cartography and existing subcategories, as well as maps and methods that serve as notable examples. Next, I outline different data sources, including art, ethnography, and community discussion groups that can serve as meaningful data sources, especially when access to participatory mapping or interviews is not feasible. Finally, I introduce the visuals I have produced.

Positionality

Creating the maps for this section has been my hardest cartographic challenge as a student. All of my projects up to this point have involved bountiful geospatial data that are easy to access. In this cartographic process, I was faced with the challenge of how to access and utilize data. Furthermore, as a non-Arabic speaker, I relied on English texts, or English translation of Arabic texts, which are often partially removed from the sentiment being expressed by the initial speaker or writer. As I created the visuals, I was not any closer in proximity to the Iraqi Marshes than the UNEP officials in Geneva. As I critique maps that have been created from a distance or with limited cultural knowledge, I acknowledge that my work faces similar challenges. Most significantly, I was faced with the challenge of creating maps that do not reinforce the boundaries and narratives of existing maps. The goals of this process were to create cartographic products that expand the narrative of wetland loss to incorporate the story of

historic livelihood practices and more recent livelihood loss. In my deconstruction of the existing visuals, I witnessed a focus on the ecological components of the wetland space and its boundaries. With this, there exists an absence of the human-environment relationship between the local people and the wetlands.

Review of Counter Cartography

To explore the potential for new visuals of the Iraqi Marshes, I turned to methods in counter-cartography. Inclusive cartography, social cartography, and narrative cartography are all related, non-traditional, counter-cartography mapping practices that utilize spatial visuals as a means of uplifting marginalized and powerless voices. They share unheard stories and reveal intimate--often personal--data. As the most broad term, social cartography is a form of mapping that provides an alternative representation of space than what is typically seen on a map (Possidonio 2018). It most commonly operates at the community level, and connects dialogue and community issues with a spatial dimension (Possidonio et al. 2018).

My focus on narrative cartography comes from a multi-part definition developed by Couling (2010). Narrative cartography is a form of cartography focused on capturing neglected knowledge about the past, while also exploring new visions for the future of the landscape (Couling 2010). In order to represent this “neglected knowledge,” human environment interaction must be depicted in new forms, beyond what has traditionally been prominent in cartesian mapping. Similarly, inclusive cartography is defined as mapping that is done by and for indigenous people (or groups that have historically been silenced, discriminated against, or unrepresented) with the goal of achieving political objectives (de Almeida 2014). The expansion of inclusive cartography relies heavily on the practice of participatory mapping: map production

that focuses on input from local communities, allowing individuals to map themselves (de Almeida 2014). de Almeida, in his work, “Project New Social Cartography of Amazon” (PNSCA), focuses on transforming indigenous maps of the Amazon landscape to understand sense of place and socio-cultural diversity as it pertains to territorialism.

Phrase	Definition
Social Cartography	A form of mapping that provides an alternative representation of space than what is typically seen on a map (Possidonio 2018).
Narrative Cartography	Mapping focused on capturing neglected knowledge about the past, while also exploring new visions for the future of the landscape (Couling 2010).
Inclusive Cartography	Mapping that is done by and for indigenous people (or groups that have historically been silenced, discriminated against, or unrepresented) with the goal of achieving political objectives (de Almeida 2014).

Table 3: Sub categories in the field of counter-cartography.

Social cartography, as well as the embedded sub-categories of narrative cartography and inclusive cartography, significantly influenced my personal cartographic process. By focusing on map deconstruction earlier in my work, I was able to then focus on mapping alternate representations of what was typically seen on the existing maps. The findings of my map deconstruction reveals that there is, in fact, neglected knowledge of the past that was absent in the popular cartographic representations of the area. I do not explicitly focus my maps on new visions for the future of the area, however, my work is inspired by the idea that cartography can and has been used to explore visions of a just and sustainable future, especially in a landscape that has experienced climate destruction and livelihood loss (Orangotango 2018). Finally, turning

to examples of inclusive cartography helps inform the way that I attempt to create maps that positively uplift the history and current stories of the marshland inhabitants. This is not an exhaustive list of the forms of social cartography or counter-cartography that can be used for new mapping of the marshlands and the stories of loss and restoration, rather, an introduction to this mapping process.

Many influential mapping projects have shaped the way I begin to think about space in non-traditional forms. I have been inspired by each of the following projects in unique ways, in part because each of them address the human-environment relationship from different methodological and creative ways. A series of inspirational maps have been compiled in printed and online form through the project “This is not an atlas,” which brings together “maps, struggles, projects, and inspirations” (Orangotango 2018). The publication of counter-cartographies that is open access and accessible to the general public is an essential step in bringing new radical forms of mapping into the public sphere, creating awareness for an expansion of cartographic practices that is happening worldwide.

Another fundamental example is the streamscapes mapping project, which was conducted by urban design and regional planning students at the Technical University of Berlin as an attempt to visualize the intricate relationship between humans and nearby river spaces in three German coastal cities (Couling 2010). The project, just like my own, deals with the difficulties of visualizing water spaces, and addresses the ways in which statistical data alone often fall short in representing human-environment relationships.

[Streamscapes are therefore also storyscapes; non-static narrative landscapes in parallel and overlapping channels, which absorb and transmit memories and knowledge, adapt to changes, negotiate borders, and connect spatial and temporal scales.]

