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# Water tenure as a form of biocultural diversity: the case of Palestine

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## 1 Introduction

“Tenure” designates the relationship, either legally or customarily defined, between people, as individuals or groups, with respect to a resource (Hodgson, 2016). Understanding Palestinian water tenure also requires knowledge of the history of land tenure in the area. This article therefore starts with a brief sketch of the historical development of land and water tenure in Palestine. It explains the appearance of legal pluralism after the Oslo Accords and the ensuing overabstraction, which started with the second Intifada, a Palestinian uprising that started at the end of 2000 and ended around the beginning of 2005. The consequences have been dire. The absence of coordination among various water tenure arrangements has led to water scarcity and biodiversity loss. Irrigated agriculture increasingly takes on high added-value, export-oriented crops, endangering local food security.

This article argues that water tenure is a form of biocultural diversity. Recognizing and supporting various types of water tenure can provide a useful means of reducing overabstraction of water and the consequent destruction of biodiversity. We suggest a concrete path to this end in the Ein Far’a Valley through the creation of a water platform.

## 2 The long construction of Palestinian water tenure

The land that is commonly referred to as Palestine, i.e. the West Bank and the Gaza Strip, became part of the Ottoman Empire in the early Sixteenth Century (Veinstein, 1990). Occupied by the British during the First World War, this land became part of the Mandate for Palestine, which the League of Nations granted to the United Kingdom of Great Britain and Northern Ireland in 1922. After the war that followed the British withdrawal in 1948, Transjordan annexed the West Bank and changed its name to Jordan. The Gaza Strip was administered, but never annexed, by Egypt. Both pieces of land were occupied by Israel in 1967. Although Israel annexed East Jerusalem, it never annexed the Gaza Strip or most of the West Bank. Jordan relinquished all administrative links with the West Bank in 1988 and the Oslo Agreements recognized the existence of the Palestinian Authority in 1993, 1994 and 1995. The law regulating land and water tenure in Palestine today is the product of an historical process that included Ottoman laws, British laws, Jordanian laws, Israeli military orders and laws promulgated by the Palestinian Authority.

The Ottoman Land Code, which entered into force on 21 April 1858, formally recognized the pre-existing categories of land in Palestine, which was, at that time part, of the Ottoman Empire. These land categories were: *mulk*, *waqf*, *miri*, *matruqa* and *mewat* (Fields, 2017). Only *mulk* land approximated the category of private land, describing the land under privately owned buildings and within the tiny home gardens adjacent to them. The other land categories of land were subject to usufruct right. Agricultural land was either *miri* (close to the village centre) or *matruqa* (distant from the village centre) and was held in common by an entire village. Until 1860, all *miri* land in Palestine was cultivated according to the *Musha* system (Granott, 1952), whereby plots were allocated to households according to the number of family members able to work the land. The village redistributed land every few years. Production on the allocated land belonged to the household. However, cultivation was carried out in common by the entire village. *Musha* land tenure corresponded to a common property regime. Consequently, when farmers used a spring to irrigate the land, they also developed a common property regime to manage it among themselves.

The Ottoman Empire made land titling compulsory on 14 December 1858. The intention was to bring land into the realm of the merchant economy. The peasants fiercely resisted registering the land they farmed. Often burdened with crippling debt (Granott, 1952), they preferred usufruct rights, which could not be taken away from them, over private ownership of land that their creditors could seize. The British, who ruled Palestine under a League of Nations mandate after the First World War, initiated the land settlement process in 1928 to pursue land titling. The process was known as “land settlement” because the authorities required anyone with a claim to land to come forward so that contradictory claims could be settled and every dunum of land could have a land deed. The process was very slow because the British faced the same reluctance from peasants, who also feared this was a ploy for Zionists to purchase land. It came to a stop with the beginning of the Second World War.

Following the departure of the British, Jordan started the process of land settlement in 1950 in the northern part of the West Bank and moved towards the south until it was interrupted by the Israeli occupation in 1967 (Fischbach, 1994). By then, all land in northern areas, such as the Ein Far’a Valley, had been titled, with the associated water rights written on the deeds. However, the process had not even started in the southern part of the West Bank.

