Technology Transfer and Sustainable Development:
Implications for Local Culture
Rachme Village, Aqaba Province, Jordan

by Nadav Feuer
1.0 INTRODUCTION

The kibbutzim of the Southern Arava are not surrounded by monumental triple-layered fences of barbed wire simply to keep the children from straying outside of the grounds. Rather, these fences are now only a reminder of a time when the political relationship between Israel and Jordan was based entirely on security. These days, the oases-kibbutzim of the Hevel Eilot Regional Council are thriving examples of communal agricultural living, adaptation to arid conditions, and, most importantly, of an assurance of peace with neighboring Jordan. A fence traverses the border and guards still patrol, but they do so with a backdrop of healthy stands of date palm, fruit trees, and experimental orchards. Since the mid-1990’s, passes in the border have begun to appear along the 500 kilometer stretch of uncrossable zone between Israel’s southernmost crossing with Aqaba and northern Beit She’an. The gate recently erected near Kibbutz Yotvata as the result of the Israel-Jordan Peace Agreement of 1994 reads, “Go in peace, return in peace,” expressing a strengthening culture of transnational collaboration.

With the fruition of agricultural projects initiated by the Jordan Valley Authority and Hevel Eilot Research and Development Station in Israel, the Jordanian side is beginning to see new growth in agricultural development. Between the village of Rachme, Jordan and Kibbutz Grofit in Israel, in particular, it is becoming increasingly more difficult to see where each nation’s agricultural lands end and the other’s begins. Rachme, which was used as the pilot program for the agricultural development collaboration initiative between Israel and Jordan, has seen more than 50 hectares of previously undeveloped land put into productive use. The resulting political externalities of these developments have undoubtedly been positive, but the overall success of these projects to improve living conditions in the predominantly Bedouin-populated Wadi Araba is still in question. This report is aimed at uncovering the behavioral patterns of behavior and perceptions that have changed in Rachme village since the founding of the project and since the cooperation with Israel began.

1.1 The Geography of the Arava Valley

Extending northward from the Gulf of Aqaba, the Arava Valley is home to a number of closed-community kibbutzim with a total population of around 3,000 and small Bedouin settlements numbering approximately 3,500 (Greenberg, correspondence). The valley itself is flanked by the Edom Mountains in Jordan and the less dramatic mountains of the Southern Negev in Israel. The temperature in the valley is extreme, ranging from 7°C in the winter to 45°C during the summer, with particularly low humidity during the summer months. The average rainfall, at 20-30 mm/year is well below the designation of arid (Arava R&D). The
geology reflects this environment, being primarily composed of sand and coarse stone eroded from the adjacent mountains.

In addition to competing with the fierce sun and rocky soil devoid of organic material, agriculture must also cope with the very high salinity of the water, which prevents or slows the growth of many types of cash crops. At one time, the Mediterranean Sea used to cover this valley and is the primary reason for the residual salinity. The high salinity is exacerbated by human application of fertilizers, which leave additional chemical salt residues, and the accumulation of saline chemicals from the recycling (as opposed to drainage) of saline water (Greenberg, correspondence).

Water is primarily drawn from artesian wells that access aquifers as deep as 900 meters. Water for agriculture is of lower quality, and significantly more saline than drinking water. Accumulation of these waters has caused salt flats to form at various pockets of lower elevation in the Arava Rift Valley. One additional source of agricultural water is the sewage water from Eilat, and Aqaba, which a few of the kibbutzim and neighboring farms use for orchard agriculture.

1.2 History of the Agricultural Development in Rachme

After peace was negotiated between Jordan and Israel in 1994, avenues opened up for sharing information and mutual help across the border. Concurrently, Jordan itself was developing plans under the auspices of the Jordan Valley Authority (JVA) and Al Haq Farms (a private enterprise) to redevelop Wadi Araba after an unsuccessful attempt in the 1980’s. Amnon Greenberg, the director of the Hevel Eilot Regional Council Research and Development (R&D) Station, used this opportunity to offer expertise in arid agriculture to the development of a pilot project in Rachme, Jordan. Delegations from the World Bank, European Union, and the Peres administration in Israel visited during 1996-97 and looked favorably at the project, although they ultimately made no funds available. Monies and political support were eventually made available by the Eilat Office of Security and the German-Israel Federation for Research and International Development (GIFRID), in addition to the primary funding of the Jordan Valley Authority.