In her analysis of the Streamscapes project, Couling acknowledges the historical and cultural power that lies in interconnected water spaces (Couling 2010). While literature and theory has acknowledged the difficulties of defining a wetland—a boundary object that takes on many forms depending on the social context—Couling’s project adds a cartographic dimension to the theory. The maps in the streamscapes project are not focused on providing a single representation of the waterways, but instead depicting the ways that a waterway holds different meaning and embodies a different geographic dimension for everyone that encounters it.

Additionally, we can turn to social cartography to employ methods of incorporating human emotion and experience into a visual representation of space. The expansion of social cartography helps address the ways in which traditional cartographic coverage of political events can often be “emotionless” (Kelly 2019). This is, oftentimes, a result of the fact that people do not think of maps, especially locator maps, as political tools. In one example of social cartography, Kelley utilizes counter-cartography techniques to expand the spatial portrayal of Syrian refugees, specifically in personal border crossing experiences. Kelly’s methods focused on transforming interviews into narrative maps, developing a unique border symbolization (Kelly 2019). Specifically in the case of refugee migration, Kelly identifies the problems of using flowlines (arrows or lines that span from the place of origin to the place of migration) for movement across borders, as this makes it seem like people or things can move with ease from place to place. These flowlines are useful in illustrating the holistic movement from one initial

place to another, but they fail to account for the failed border crossings, losses, and separation that exist in the individualized refugee experience.

New Cartographic Representations of the Iraqi Marshes

With limitations to participatory mapping and interviews, as well as limited geospatial data, we can consider the way that other scholars gather research on Iraq that could be adopted as methods in this process. Oftentimes, media like creative writing, paintings, or photography are disregarded as geospatial data, as they are harder to integrate into GIS software and data visualization (Damluji 2015). The use of these unconventional data sources in the research of Iraq's history and current culture welcomes complexity, providing space for plural histories of a region, instead of relying on fixed narratives of fact (Damluji 2015). Fortunately, there are numerous individuals who have conducted research in Iraq adopting mixed methods in the information collection process. Below I outline a few of the forms of nontraditional data that has been utilized by scholars to research Iraq's history and culture and the ways in which I employ those sources in my own cartographic products.

Ethnography

I utilize information from ethnographies that tell a story of the history of the region. While ethnographies are a retelling of a community's culture by a traveler or outsider, they can still help to share information. In my project specifically, I utilized information from S.M. Salim's ethnographic writing, *Marsh Dwellers of the Euphrates Delta*, which focuses on the livelihoods of the Marsh Arabs in the Chibayish region around the Central Marshes. Salim spent two years living with the group and documents information covering clan structure, agriculture, boating, and climate (Salim 1962). I used this ethnographic information to map the importance of

the wetlands for regional trade and passenger travel routes, which were ultimately destroyed with the draining events in the 1990s. Most of the work that I read for my thesis focused on the state of the marshes during and following the wetland draining (CIA, UNEP etc.), therefore using ethnographic reports of the area allowed me to convey the extremity of the livelihood destruction that occurred. To incorporate elements of the ethnography in my cartographic products, I georeferenced the casual marsh sketches that were provided in the text (using georeferencing tools for QGIS), and aligned notable cities such as Chibayish, il-Hammar, and il-Gurna with their real locations.