Although the category of miri land was officially abolished in 1915, Jordanian land settlement officers required the villagers to elaborate the “*taqsim*”, i.e. the manner in which land and water held collectively would be divided among themselves (Trottier, 2015). This ensured that the villagers would consider the “new” rights to be legitimate and would respect them.

The transformation of the Ottoman Land Code in the Nineteenth Century allowed the state to confiscate uncultivated (*mewat*) land. Bedouin communities saw much of their pastureland confiscated and sold by the state because it was considered to be *mewat*. As a result, members of the merchant elite in Jerusalem, Nablus and Bethlehem acquired large tracts of land in the Jordan Valley. This, combined with the arrival of several hundred thousand Palestinian refugees during the 1948 war that followed the proclamation of Israel’s independence, led to the development of sharecropping as a dominant form of land tenure in the Jordan Valley. Sharecropping agreements allowed a landowner to grant sharecroppers a plot of land and the associated water rights for a fixed number of years in exchange for half the produced crops. Most land in the Jordan Valley was farmed by sharecroppers who lived on the land they farmed, while the landowners lived in urban centres. The evolution of land tenure on the western slope of the West Bank followed a different path. There, small plots predominated, with most land either farmed either by the landowner or by tenants.

Two forms of water tenure emerged in this context, one for springs and later, one for irrigation wells.

## 2.1 Springs

Palestinian common property regimes for springs provide for systematic water shares in accordance with “water turns” measured in time units. A water shareholder benefits from the full flow of the spring for the duration of his water turn. This can vary from a few minutes to many hours. He will receive water again when the full rotation of water turns has been completed.<sup>1</sup> Typically, a farmer will have a water turn every five to eight days, depending on the arrangements of the spring concerned (Trottier, 2013, 2015; Trottier *et al.*, 2020).

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<sup>1</sup> The pronoun “he” is used here because, according to Palestinian custom, only men inherit water rights. Muslim law legislates inheritance and specifies that daughters receive one-third and sons receive two-thirds of the estate. However, a daughter systematically offers her brother her water rights according to custom. As a result, water rights are overwhelmingly held by men. In 25 years of research, the author encountered only one case where a widow held a water right. This was an exception.

The flow of Mediterranean springs fluctuates greatly throughout the year. Palestinians developed an approach to water tenure that distributes water scarcity during periods of low flow and water abundance during periods of high flow, in a manner that is unequal but considered equitable by community members. Since spring irrigation networks are usually gravity fed, water is free of charge for the "shareholders" (the users). Such water tenure arrangements were established with the construction of the irrigation schemes. In Battir, for example, the water turn comes around every five days because there are five main families in the village. Each family has one water day, which it regulates in its own way. In Ein Far'a, the water turn comes during the night one week, and during the day the following week, allowing everyone to sleep well at least one week out of two. In Ein Far'a, Thursday was the "day of thirst," when anyone could take water from the spring if needed. Of course, gravity-fed, open channel networks need to be maintained. The shareholders usually have to contribute labour for this maintenance in proportion to the number of water hours they are allocated.

Palestinian spring water tenure complies with several principles of good water tenure governance. It is necessarily participatory because the water users themselves block and unblock the channels leading water to their respective plots of land. They also need to maintain the network collectively otherwise it would become dysfunctional. This form of tenure is transparent because everyone can see who abstracts water and for how long. Misbehaviour is thus immediately apparent. At the end of the 1990s, a development project transformed the open canal network linking the Ein Sultan spring in Jericho to a pressurized pipe system, forcing the users to switch to distribution by volume (in cubic metres of water) instead of time (in hours of water). This created great stress among the irrigating farmers at the time. They were intent on conserving the proportional distribution that prevailed under the time-based allocation system.