A four-step process was suggested by the R&D Station, involving supervised construction, continuous soil quality monitoring, training, and wider dissemination of information from successful projects. The goal of the Israeli collaboration was to introduce the latest designs and methods from Israel and supply contingent advice so that Rachme’s agricultural sector could leapfrog the 30-50 years spent in agricultural development in Israel. On the Jordanian side, Al Haq Farms was employed as the primary management body and responsible for the day-to-day running of the project (Heidtmann 2001). Al Haq is a quasi-governmental farming company with a large presence in Jordan and specifically near Aqaba, where they operate a 70 hectare date orchard fed by treated wastewater (Al Ghazawi et al. 2003). In 1997, the first three-month training at Kibbutz Yotvata attracted Bedouins of Rachme and agronomists from Amman, and led into successful crops of melons, followed over the years by tomatoes, onions, table grapes, lemons, mango, and date palm. One of the
Bedouins trained at Yotvata is now a manager of the tomato fields, and has seen four of his children sent to the university in Amman. But among those trained in Yotvata, and especially among the Rachme villagers, some relate that advancement has not been forthcoming or they have grown dispirited with the company. To this day, in an effort to maintain follow-up on the project, the R&D Station continues frequent soil quality monitoring in Jordan and maintain regular contact with Al Haq Farms. The project was considered a success and the process was repeated in other communities around the Southern Arava.

According to an initial evaluation conducted by Miriam Heidtmann (1998), a German masters student, the project initially did not succeeded on a few key areas. For one, she points to a number of reasons why the abundant orchards and fields of Rachme did not significantly benefit the citizens of Rachme. The initial workforce employed in the project, for instance, were generally not locals. Instead, they were Jordanians of various professional experience from Amman, Israeli experts, and Egyptian workers. Only a handful of the residents of Rachme were initially involved. Perhaps for cultural reasons, many of the Bedouins, who were given priority in getting jobs, did not elect to work and thus were replaced by Egyptian workers. In her follow-up report three years later, Heidtmann (2001) observed that the Egyptian workers were employed, despite explicit goals to involve Rachme villagers. By the closure of 2005, this circumstance had changed significantly in favor of the local villagers, although Egyptians were retained for certain jobs.

From an ecological standpoint, Heidtmann (1998) also points out that the water consumption of the project relies on rapidly diminishing supplies from non-replenishable aquifers. The R&D Station confirmed this result in 1999 and the village began petitioning the government for additional wells. In general, Heidtmann (1998) states that the project was prematurely deemed a success. In her follow-up study, she confirms the success of the agricultural side of the project through the year 2000 on certain dimensions, but suggests that the social integration of the project has had mixed results. One of the primary problems is the poor rate of participation in agricultural projects.

1.3 Current Trends in Rachme

New agricultural production from Wadi Araba has increased the local economy by approximately $500,000 since the inception of the project (Greenberg, correspondence). Rachme, as the key pilot program, has received the largest share of this benefit, enjoying healthy trade to markets for high-quality goods in places such as Aqaba, Saudi Arabia, Israel, and Amman (Heidtmann 2001). For the scope of the project, relatively few villagers are directly employed, and only rarely have local villagers advanced from worker standards. The rest are generally drivers, security personnel, office workers, or receive other forms of urban employment in Aqaba.
And like most desert agriculture in this region, produce matures earlier here and is able to capture the very lucrative pre- and off-season markets. A future goal of Rachme’s agricultural sector is to adhere to the strict ecological standards of the European Union in order to be able to access the markets in the bulk of Western countries. Doing so would have the additional benefit of initiating reform in pesticide and fertilizer application and stepping the village toward a more integrated and sustainable agricultural system. But as yet, primarily regional markets in Kuwait, the United Arab Emirates, and Israel have received imports from Jordan.\(^1\)

Due to infrastructure improvements initiated by the Jordan Valley Authority, and in no small part to the indirect support of the improved agricultural sector, services in Rachme have improved markedly since 1998. A post office has been established, and landline phones capacity has been installed. An affordable medical center has been renovated; the school has been upgraded and teachers now live locally\(^2\); the police services have also been rebuilt. Infrastructure improvements to the electricity and water system have allowed the majority of the citizens lacking these services to receive them.