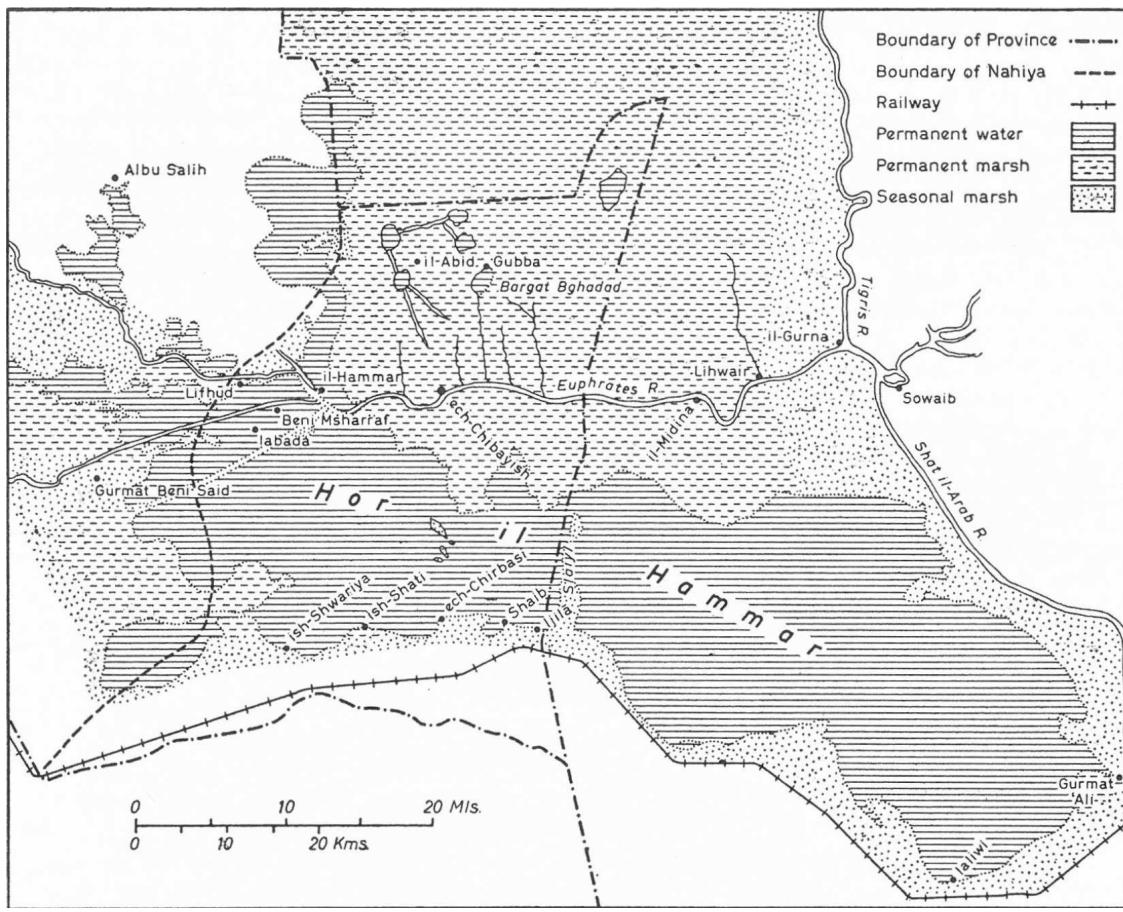


Figure 14: Sketch of the Central Marsh provided in Marsh Dwellers of the Euphrates River Delta (Salim 1962).

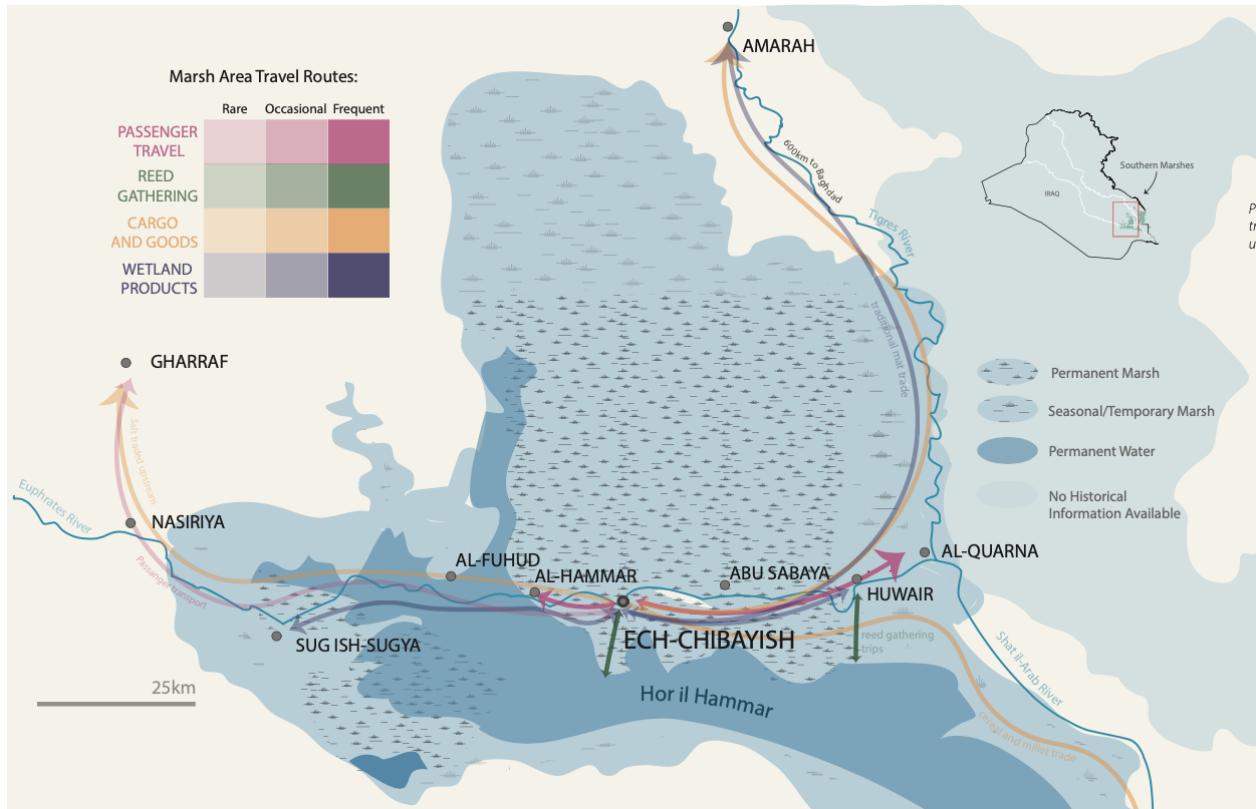


Figure 15: Utilizing the georeferenced sketch to infer historic wetland extent and historical wetland travel routes.

After georeferencing the sketch, I was able to utilize ethnographic information in the text and the provided sketches to create a map out of Salim's recounting of the travel routes. By creating this map, I work to tell a story of indigenous practices, travel routes of significance, and what has been lost over time. Beyond this, I also connect the significance of these historical practices with current attempts by communities in the marshes that are working to create new reed boats to pass along tradition and culture (full map layout on page 82).

Modern and Historical Art

Next, I turn to the significance of different art forms that help convey the story and sentiment felt by Iraqi Artists. For example, Saleem Al-Baholy has documented the history of Iraq through the expansion of Modern Art in the nation, focusing on a political period of violence following the 2003 invasion of Iraq (Al-Baholy 2014, Damluji 2015). In the process of art interpretation and placing art within its historical time period, Al-Baholy gathers insight to a new history told by the artists, their motivations, and their work (Damluji 2015).