## 2.2 Wells

Agricultural wells first appeared in the northwest part of the West Bank in the 1950s. Neighbouring farmers pooled their savings to create a *shirket al bir*, a well company, with written statutes, that funded the drilling of the well and its equipment with a pump. The early well companies defined themselves as private, but field observation reveals that they function according to communal property regimes. Land plots tend to be connected to a single well, initially through open air channels. These were soon replaced by pipes. When a farmer needs water, he asks for an hour of water from the well operator, who opens the gauges of the pipes leading to his plot. The user may or may not be a member of the "well company." The well operator keeps a record of how many hours of water he directs to each farmer's land, which he then delivers to an accountant who sends a monthly bill to each farmer. Every well has an accountant who has access to the full details of monthly water use over as many years as the well has existed. Such transparency is essential to the success of this form of tenure. Social cohesion is important in a village. People who are unable to pay are offered "payment plans," which usually means that they will receive water free of charge for as long as necessary. The well company does not aim to earn a profit from selling water. The goal is to recover the operational costs of the well.

In 1967, following the occupation of the West Bank, Israel started to equip every agricultural well in the area with a meter. The Israeli-controlled West Bank Water Department sent an employee every month to record how much water had been pumped. After a year of metering, the Israeli authorities granted every well an annual quota that corresponded to the quantity of water it had pumped over the previous 12 months. From that point on, it was prohibited to pump more water than indicated by the quota. The Israeli Authorities also forbade the drilling of new agricultural wells without a permit. This occurred very rarely until the conclusion of the Oslo Accords, a series of agreements signed in 1993, 1994 and 1995. In the two decades following 1967, many wells pumped less than their quota as young men disengaged from agriculture to seek employment in Israel (Trottier, 2007). This reduced the demand for irrigation water from the wells.

On the eve of the Oslo Accords, Palestinian water tenure, whether it related to springs or wells, overwhelmingly corresponded to the common property regimes established locally by farmers. Each well and each spring benefited from its own grassroot, local tenure arrangement. Wells were run by institutions with written statutes, and springs were run by institutions relying on oral custom.

### 3 The Oslo Accords: a game changer

Among other things, the Oslo Accords of 1993, 1994 and 1995 created the Palestinian Water Authority (PWA) and entrusted it with managing all of the water used by Palestinians (Trottier, 2000). The Palestinian Authority adopted Water Law No. 3 on 17 July 2002 (Palestinian Authority, 2002). The law declared that water was public property. From that point onward, a situation of legal pluralism existed. Local institutions that established water tenure arrangements for springs and irrigation wells were not formally recognized by the new law but continued to function because they were firmly embedded in local practices.

On 2 June 2014, the Palestinian Authority adopted new water legislation in the form of Decree Law No. 14 (Palestinian Authority, 2014). This abrogated Water Law No. 3 but continued to maintain water as a type of public property. It also recognized “historical rights” over water but did not define what those rights might be. In 2018, the Palestinian Authority adopted Regulations on Water User Associations, which set out detailed rules regarding the institutional structure and responsibilities of water user associations (WUAs). Compliance with the rules was a condition for recognition of WUAs by the PWA (Perrier, 2020a). However, none of the existing institutions governing common property regimes for wells and springs complied with the rules governing institutional structure or responsibilities. So, none were officially recognized by the PWA.

### 4 The current situation

A turning point for water tenure arose with the start of the second Palestinian uprising at the end of 2000. The Palestinian Water Authority had taken over the work of the previous West Bank Water Department. The violence of the Intifada led its employees to stop verifying the meters on agricultural wells. An institutional vacuum arose, which led new investors to start drilling unlicensed wells in areas where neither Israeli soldiers nor Palestinian Authority employees were present. Today, well owners either use water directly on their own large farms or sell it to neighbouring farmers at an unregulated price. Although, at first sight resembling a kind of a private property regime, this type of water tenure is best described as open access. Indeed, as described below, well drilling is effectively unregulated, so water can be obtained by anyone who has enough capital to drill a well.