The improvements in the late 90’s were dramatic, and echoed a sense of growing cooperation between Israel and Jordan since peace was brokered in 1994. In the period leading up to the Second Intifada in Israel, progress was continuous and proceeded along many lines. King Abdullah referred to the Wadi Araba as “peace valley,” and an American group of entrepreneurs and philanthropists headquartered the new “Bridging the Rift Foundation” in Rachme. Due to the deteriorating political situation in Israel, the aims of the project were abandoned and effort is still being made to rekindle the optimism of the late 90’s (Heidtmann 2001).

### 1.4 Ecological and Social Impact of Israeli Agriculture

The remarkable success of Israel’s kibbutz-based arid agriculture system can easily be seen on the stretch of highway 90 leading north out of Eilat. Stands of highly productive vegetation suited to the desert climate are attached to each of nine kibbutzim in the Southern Arava Valley, and continuous development and improvement is underway. The Hevel Eilot Research and Development Station, which generally reflects the current level of advancement in agriculture, is the primary liaison between Rachme and Israel, providing advice and often direct consultation visits. And while the privately-owned *Al Haq Farms* manages and implements the agricultural project in Rachme, a significant portion of the expertise is drawn from the Israeli side. Additionally, the set up and procedures attached to the technology and methods passed along by Israeli agronomists have already adapted to a relatively strict and bureaucratic regulatory system in Israel and advance upon the bureaucratic demands in Jordan. In the few years leading up to 2006, there has even been a reversal of expertise trade, with *Al Haq* providing useful tips to the R&D Station. To the extent that this expertise is beneficial and ecologically sound, this has been a positive development.

However, in many cases the unsolved environmental impacts, in addition to unintended social impacts, from Israeli agriculture have been transmitted to the various projects in Jordan. Pesticide and fertilizer use, as well as overly optimistic water consumption practices are an unfortunate norm for much industrialized agriculture. In other

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\(^1\) Certain Eastern European countries not requiring EUREP-GAP have also received specific imports.

\(^2\) Although teachers now live locally, the majority are from larger urban areas in Jordan and generally have little connection with the community after many years of living among the Bedouin in Rachme. It is also useful to point out that Rachme villagers who have received training to be teachers are still on the waiting list for positions in Rachme and outside.
words, the bads and the goods of the Israeli experience have been passed along and potentially threaten the sustainability of the development in Rachme. Fortunately, there exists a very good working relationship between the R&D Station in Israel and Rachme, which leads to issues being resolved fairly quickly and a parallel growth in agriculture technology and development. Over-salination from excessive fertilizer use as well as depletion of groundwater already threaten the project in Rachme, in addition to the well-known hazards pesticide use. Furthermore, as in many programs in Western countries, agriculture has become dependent on hired (immigrant) labor. In the Southern Arava, this labor is primarily Thai or other Asian descent. While labor shortage and/or cost of labor are not as relevant in Rachme, there are issues with transplanting certain production methods that have implicit social and labor institutions embedded in them. This issue already came to the fore when Rachme Bedouins elected not to work for cultural reasons and Egyptian workers had to be brought in. A colleague of the author concurrently produced a report detailing the newly-established role of women in the labor pool and the social implications for the advancement of Rachme.

1.5 Water Use, Modern Agriculture, and Politics

In part due to the Rio Declaration on Environment and Development, the Israeli Ministry of Environment is embracing the concept of cross-boundary cooperation in environmental stewardship. As an extension to this, sustainably developing arid areas without jeopardizing resources or ruining land has become a primary concern in Israel, as well as Jordan. According to the Israeli MoE annual report *The Environment in Israel*, “A major focus of development is the Jordan Rift Valley (JRV) whose development potential, coupled with resource constraints such as limited availability of water, hot desert climate, and fragile environment, create a unique development challenge” (Gabbay 2002, 68). The Negev and Arava pump a total of 88 MCM (million cubic meters) of groundwater, most of which (67%) is saline, with the recognition that only a little over 60% of this water is replenishable to any extent. Israel also subsidizes agricultural water costs heavily. The cost of the shortage (shadow cost) and the marginal cost of water are subordinate to the demands of the agricultural sector—the primary water consumer. Economics and ecological reasoning together agree that this is an unsuitable situation (MoE 1999; 60).