By looking at marsh related artwork, I found that a number of artists were sharing new stories of histories, loss, and culture through their art. The work of Iraqi artist Rashad Salim uses the biblical story of Noah and the flood to highlight the environmental importance of the marshes, and the unique story that Noah's ark had traveled down the same waterways that the Marsh Arabs did, decades before the draining. Salim has created his own replica of the ark, one that brings in the landscape narrative of the marsh natives, not Europeans. In Salim's story telling of Noah's marsh travels, the ark is not one large boat as we typically picture in modern day representations of this biblical event, but instead "as a gathering of many ordinary vessels. It would have been a community contained within a structure of unity that would protect them from catastrophe," more so a floating village in design (Pelham 2018). In an interview with Pelham, Salim talks about the significance of the role of the marsh environment as the "material" for the art (Pelham 2018). Besides from the specific instance in which Salim challenges a Eurocentric representation of a Biblical tale, this can be useful in a more general sense in acknowledging that there is not one set or correct narrative to be told.

In another project by Salim, the “Atlas Ark,” the unification of many boats within the marshes is portrayed through the construction of a globe, made up of many small hexagons and pentagon shapes. The globe represents a variety of different narratives that Salim, through his art, is sharing about the marshes. The pattern of repeated shapes that together build a larger atlas ark represent the smaller floating rafts that comprise a unified Ark that Noah used to travel. In the construction of the globe, the creation of each individual piece becomes part of a whole, rhythmic motion, like the paddling of a boat. As a whole, Rashad Salim’s project “Safina Projects” is focusing not on the exact boundaries, area, and extent of wetland destruction, but instead on the importance of Iraqi indigenous marsh and coastal craft. There is a focus on the reviving of local traditions that is often unaccounted for when strictly measuring loss by the changing level of wetland size. By working to tell stories of local craft heritage, Salim adds a socio-cultural component to the landscape we see in repeated cartographic representations.

Similarly, Iraqi interior and architectural designer Maryam Saeed (2017) explores the traditional watercraft boat patterns and creates digital reconstructions in her project titled Computation and Craft. This project was inspired by Rashad Salim’s “Atlas Arc” project, but incorporates Saeed’s architecture background to create computation designs that reveal the complexity and craftsmanship of the boat structures (Saeed 2017). By exploring four different traditional boat structures and digitally rendering what these structures may have looked like, Saeed combines historical knowledge with modern architecture technology to share information about this history. Saeed (2017) also shares on her project page that this was a way to connect with native architecture and craft.

In my project, I utilize Saeed's art to convey information about the boat variation and structures, as well as her digital renderings to serve as pattern design. By utilizing one of her

designs for a Guffa boat as a pattern fill for the existing wetlands extent, I attempt to overlay the socio-cultural significance of wetlands for local craft onto the extent of the wetlands—an extent that is symbolic of where these reeds can be harvested for use in craft.

Digital Groups

Because I was unable to conduct participatory mapping and interviews with people in the Marsh communities, I turned to public community groups that I was able to join and then read. I reviewed community groups on Facebook as a way of perceiving the discourse around marsh destruction, and the current socio-political climate. The first group I reviewed, titled The Iraqi Maritime Heritage of Huwair (translated from التراث الملاحي العراقي في الهوير) was created in 2019 and now has over 4,000 followers. This page serves as a way for people to share information about traditional boat building, post images of their own boats, and plan boat launch gatherings. The group is full of both photographic and video media, and people often post photos of boats that have historical significance to their ancestors. Viewing this page helped me to make a map that illustrates the historical boating passages that were once populated with these same boat structures, while being about to relate traditional practices with community building today. (Discussed in the ethnography section above.)

In another facebook group titled Mesopotamian Marsh Dwellers (translated from سكان الاهوار) over 3,700 individuals gather to share sentiments about marsh destruction, and the marshes more broadly. The group was created in 2014, and averages around 114 posts per month. These posts have more variation in topic than the posts in the Maritime Heritage of Huwair group, and include people's personal art creation, images of boats (historical and present) and memorial posting about the Marsh Arab Genocide (Mesopotamian Marsh Dwellers, 2019). On

April 21st, the group was filled with posts acknowledging the Marsh Arab Genocide, which is memorialized on the date that the Iraqi Government created the draining plan. Below is one of the posts from the group from the 2022 Marsh Arab Genocide memorial day (translated into English) and accompanying graphics from the same post:

[Marsh Arabs genocide was described as one of the most Tragical events after the second world war, the destruction of the Mesopotamian marshes was described by NASA as "one of the largest environmental disasters in the world", thousands of people were killed and tortured, and we lost our land and culture in a way that almost we cannot recover, The Marsh Arabs Now are living like how we're in the 90s and even worse! *And no one talks about that, not the people and definitely not the organizations.*

We faced ethnic cleansing and Forced displacement and we are still facing forced displacement because of the Dams and Climate Change, Racism and poverty. It's all what we get.

Add your voice to ours, the people who have never gotten the chance to be heard, educate yourself and share the information about the genocide, we need to tell others about The Marsh Arabs and what happened to them, We need solidarity more than anything else, a post or share in the social media helps to raise awareness! The Marsh Arab's modern history and culture were written in two ways, either by colonialism 1918-1958 or banned under The Baathist party 1968-2003, help us to change that by supporting Marsh Arabs Writers and Projects and learning more about our unique culture.