The Oslo Accords created the Joint Water Committee, half composed of Israeli officials and half of Palestinian officials. Any water infrastructure in the West Bank needs a permit approved by this committee, which functions on the basis of consensus (Trottier, 1999). This situation effectively gives Israel a right to veto water infrastructure projects in the West Bank. In 2010, the Palestinian Water Authority granted “oral licences” to wells drilled in Ein Far’a between 2000 and 2008 (Perrier, 2020b). These “oral licences” were not approved by the Joint Water Committee and so are not recognized by Israel. But they do confer some security to well owners as a result of their recognition by the PWA. In areas where Israel turns a blind eye, such as the “C Area” around Jericho and Al Auja or the “A Area” in Ein Far’a, the drilling of unlicensed, private agricultural wells has multiplied since 2010. Some well owners apply for an oral license after having drilled their wells. Some do not declare the existence of the well to the PWA. Participants in workshops organized by FAO and the Palestinian Authority on 8

July 2021 (8 July 2021 FAO workshop report), including non-government organizations and ministry employees, and 15 March 2022 (15 March 2022 FAO workshop report), including local actors in Ein Far'a Valley, confirmed that the process of granting oral licenses continues to take place for wells drilled in Ein Far'a Valley.

The use of wastewater, whether treated or untreated, in irrigation, has also emerged as an issue over the past ten years. A reuse project has long been proposed that would convey treated wastewater from the first functioning Palestinian wastewater treatment plant in El Bireh to Al Auja in the Jordan Valley (ARTELIA, 2016). Another project aims to reuse treated wastewater from West Nablus wastewater treatment plant (Perrier, 2020b). The June 2019 Kushner Plan aimed to fund "critical connections" to increase irrigation using treated wastewater (Trottier *et al.*, 2020). The soaring cultivation of date palm trees in the Jordan Valley, both by settlers and Palestinians, is fuelling a demand for such projects. Meanwhile, much of the untreated wastewater that flows from cities such as Nablus is now used to irrigate both vegetables and trees. This is the case in Jiftlik (interview carried out in Jiftlik, 10 March 2022) and Furush Beit Dajan (findings from FAO water governance project in Palestine) for example.

## 5 Consequences of the current state of water tenure

### 5.1 Creating water scarcity

Traditional water tenure institutions have managed water sustainably. But the current proliferation of both licensed and unlicensed wells is creating a situation of water scarcity. Because a karstic aquifer is very difficult to model, the impact that a well has on springs and other wells is difficult to prove using hydrogeological studies. However, empirical evidence allows water users to observe that when wells stop or reduce pumping, springs reappear, suggesting that the wells caused the springs to dry up in the first place. The disappearance of the El Auja spring in 2010 was probably caused by the drilling of a well in Ein Samia by a German aid organization to supply Ramallah with drinking water (Trottier, 2013). The disappearance of the Ein Far'a spring after 2006 was probably due to the drilling of wells in Atuf. Reduced pumping from these wells since 2016 has coincided with Ein Far'a spring flowing once again, albeit less abundantly than before. The multiplication of wells is also causing nearby wells or wells located downstream, aquifer-wise, to dry up. In March 2022, Tamun municipality was keenly aware of a looming catastrophe for its agricultural well because an investor was drilling a new well close by. Simultaneously, many farmers in the Ein Far'a Valley reported reductions in the water level of the wells they used, ranging from two to five metres/year.

The water scarcity caused by the proliferation of wells also affects water tenure around springs. The water rights may still be recorded on the land deeds held by the Land Authority, as is the case for land in the northern West Bank, but they can no longer be used when a spring dries up. Wastewater reuse projects also harm springs and wells when they carry treated wastewater directly to agrobusinesses, bypassing the recharge zones for both springs and wells. Treating wastewater is always good for the environment, but reusing it directly in irrigation, instead of releasing it into the environment, harms the recharge of aquifers, springs and wells. It also harms the biodiversity that exists in the soil.

### 5.2 Creating biodiversity loss

The disappearance of springs from the Ein Far'a Valley has eliminated the most important ecological corridor available for vegetal and animal species to migrate from the Jordan Valley to higher altitudes in order to adapt to climate change. But the most important environmental impact caused by the disappearance of various forms of water tenure probably relates to soil biodiversity.