*Al Haq Farms* in Jordan receives similar agricultural water subsidies and, as a quasigovernmental business, probably additional incalculable benefits. In fact, as a quasigovernmental organization pumping locally, it is unclear that any functional economic constraints limit *Al Haq Farms* water consumption. However, real economic costs reveal that there is a striking divergence between the rising costs for pumping diminishing (and lower quality) water resources and the optimistic outlook for growth and expansion of the farm on into the future. What Rachme inherits from *Al Haq* following privatization may be a structurally sound farm, but one with multidimensional problems of water sourcing, salination of ground and water, and loss of government benefits. If these problems go attended, not only will salinization will increase, but nitrate pollution will go up, drinking water quality will go down, yields may suffer, and recession may slip in (MoE 1999; 72).

As the Ministry of Environment (1999; 276) in Israel defines it, “Sustainable use of water will enable the preservation and conservation of the soil, physical conservation of land reserves and conservation of soil quality.” While significant advances have been taken in Israel, with the advent of drip irrigation, and more locally in the Arava, with the creation of

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3 Data from Gabbay (2002), using water data from 1999/2000. Saline water is defined as exceeding 400 mg/L of chloride concentration.
arid ecotypes, there is still a distance to go before a truly sustainable water usage pattern emerges. To imagine the fate of Jordan in the future, it is possible to look at Egypt outside of the Nile Valley, which is a similarly endowed land populated by those of primarily Arab descent and marked by high population growth. Martin Hvidt (The Middle Eastern Environment 1995; 90) reports that, without problematic extrapolation, Egypt is threatened to lose the capacity to irrigate 60% of land currently under irrigated by 2025.

The Hevel Eilot R&D Station located in Yotvata has the most direct link to Rachme and therefore the success of its advice, methodology, and technology in bringing about sustainable development in Rachme. It is important to point out that some of the kibbutzim within the domain of the Hevel Eilot Regional Council in Israel depart significantly in practice and ideology from that of the R&D Station. Dr. Elaine Solowey, founder of the Center for Sustainable Agriculture at the Arava Institute for Environmental Studies, has been developing low-impact orchard and field agriculture that, in many cases, differs widely from the crops chosen for Rachme by the R&D Station. In her recent book, Small Steps Toward Abundance, she outlines the theory and practice of managing irrigation crops in an arid and saline environment, as well as describing responsible methods of pest control and fertilization. Because many of these theories have not been adopted by the R&D Station, they are not transmitted to Rachme.

1.6 Research Question

All residents of an arid environment face a very unique and challenging path toward sustainable development. By looking at the results of collaboration between Israel and Jordan on the pilot agricultural project in Rachme, what is the sustainability potential for such technology transfers on the long-term economic, social, and ecological development in similar environments? Issues that will be investigated will be: social progress (particularly female labor force participation), sustainable and non-sustainable agricultural practices, local involvement, and whether or not the benefits and disadvantages accrue locally.

1.7 Study Area

Besides the port and tourism city of Aqaba (pop. 50,000), and Eilat (pop. 45,000) only about 7,000 people live in the Southern Arava. Of the settlements on the Jordanian side, Rachme is one of the largest, with approximately 1,500 residents of Bedouins. The most common tribal affiliations are: Huweitat, Saidiyin, Ammarin, and Heewat (Heidtmann 1998). Of the residents, there are approximately 300 working-age males and about an equal number of females. The remainder are school age children and elderly residents. Most of the residents (over 80%) have electricity and adequate drinking water, and schools in Rachme are more local than similar sized villages in the Southern Arava. On the Israeli side of the Southern Arava though, 9 kibbutzim with a population of around 3000 people reside, mostly agricultural communities harvesting vegetable, fruit and flowers. The research station of Arava R & D is located next to Kibbutz Yotvata, only 5 km west of the Rachme project’s headquarters.
2.0 METHODOLOGY