We will remember our Genocide every year on this day from now on, because our Genocide was denied by the Iraqi government and we don't have a specific day so we chose this day the day when the Iraqi government made the destruction plan to destroy Ahwar as the memorial day.

#TheMarshArabsGenocide]

- Mustafa Hasheem in the Facebook group “Mesopotamian Marsh Dwellers”
April 21st 2022



Figure 16: Graphic from Mustafa Hasheem's facebook post honoring the memorial day of Marsh Genocide (Mesopotamian Marsh Dwellers 2019)



Figure 17: Graphic from Mustafa Hasheem's facebook post honoring the memorial day of Marsh Genocide (Mesopotamian Marsh Dwellers 2019)

Although these are only the words of one individual, they are powerful for helping understand the perspective of a local person. Hasheem's words serve as direct contrast to the voices of restoration and development organizations, or Federal Government officials. In this post, the Marsh Arabs are calling for solidarity, support, and awareness. This is especially necessary—as Hasheem articulated—because regional damming projects, climate change, racism, and poverty continue to plague the region (Mesopotamian Marsh Dwellers, 2019). Additionally, the attached graphics for remembrance that Hasheem includes in his post strengthen the message that the draining of the marshes and their lasting effects must not be forgotten. The portrayal of indigenous and livelihood related symbols such as the boats, grasses, and water buffalo, with the

war vehicle coming towards them conveys the socio-political nature of the wetland draining, and all that was lost by the Ma'dan Marsh Arabs. Utilizing Facebook group activity cannot serve as a replacement to interviews or indigenous participatory mapping, but it is one way to access a local perspective through language and distance barriers.

Cartographic Products

Below are three cartographic products that I have created, utilizing a variety of spatial data, ethnographic work, art pattern, and inspiration from digital groups. The maps are intended to be viewed at a larger size, and colors have been formatted for the intention of being printed. Online versions of these maps for viewing in more detail can be found on an Open Science Framework (OSF) web page cited in the bibliography (Laird 22).

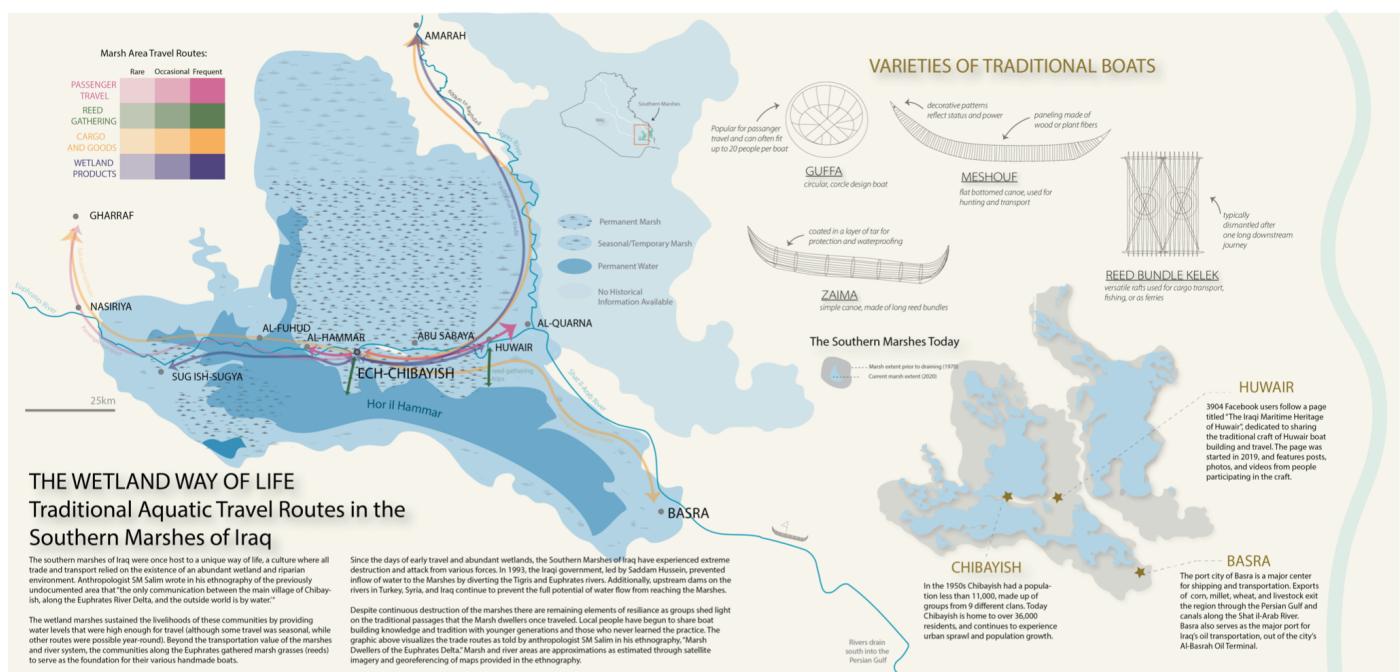


Figure 18: Mapping historic travel routes in the southern marshes with inspiration from ethnography, art, and community groups.