Soil biodiversity links to water in many ways. The total biomass below ground is at least as important as the biomass above ground. Biodiversity in the soil exceeds that of other terrestrial systems by several orders of magnitude (FAO, 2020). Pores of different sizes inside the soil may be filled with air and/or water. This offers a diversity in habitat composition where numerous taxa of different sizes can live (Andre' *et al.*, 2002). Water tenure plays a fundamental role in determining the frequency and the duration of water flow to a plot of land. As a consequence, the type of water tenure deployed in a village maintains a soil habitat, and by extension, a soil biodiversity that differs from the habitat and biodiversity maintained in the same type of soil in the same village under another form of water tenure. For example, Ein Far'a spring, when it was flowing, was subject to a form of tenure that meant its full flow was directed to a plot of land every seven days. In one seven-day period, this water turn occurred during the day, while the following week, it occurred at night. This created a pattern of penetration of water in the soil that was different from what occurred in places where the water turn took place at the same time every week. Similarly, a water turn that occurs every five days creates a pattern of penetration of water in the soil that is different from a water turn that occurs every seven days.

Water tenure plays a crucial role in water flow above as well as within the soil. Most terrestrial algae is concentrated on the soil surface and in the upper soil layer, where they help to form biological crusts (Büdel *et al.*, 2016). Such crust formation increases rainwater storage and reduces water loss from evaporation during dry periods, while enhancing overland flow by diminishing leaching during wet periods (Lichner *et al.*, 2013). The size of water-filled pores has long been known to constitute the major structural limitation for soil nematodes (Jones and Thomasson, 1976). Both soil aggregation and porosity are affected by earthworm activity (FAO, 2020). This has significant consequences for the flow of water through the soil. Soil moisture and soil organic carbon are the main drivers of many soil microbial functions such as basal respiration. They also drive the distribution pattern of larger soil organisms, such as nematodes (van den Hoogen *et al.*, 2019) and earthworms (Philips *et al.*, 2019). Clearly, water tenure and soil biodiversity interact with each other. Forms of land and water tenure evolved because farmers recognized how best to maintain soil fertility. They may not have specifically considered nematodes, earthworms, algae and microbial life. But their water tenure systems contributed to engineering the soil habitat for these species, which in turn, created a rich, healthy soil suitable for farming.

The role played by water tenure with respect to biodiversity is largely unintentional. But the science of soil biodiversity provides overwhelming evidence that a diversity of water tenure arrangements produces a variety of soil habitats and populations.

### 5.3 Water tenure and food security

The Palestinian Authority has adopted an agricultural policy promoting high value, export-oriented crops. Its national water and wastewater strategy follows suit (Palestinian Water Authority, 2013), aiming, for example, to use treated wastewater in the Jordan Valley to irrigate date palm trees. Donors have supported this policy choice (FAO, 2021). So did the Kerry Plan and, later, the Kushner Plan (Trottier *et al.*, 2020). The Palestinian Authority and donors seek to develop a modern, competitive agricultural sector run by agribusinesses that are well integrated in global trade. This aim is based on a notion of food security that depends on international trade rather than on food self-sufficiency. It reinforces the invisibility of local forms of water tenure that rely on common property regimes. It also incites the granting of oral licenses *a posteriori* to large agricultural companies that rely on a well they drilled themselves. Ultimately, it drives water scarcity and the accompanying biodiversity loss, which is already occurring.

Local forms of water tenure are driven by the notion of local food security. This explains why the well companies maintain such generous payment plans for the poorest members of their communities. It

also explains why many leaks in the Jordan Valley are not repaired. These leaks foster the growth of mallow, a nutritious weed that is picked free of charge by the poor to feed their families. Participants in local water tenure systems are keenly aware of the links between their interactions with water, and water access by villages further downstream. What appears as overirrigation or a water loss for farmers often allows trees in their neighbours' plots to survive as water percolates into the soil (Lankford, 2013). Local farmers know this and adopt "wasting water" practices when they are useful or necessary for the rest of their community. By contrast, agrobusinesses perceive water as a stock they need to use efficiently by maximizing the portion of the water they abstract, which is then transpired by the plants and trees they cultivate. As a result, local food insecurity can increase at the same time as productivity and exports increase.