Step 1 - Visiting with major stakeholders on the Israeli side, and the Jordanian side; Informal interviews

Stakeholders include representatives from the Hevel Eilot Research and Development Station, personnel staff in Kibbutz Ketura, the tribal sheiks in Rachme, project managers in Rachme, and supervising farmers. Approximately 20 informal interviews with a range of citizens, prominent figures, and businesspeople were conducted in addition to the major stakeholders. These interviews were free-note taking sessions and not guided by questionnaire.

Step 2 - Demographic survey [Questionnaire Part 1]

This survey was conducted in Rachme as a pre-assessment portion of the individual household interview. Demographic data was also sought from local authorities, such as sheiks, school directors, project managers, and basic services technicians.

Specifically, information was gathered relating to:
- population characteristics
- housing arrangements and living conditions
- labor participation and trends
- livestock
- access to services (health, education, electricity, water, etc.)
- age of the population, marriage statistics, family size, natural increase rate
- leadership and politics
- cultural events, festivals

Step 3 – Interviews with villagers [Questionnaire Part 2]

Twenty interviews were conducted during December 2005 and January 2006, covering more than 100 individuals from random stratified samples from various economic/social groups in Rachme. The interviews were conducted with adult males (usually household heads). Interviews lasted between 1-2 hours.

This part of the questionnaire is a mix of fixed answer questions, dummy variable questions, ranking questions, and free answer. The primary purpose of the questionnaire will be to assess socioeconomic circumstances, attitudes and opinions vis-à-vis the agricultural developments and ensuing social (and employment) changes.

3.0 RESULTS

Conducting interview work of this type was marked by a variety of challenges which should be outlined for the reader. First and foremost, due to availability and personal choice, many intended interviews were not conducted, which may skew the data. And because there was an attempt to randomly sample within certain artificially-specified subpopulations in Rachme (such as farm workers, business people, unemployed, etc.), this cannot be considered a
sample appropriate for extrapolation to Rachme village as a whole. Second, and despite attempts to be represented as academic researchers, some interviewees assumed a relationship or association with the Al Haq farming company existed. This has clear implications for responses relating to the farm. Third, an overall atmosphere of suspicion is accorded to Caucasian foreigners, and particularly so in a village within a military zone and resident to a quasi-governmental farm. Simple fear of the government and government agents appeared to be a factor for some interviewees. That being said, most interviewees seemed honest and enthusiastic to speak about the situation in their village.

3.1 Demographics and Socioeconomics of the Sample

Rachme could be seen as somewhat of a flagship town by the Jordan Valley Authority—a fairly satisfied and sedentarized Bedouin community with a large and growing population, full services, including electricity, piped water, garbage collection, and sewage, as well as the location of a productive 50 hectare farm exporting to international markets. A deeper look at the socioeconomic trends displays a slightly different picture and a brief look at the history of the village disrupts this satisfying picture yet further.

While one can say that the government of Jordan did not neglect the southern Bedouin, it is anecdotally clear that the effort to fully network the village with water and electricity, and even build a gas station, was driven by the needs of the farm. In terms of the functional socioeconomic result, the farm should be thanked for putting the pressure on the government and, by demanding services, indirectly providing the final push for fully servicing the village. Heidtmann (2001) reported an astonishing increase in services over just three years in her post-project evaluation of Al Haq Farms. All interviewees, almost without exception, have all basic services and report that these services are ubiquitous. Other indicators of socioeconomic standing are not as optimistic.

Education, in particular, is a problematic area. Adult villagers remain largely uneducated (see Figure 1), and seem to have chosen either to remain illiterate or to “go all the way” and try to reach the level of high school graduation. Women, in particular, fall into these two extremes. Perhaps because of this decision, many of the teachers (largely urbanites) joke that the villager who reaches 8th grade is looked at as a PhD in the village. While the demographic statistics show that children are now always sent to school, it is hard to determine what their actual level of involvement is. And given the boyish contempt the teachers collectively held for students in the village, it is also worth considering what these students are getting from school.