In this first map layout, I illustrate the traditional aquatic travel routes in the marshes, which have become largely unusable since the draining of the marshes. Flow lines that illustrate travel passages based on their frequency and purpose are based on information provided by Salim (1962) in his ethnographic recounts of the region. Because Salim focused on travel routes in and around the village of Chibayish, there is no historical data for human use in the Hawizeh Marsh. On the top right of the graphic, I share sketches of traditional boat structures along with their purposes, based on the art and design project done by Maryam Saeed (Safina Projects 2017). Information about the boat structures allows readers to connect travel passages with the potential travel vessel, while also learning about the resurgence of boat building as a traditional practice around Huwair. While this graphic conveys a story of livelihood loss, it also sheds light on the ways that local people continue to engage with traditional Marsh Arab culture through boat building and community connectedness.

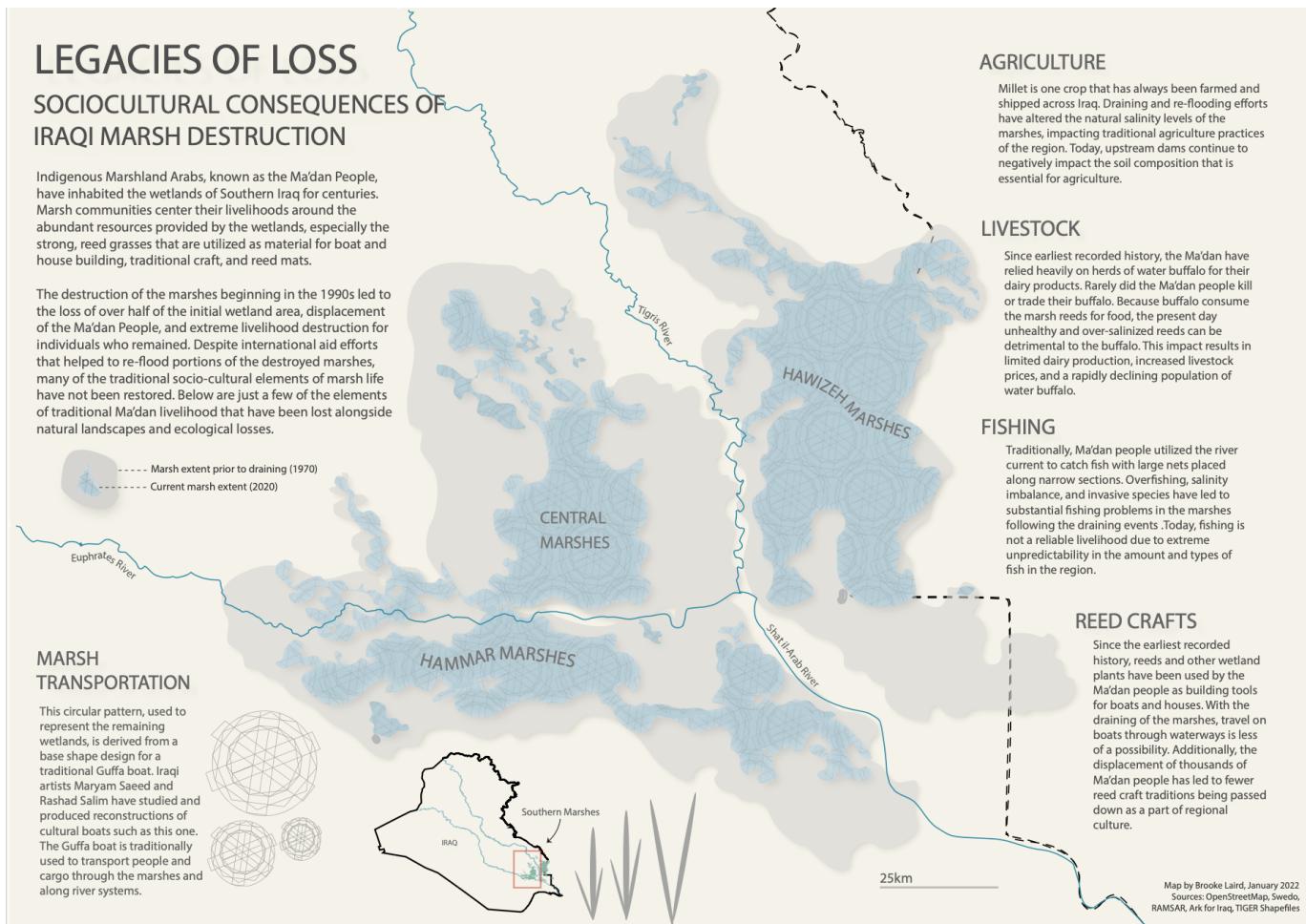


Figure 19: Cartographic product exploring socio-cultural loss associated with a destruction of the natural environment

In this second graphic, I focus on components of wetland loss that are less prominent in depictions of the Iraqi wetlands I had come across previously in my deconstruction work. Primarily, my intention was to convey linkages between the environmental destruction and the sociocultural components of Marshland life that had also dissipated with the draining events. By referencing problems of wetland over salinization, reed destruction, and sociocultural losses, I convey that wetland loss cannot solely be defined by change in the water levels. While my map first uses a base layer of Swedo wetland classification, derived from satellite imagery, I layer on pattern shapes, boat design, reeds, and informational text to bring out other dimensions of the

wetland ecosystem. In using this specific pattern for the areas of wetland that remain, I draw ties between remaining wetlands, and remaining culture and indigenous identity. I chose to place the pattern fill on the remaining wetlands rather than on the areas of wetland loss, (which could instead represent a loss of culture connected to environmental loss) because the pattern is representative of the Safina Project. By combining visuals of environmental loss, historic cultural information, and creative art, this graphic works to reshape the narrative of wetland destruction beyond the spatial extent of the area.