## 6 Recognizing water tenure as a form of biocultural diversity to improve water tenure

Section 5 of this paper showed that disregarding local Palestinian water tenure has created a situation of water scarcity, biodiversity loss and degraded food security. Section 6 considers how this situation could be improved. Recognizing water tenure as a form of biocultural diversity is key to turning the situation around.

### 6.1 Water tenure as a form of biocultural diversity

Initially proposed by biological anthropologists, the concept of biocultural diversity sprang from the observation that many nations, cultural and linguistic groups have forged special connections to biodiversity through the way they have understood, used and adapted species, plant varieties and animals over time (Robinson, 2018). This led to the definition of biocultural diversity as "the diversity of life in all of its manifestations – biological, cultural, and linguistic – which are interrelated (and likely co-evolved) within a complex socioecological adaptive system" (Maffi and Woodley, 2010).

Water tenure can be understood as a local system of knowledge, values and practices that has a clear impact on the conservation of vegetal and animal species or ecosystem functions. Most case studies of biocultural diversity have focused on intentional practices, such as the deliberate cultivation of specific varieties of corn or rice for religious reasons, for example (Foyer and Ellison, 2018; Hanspach *et al.*, 2020). The notion of biocultural diversity has yet to be harnessed to study the impact of water tenure on biodiversity, probably in part because the impact of water tenure on biodiversity is not intentional. Farmers who devise grassroot forms of water tenure aim to regulate interactions among themselves concerning the use of water. They do not aim to develop soil biodiversity. However, the forms of water tenure they develop need to maintain soil biodiversity to be sustainable. By trial and error, long lasting forms of water tenure necessarily maintain soil biodiversity, otherwise they would not have persisted through time because soil fertility would have waned. The impacts that various forms of water tenure have on biodiversity can be roughly estimated, using soil quality indices based on their nematode community composition for example. The Maturity Index (Bongers, 1980) and its derivatives (Vonk *et al.*, 2013) have proven useful for comparing different management regimes in agriculture. Similarly, these indices could be used to compare different forms of water tenure. This research needs to be further developed.

### 6.2 Reconsidering the categories used to assess water tenure and agriculture

Current water and agricultural policies tend to be based on principles deemed to have universal value. A narrow definition of water use efficiency, a simple definition of productivity and a one-size-fits-all



definition of water user associations prevail across the world. This has prevented us from harnessing the positive externalities generated by local forms of water tenure, such as those that exist in Palestine because such forms of water tenure rely on locally-constructed categories.

The definition of water use efficiency that predominates in national water and agricultural policies is “more crop per drop.” This implies that water is a stock and, when it is not “beneficially used,” i.e. transpired by a cultivated crop, it is lost. Yet the beneficiaries of local water tenure arrangements often have a different view of water use efficiency. For example, water may be perceived as a flow, and the various interactions that occur with that flow may be considered beneficial even if it means that some of the water is not consumed by the cultivated crop.

Many Palestinian farmers grow potatoes between rows of irrigated guava trees. They often use lemon trees to mark the boundaries between the plots of irrigated avocado trees that have been inherited by various siblings. Both potatoes and lemons are destined for family consumption. These crops consume a portion of the water that could have otherwise gone to the irrigated crops destined for the market. That makes these farmers less effective, according to the hegemonic definition of water use efficiency. But clear boundaries between plots make for good relations between neighbours, and potatoes and lemons make a useful contribution to local food security that conveniently bypasses market exchanges. As previously noted, some farmers refrain from repairing leaks because they allow mallow to bloom, thus providing a nutritious, free food for the poor in their village. Such interactions at the village level are fundamental because they maintain local food security. Local forms of water tenure are built on the understanding that any water that contributes to maintaining such interactions is used efficiently.

Similarly, the hegemonic definition of productivity in national water and agricultural policies relates to the ratio of output, in terms of crop or income, over cultivated surface area. But labour-intensive practices may be important to maintain local social interactions and an equitable access to food at the village level. Thus practices that appear less productive at first sight may be considered as very productive locally. Once again, local forms of water tenure are built on the basis of a locally-constructed understanding of productivity.