![Education Distribution in Rachme for Adults](image_url)
Economically, there is significant consistency among the villagers. Working villagers tended to receive between 110-170 JD monthly, although 35% reported being in a lot of debt. Even retirement benefits from the military (a major source of pension for Bedouin) falls within this salary range. A representation of adult occupations within the sample can be found in **Graph 2**—although it should be mentioned that all women captured by the sample were housewives. Land ownership is also very homogenous, with most families living on a 1.5 dunam piece—the standard set by King Hussein during the founding of Rachme. Recent properties built by King Abdullah are smaller pieces of land with more modern housing. More deeply than salary, 90% sampled Rachme villagers cook with gas and have a television set. Variation can be seen for ownership of other items: 20% have satellite dishes, 55% of families have at least one cell phone, and 35% of families have a car.

3.2 Quality of Life Indicators

From a classic world development perspective, Rachme village is a good example of successful rural development and advancement in basic human rights. The town is fully serviced and health care is affordably available—a major stride in comparison to other poor communities. By the standards of world development, *Al Haq Farms* is also the champion of development: bringing jobs, bringing pressure on the government for services, and liberating female labor. But for the villager living in Rachme village, all of these classic improvements may not have hit home—in fact, they may have gone in a direction opposite of his or her view of development. Therefore, it is...
critical to look at the *perceptions* of the people as well as the infrastructure and “measurable” improvements. While some issues are clear winners as physical ideas (electricity, water piping, schools), the quality of these services is equally as important.

Although villagers all have water, and the water is of technically higher quality (antiquated piping system was replaced two years ago), the villagers are upset with the quality (see Figure 3). The high salinity leaves a poor taste and a trail of dental problems throughout life. This is in direct contrast to how they perceive the cleanliness of their village, which in many Bedouin communities is a major problem (see Figure 4). In Rachme, they have regular trash disposal service and the village is, even by Western standards, very clean.

Social services in the village have clearly improved from a technical aspect in the past few years, and by the numbers, it seem as though approval of at least education and health care is soaring (see Figure 5). Although many teachers have low aspirations for their Bedouin students, this does not prevent them from giving proper instruction. The reality, as one Bedouin explained, is not as much related to the quality of the teachers, but to the options one has set before him in life.

Health services receive a very high rating—and represent the area of most satisfaction in terms of social services.

The two doctors that serve Rachme are well trained and proper, and have quickly learned how to make their services more accessible to the villagers. The only problem is that drugs that were highly subsidized (down to a fraction of their retail price) have crept back up and discouraged a lot of potential Bedouin patients. Equally problematic is the cultural consideration attached to receiving treatment from the Western medical center. Bedouin
usually attempt to treat themselves using traditional methods and often come when conditions have only worsened. Even if a certain course of drugs reduces the system, the Bedouins often discontinue use before the end of the course and lower the effectiveness of the medication.

3.3 Politics and Tribal Relations

The role of the dominant social system in Rachme has a direct bearing not only on the social response to the introduction of large-scale farming, but how the farm interacts and responds to the community throughout its lifetime. In this respect, the Al Haq Farms correctly gauged the local tribal and political leaders—either through cooperation or other incentive, both the sheik of the largest tribe, Hayawatt, and the local mukhtar, the elected political head, are allies of the farm. The tribal leaders are, by in large, charged with maintaining open lines of communication with the farm, so as to stay abreast of each other’s needs. The mukhtar, on the other hand, has relationship with Al Haq Farms based more exclusively on economic factors. Infrastructure improvements and social service upgrades, for instance, are likely mediated through the mukhtar. In interview with the mukhtar himself, it seemed that he has been particularly effective in building off of the entrepreneurial spirit the farm has brought to the village—and his more recent social programs and organizations are characteristic of this.