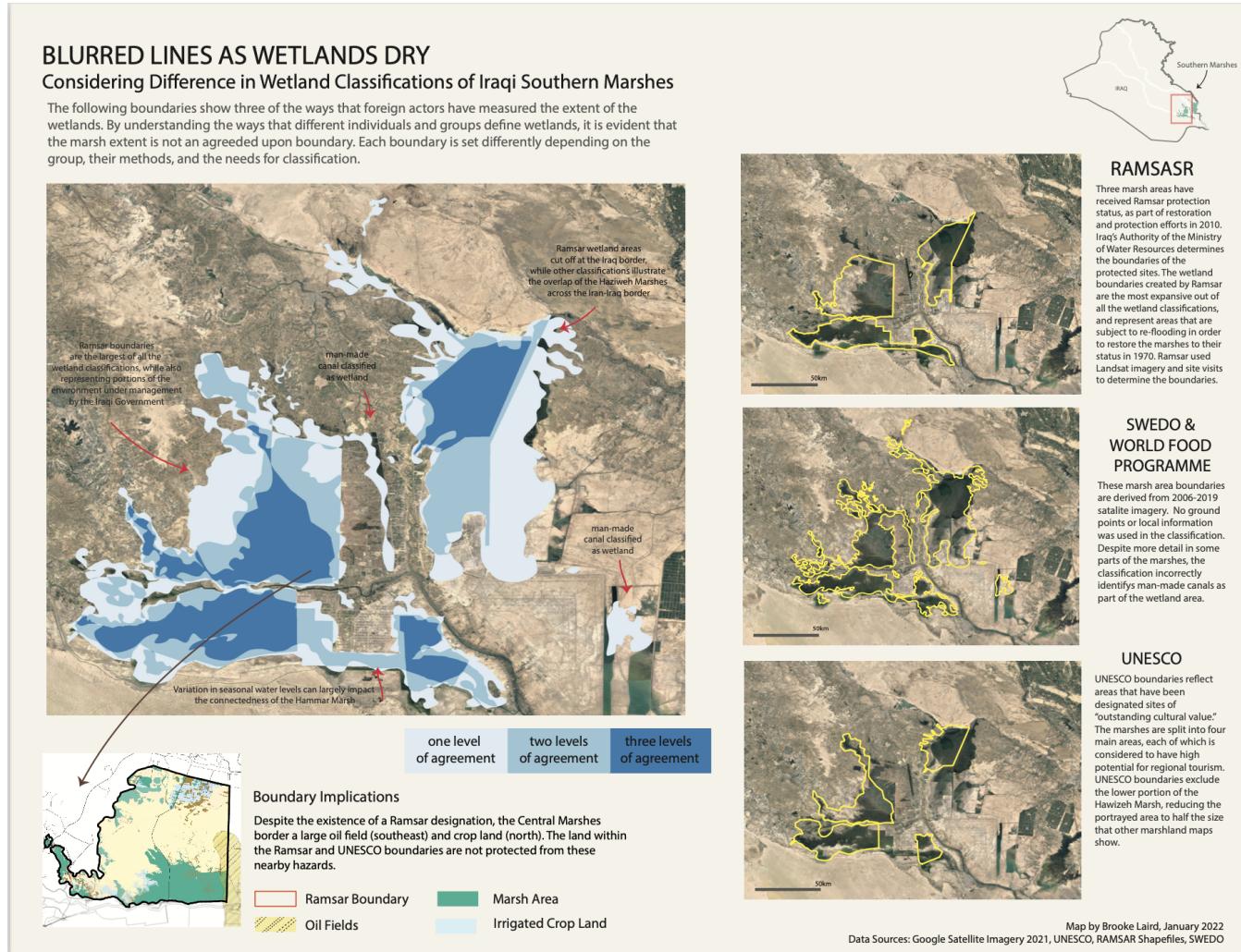


Figure 20: Mapping difference in wetland classification by international actors to convey boundary complexities and disagreement.

My third map is focused on revealing the complexity associated with wetland classifications and destabilizing the power and authority of a single representation, specifically within the Iraqi marsh context of wetland restoration efforts. Methodology for boundary agreement comparison and georeferencing is explained more in depth in chapter 3 of my thesis. Inspired by Shapiro's 1995 study of comparing wetland criteria in the United States, I compared three different wetland classifications as they map onto the Iraqi Marshes. I chose Ramsar boundaries, SWEDO Aid and World Food Program's remote sensing derived classification, and UNESCO boundaries, because all three boundary layers were produced in the same five year window (2014-2019). Although I talk about UNEP management plans and a UNPE produced graphic in my report, I omitted the boundaries in this comparison because UNEP visuals illustrate estimated wetland extent in a significantly earlier period of marsh restoration (2001). I wanted to focus on wetland boundary lines within a comparable and more recent temporal window.

The resulting graphic conveys the ways that three wetland classification schemas for the same time period do result in disagreement, which is due largely in part to the different functions of each organization and their intentions for involvement in Iraq. By creating a layout that visually and quantitatively compares modern restoration related boundaries, I reveal the shortcomings in marsh restoration and conservation as a whole. I specifically identify the existence of oil fields within the Central Marsh Ramsar boundary, a major threat to indigenous land and regional environmental quality that is of risk to the wetland area today, but remains largely unaddressed by the federal government of Iraq who manages Ramsar protected land.