Finally, Palestine has long had local water user institutions nearly everywhere there is a spring or well. Established locally, their rules rarely correspond with the Regulations of Water Users Association promulgated by the Palestinian Water Authority in 2018. These grassroot institutions exclude women and often are only open to the members of certain families. Sometimes, they are allowed to sell their land while retaining their water rights. Although the rules of the WUAs may contradict other laws and basic principles of human rights, these grassroot institutions receive a high level of participation and their rules are widely observed by water users. In the current circumstances, where unregulated well drilling is causing water scarcity and biodiversity loss, rallying water users to observe certain rules becomes urgent. Long-established water tenure practices serve that purpose. This is a positive externality provided by local, grassroot water tenure institutions.

For these reasons, it is important to reconsider the definition of water use efficiency, productivity and water user associations. In so doing, we should assess whether the definitions of these concepts in national legislation matches the ways that grassroot institutions value water and water tenure. Otherwise, national policies may counteract the local practices that have successfully ensured sustainable water use, protected biodiversity and allowed local food security. Such an exercise requires distinguishing between types of farmers based on the mode of water and land tenure they employ. For example, in the context of the West Bank it is necessary to differentiate between:

- i. landowners who rent their land for money and live far away (especially in Ramallah);
- ii. landowners who rent their land for money and live close by;

- iii. landowners who rent their land under a sharecropping arrangement and live far away (especially in Nablus);
- iv. landowners who rent their land under a sharecropping arrangement and live locally
- v. landowners who hire labourers (cucumbers and dates...);
- vi. landowners who work the land themselves and hire labourers seasonally;
- vii. landowners who work the land themselves together with their family;
- viii. landowners who bought land to speculate and sell it bit by bit (mostly for holiday homes);
- ix. sharecroppers who work the land themselves;
- x. sharecroppers who also practice sharecropping with their extended family on a part of their land (multi-layered sharecropping);
- xi. tenants who pay money to rent land and acquire water and farm the land themselves (occasionally hiring labourers);
- xii. tenants who farm the land themselves with their family and do not labourers; and
- xiii. tenants who pay money to rent land and acquire water but don't farm it themselves because they hire labourers.

Each of these actors is embedded in a different water and land tenure arrangement. Landowners with capital may need to maintain the current open access regime so that they can drill “private” wells. Sharecroppers that live on the land they farm may rely on water rights that are defined by the communal property regime governing the spring they use. Businessmen living in Ramallah may promote the reuse of treated wastewater to secure a stable supply of water – under a public property regime – to land they intend to lease for 50 years. Each defines water use efficiency differently, depending, among other considerations, on the mechanisms that ensure their food security. When exploring the various forms of water tenure, which either coexist in the same physical space or exist in different physical spaces but impact each other, it is necessary to understand how and where they are elaborated and maintained. Continuing to use an existing form of tenure or replacing it with another, requires these actors to put forward varying concepts of water use efficiency, productivity and water user associations. At present, only some of these actors are heard: those who have access to ministries and international organizations and espouse the concepts that claim to have universal value.

The interactions needed to maintain open access to water also need to be further explored. For example, farmers or agrobusinesses that drill unlicensed wells and abstract water in an unregulated fashion may devote a great deal of energy to maintaining good relations with government officials to ensure their wells will not be forcibly closed. In such cases, the environmental narrative and the definition of water use efficiency advocated by well owners may be adopted by government officials, who then champion the *a posteriori* licensing of these wells and their abstractions. As detailed above, this practice has caused all of the springs in the Al Far'a Valley to dry up. This has in turn dispossessed the farmers who held water rights to these springs. The dispossession is made invisible by the narrative upheld by the agrobusinesses and the ministry officials who promote their practices. This narrative is rooted in an epistemology where only classical economic considerations are promoted. It portrays grassroot forms of water tenure as inefficient because it excludes considerations of biodiversity, the manner in which local food security is maintained and the way that rules are accepted and followed, i.e. how social capital is constructed.

## 7 Concrete paths ahead

All Palestinian irrigators are very aware of the growing water scarcity. Their discourses and their strategies vary according to the water and land tenure arrangements they employ.