Although of a tribe without significant representation in Rachme (Drousche), the mukhtar clearly persuaded the village of his capability to adequately and progressively handle local politics. Besides his ability to diplomatically leave many of his personal grievances and preferences aside, which is important for dealing with a largely unfamiliar farming operation, he has humbly brought many positive influences to the village. The Cooperative Association of Rachme, a joint project he arranged with the Jordan River Association (headed by Queen Rania), brought the community-owned and operated ostrich farm to Rachme. Almost by default, all villagers agree that the project is interesting and good, although many cannot afford the initial investment required (50 Jordanian Dinar upfront), or are intimidated by the Association’s domination by Hayawatt members. He also created the Rachme Charity Association, which is now a progressive force in the community run entirely by women. They carry out trainings in computer skills, sewing, and have initiated small cottage industry and high-value projects, such as a oyster mushroom cultivation project. His future goals include revamping the abandoned police station into a youth club, a sorely needed source of entertainment for the younger generation, initiating a cow dairy, and establishing a local council in order to distance themselves from the political problems in the Aqaba municipality.

Although at the discredit of the mukhtar himself, it is safe to say that not only did bring villager-centered activities to fill the social gaps created by the farms, but he did so by building upon the energy and freshness of the farm. In many ways, high-tech modern agriculture, complete with irrigation pipelines, computers, chemicals, and fancy packaging is locked away from poorer people, who are overwhelmed by the complexity and social distance of the project (Amanar 55). Even workers who claimed they learned a lot about cultivation of certain crops are still, by and large, awed by the enormous investment required to start down the path of modern agriculture. The mukhtar, to his credit, was able to section off some of the “eminent domain” created by the enormous complexity and resources of Al Haq Farms and channel it toward creative and more locally appropriate projects (Colchester 80). Even some of the progress toward local benefits are probably indirectly, if not directly attributable to the mukhtar and the voices behind him. The farm now provides green fodder
(scraps) from harvested fields and allows workers to take a few kilograms of fresh produce home each week—two clear improvements upon existing conditions.

3.4 Farm Perceptions and Social Progress

As an institution that has brought about significant changes to the physical as well as social landscape in Rachme village, the ability of Al Haq Farms to draw support or alienate people is a fundamental indicator of social welfare in the community. Among the sampled population, which is biased slightly toward farm workers at Al Haq, there is a 65% approval rating of Al Haq’s practices in the past year. However, this only indicates temporal improvement in conditions or outlook in the past year(s), and not an overall level of satisfaction with the farm. While some substantial economic reasons can be cited for the majority approval rating, such as increased employment due to expansion, and more generosity in terms of free vegetables and providing green animal fodder, most discussion is about a few specific key issues that are debated on and viewed sometimes radically differently by different people. Please see the series of two charts (Chart 7 and 8) below to examine the overall distribution in responses.

A closer look at the responses provided by villagers indicates that villagers have more thoroughly rehearsed and deeper convictions about the drawbacks brought to the village by Al Haq Farms. By in large, the benefits cited by citizens were related to the slight improvements in social service infrastructure (parks, clinics, schools), as opposed to cultural or broad economic reasons. The author considered removing the benefit “employment” because, by nature of the project, one cannot remark that “less people are employed”—whereas the goal of probing employment was to determine if villagers felt Al Haq Farms employment practices (number and conditions) went above and beyond what they expected. There is also a good argument for removing the “park” as a benefit, because, as many villagers report, it remains locked for large periods. But, as in the case of employment, one cannot say that Al Haq did not build a park that is occasionally used. What are left are minor reports of sampled villagers receiving green scraps as animal fodder and those considering the gifting of vegetables to workers as a village-wide benefit. Finally, although villagers often reported the farms playing a role in bringing public attention to Rachme, it is unclear if this has manifested in real benefits for the village or simply become a convenient icon of pride.

The drawbacks of the farm’s presence in Rachme are more varied, nuanced, and represent a divergence of opinion as to what are the major issues. Far more people report that Al Haq does not provide vegetables as opposed to those who cited it as a benefit (16% versus 2%). Many villagers went on to explain how Al Haq Farms has a three-tiered system of produce quality, the poorest quality of which (Tier III) is destroyed rather than given to the local community. This system was corroborated by Al Haq personnel, who proudly reported that Tier I crops were made available to Kuwait, United Arab Emirates, and Eastern Europe; Tier II was sent to regional population centers, such as Amman and Aqaba; and Tier III was “unusable” crop. From an economic standpoint, the crop destruction prevents a dilution of the market in Aqaba, but from a social standpoint is a major disappointment for the community. The author confirmed piles of burnt dates and other dump spots where vegetables were rendered unusable by tractor. The vegetable issue alone represents 30% of the comments against Al Haq Farms.