Each of these three graphics serve different purposes in expanding cartographic renderings of the wetlands of southern Iraq, and the culture, destruction, and modern risks of the

region. Furthermore, these graphics would not exist if it was not for the information that came from non-traditional geospatial data. Mapping the wetlands of southern Iraq was a challenge, but ultimately it served as an essential final step in my deconstruction of destruction, restoration, and conservation narratives in these wetlands. For my work, these figures serve as the “seed” for planting new dialog and narratives of the wetland destruction, following the “hatchet” of deconstruction that comprised earlier sections of my work (Robbins 2011).

Conclusions and Further Work

The purpose of this thesis was to evaluate restoration and conservation efforts following the draining of the Iraqi marshlands through a review of wetland defining criteria, boundary lines, data sources, and maps, and the creation of counter-cartography visuals. Specifically, I was interested in reviewing the ways that dominant narratives of destruction and the subsequent restoration policies have impacted local perspectives, and failed to consider local conceptions of wetlands, and wetland related tradition, in the restoration process. Through this work, I have pushed back on claims that wetland restoration in the marshes has been successful by identifying evident shortcomings. These shortcomings include but are not limited to the complete reliance on remote sensing representations of the wetlands for considering wetland extent and restoration status, wetland criteria that is focused strictly on ecological components of the landscape, and insufficient acknowledgement of local groups in cartographic representations of the region. As exemplified through other political ecology case studies (Neumann 1989, Fairhead and Leach 1996, Robbins 2011), these specific wetland representations can have significant negative impacts for local communities.

In bringing together political ecology theory and database and map deconstruction, I work to reveal shortcomings in international restoration and conservation work, not for the intention of criticizing restoration actors such as UNEP, Ramsar, and UNESCO, but to identify that there is more work to be done. One of the largest findings is that a focus on restoring wetlands to their previous extent is not a sufficient goal. A restoration focus on wetland extent fails to consider problems in wetland over salinization, the existence of nearby anthropogenic threats such as oil fields, and the ability for wetland indigenous communities to continue with traditional livelihoods and practices. Successful restoration must acknowledge a broader scope of

landscape knowledge, incorporating both remote sensing technology *and* local ecological knowledge that is rooted in the landscape. The incorporation of multiple landscape readings and broad knowledge sources will best support the marshes and marsh communities as they undergo continuous risk from climate change.

Through my work, I identified a number of priorities that must be central for achieving equitable, sustainable, and transformational marsh restoration. First, environmental management work must target anthropogenic threats on both a local and transnational scale. The development of upstream damming projects in Turkey and Syria continues to threaten the flow of water on the Tigris and Euphrates Rivers. The Mesopotamian Marshes are directly impacted by upstream diverted water, and remain at risk of severe water diversion unless transnational water access policy is established. Within the surrounding marsh area, oil projects such as the continued development of the Majnoon Oil field—one of the richest oil fields in the world—pose a threat to the wetland area despite the existence of Ramsar and UNESCO protected boundaries in the area.

Beyond a focus on these specific present day threats, successful wetland restoration and land management requires a focus on capacity building and identification of the needs of women, and other vulnerable populations. This is essential, because the majority of marsh research (spanning from historic ethnographic work to present day regional research) consists of male researchers interviewing male community members (Al-Mudaffar Fawzi 2016). While historically Marsh Arab women have engaged in reed cultivation, market trade, and agriculture, the draining of the marshes has led to over 60% of women strictly engaging in domestic activity (Al-Mudaffar Fawzi 2016). Including the perspective of Marsh Arab women in the wetland management process is essential for re-establishing female roles in wetland centered livelihoods.

Expanding beyond the scope of marsh restoration, my findings stress the importance of database ontology and thinking critically about data sources and map production. This is especially important as maps become highly circulated away from their original context, and therefore, away from their intended actor-networks. My work expands conceptions of map deconstruction to include both a consideration of data sources and finished map products. This helps to understand the power and role of maps by noting not only what is presented on the map and what is missing, but who is creating this graphic and through what methodology.

My work was greatly limited by my inability to conduct participatory mapping and interviews with local community members living around the wetlands. Participatory mapping efforts that allow local people to convey their feelings of connectedness to the wetlands and thoughts about restoration efforts would significantly strengthen my deconstruction and mapping efforts, as well as recommendations for the future. While the case studies from my literature review are able to identify clear negative impacts that international intervention had on the local populations (malinformed policy, harmful land use decisions), my work uncovers policies and narratives that may be harmful, but I do not identify specific negative impacts. Therefore my research serves as a tool for thinking critically about foreign actors in Iraqi wetland management, however continued research is needed to assess specific harmful outcomes.

Lastly, there is a continuous need for environmental research and political ecology work that focuses on the Middle East. While there are over 230 protected areas in the Arabian Peninsula, there is limited existing research that examines the impact of this conservation on local communities (Karam 2021). Further research is needed to examine the impact of conservation on local livelihoods, decision making power, and socio-economic well being in these areas (Karam 2021). The case studies I consult in my research largely draw on political

ecology work focused in Africa, and an increase in Middle East specific research would help to better inform my work, as well as others'.

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