The people that promote the reuse of treated wastewater aim to secure a supply of water from the only source that will grow in the future. Most of the domestic water delivered by the PWA (59 percent in 2016) (World Bank, 2018), is purchased from Mekorot, the Israeli national water company. Israel made a strategic choice of mass desalination in 2000. It now produces about 90 percent of its tap water through desalination. As demographic growth continues in Palestinian towns and villages, so will the use of domestic water produced from desalination and the production of wastewater. Climate change models all agree that a reduction of rainfall is expected in the future throughout the Middle East region. The actors hoping for a supply of treated wastewater argue that such water is lost if it is not reused directly in agriculture. They also argue that the reuse of treated wastewater will reduce the pressure on the aquifers since farmers will pump less water. Both claims are wrong. Treated wastewater is only “lost” if it is released directly into the sea. Otherwise, it penetrates the soil and recharges aquifers, wells and springs while maintaining soil biodiversity. Furthermore, farmers who abstract groundwater will not reduce their pumping because other farmers use treated wastewater. They will keep irrigating from their wells.

The actors drilling “private” wells in a *de facto* situation of open access have caused all the springs to dry up and are now causing the water level in wells located downstream to drop significantly, by as much as five metres per year. They sometimes secure oral licenses from the PWA. The farmers that rely on the springs of the Al Far’a Valley are not presently considered by the Palestinian Water Authority, despite the fact that their rights are recorded on their land deeds, which are held at the Nablus office of the Land Authority.

An FAO workshop on 15 March 2022 gathered heads of municipalities, large- and small-scale farmers representing a variety of tenure situations, and well owners from the Ein Far’a Valley. The participants were eager to form a water platform where water users could meet, receive sound hydrological information concerning the valley and negotiate an abstraction plan that would be more sustainable than open access and equitable for water users throughout the valley. In the case that no consensual agreement was possible, even a majority agreement could be presented to the PWA that might help to abate the present overabstraction. The water platform could serve as a “missing link” between the PWA and local water abstraction management..

The proposed water platform would not require any change to local water tenure arrangements. The social capital of the local grassroot institutions, i.e. their capacity to enforce water management rules, would thus remain intact. Their institutional structure would not be required to change to match the requirements of the Water User Association Regulations of 2018. Including the heads of municipalities in the platform, alongside landowners, well owners, sharecroppers, farmers renting land, and spring water right holders, would enhance their social capital. At present, heads of municipalities often intervene to settle local disputes, including those related to water. However, they lack a mechanism for negotiating with the leaders of other municipalities, even when the wells in a neighbouring area are harming springs and wells in their own. Such negotiations would no doubt lead to an unequal distribution of water among villages and users. But it might also be a way to allow springs to flow again and abstraction from the aquifer to be brought down to a sustainable level.

## 8 Conclusion

Recognizing water tenure as a form of biocultural diversity paves the way to bringing together a great variety of grassroot forms of water tenure institutions for a much-needed discussion of water governance in Palestine. As detailed above, water tenure in Palestine has evolved over time, alongside land tenure, on the basis of arrangements that were considered efficient and legitimate to the local population.

Water Law No. 3, promulgated in 2002, was written, in English only, by international consultants who it seems did not study, consider or include existing local Palestinian water management institutions. Such institutions do not disappear overnight because a new law now that water has become public property. Nor would it be desirable that they disappear overnight. The social capital they have constructed over time, i.e. their capacity to have the rules they enunciate respected by the population, is a clear positive externality.

Decree Law No. 14 of 2014 abrogated Water Law No. 3 of 2002. It had the immense merit of being written in Arabic. But it focused on the internal rearrangement of tasks and responsibilities within the Palestinian Water Authority and government institutions. Decree Law No. 4 maintained the principles of Water Law No. 3, such as declaring water a public property. Unlike Water Law No. 3, it recognized “historical rights” to water, but unfortunately it did not seek to define them. The continuing overabstraction and pollution of water is evidence of the need to maintain the social capital that local grassroot water tenure institutions had developed. Gathering these institutions within a forum where their members can discuss and negotiate could prove enormously beneficial to the Palestinian Water Authority.

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