Disruption of culture and the presence of outside or female workers overlap to a certain extent in describing dissatisfaction with the social changes resulting from the introduction of the farm. Other villagers reported that the pest problem has become
unbearable since the introduction of water works—although the mukhtar rightly points out that cleanliness can solve this and, more to the point, what did the villagers expect? A surprising drawback mentioned by some villagers was the existence of discrimination on the part of Al Haq Farms. Those who reported this were by and large connected to someone who claims mistreatment by Al Haq, although the specific reasons for the feeling were not provided. Among these were some of the Rachme villagers who were trained at Yotvata during the optimistic first years of the project and have since grown dispirited with the company—perhaps for reasons of lack of advancement or no real future outlook for a hard, traditionally non-Bedouin type of work.
Reported Benefits of Al Haq Farms

Figure 7

- 38% employment
- 27% new park
- 19% public awareness of Rachme
- 8% local vegetables
- 4% animal fodder
- 2% health care
- 2% school improvements

Source: Rachme Labor Survey

Reported Drawbacks of Al Haq Farms

Figure 8

- 13% water overuse
- 19% destruction of edible crops
- 15% cultural disruption
- 15% outside workers and/or female labor
- 15% no provision of vegetables for Rachme
- 8% discrimination
- 8% health problems (pests)
- 6% none

Source: Rachme Labor Survey
As a relatively new phenomenon in Rachme, the issue of outside workers and female labor is one that has fundamentally changed the landscape of labor and traditional roles in Bedouin society. The process of sedentarization, which began in the 1940’s and was clinched in 1975 when Prince Hassan of Jordan officially called the settlement Rachme, was the first of such major changes to happen to the Bedouin. Although giving up a pastoral, nomadic lifestyle would seem to imply an adoption of agriculture, this is not the case for the Southern Jordanian Bedouin, for whom plant agriculture remained a foreign concept. When the farm project began in 1998, agriculture (more specifically, modern agriculture) was literally thrust upon the Bedouin with all of its social implications and structural changes. Although the workers at Al Haq Farms are primarily Bedouin now, there was a period where farm managers relied on Egyptian labor because, as they claim, laborers from the village were not forthcoming. This is logical, given that such a major change likely initiated a slow adaptation from the Bedouin in Rachme. But in addition to the upheaval associated with the new agricultural project, two new social dynamics arose and are apparently here to stay: female labor and Egyptian workers.

The precedent for foreign workers in Rachme is not entirely new, although the scale adopted by Al Haq in the early years was on a large scale. Syrian workers have been employed at the local brick factory for over 10 years. The benefit of these workers is clear: they live on site, work very hard, are loyal, and do not have the adaptation idiosyncrasies of the Bedouin villagers. That being said, foreign workers are not particularly welcomed by the Bedouin (See Figure 9). The majority are not welcomed at all, although some admit that it is
useful to have Egyptians around to do “women’s work” or other jobs beneath the dignity of the Bedouin culture (such as working in the kitchen at Al Haq’s headquarters).

The perspective on the recent influx of female Bedouin farm workers (who outnumber the men now during certain seasons) is more divided among the Bedouin (See Figure 10). The majority (60%) of the sample are accepting of the women to some extent, usually encouraging or at least sympathetic to the socioeconomic circumstances that drove them to seek employment at the farm. As a result, there is overlap with the 15% who believe only a desperate situation should justify females working at the farms. Only a quarter is fervently against this cultural change. This is very good progress for short a short time period even though there seemed to be almost no other choice but to adapt to the new social order brought by the farms.

The drawback of water overuse as perceived by the villagers is also a topic that deserves more exploration. Al Haq Farms was not forthcoming about its water consumption, although it admits they are depleting resources fast, and therefore discussion with the villagers relating to water overuse was dependent entirely on personal information and on a hypothetical game simulating water overuse scenarios. According to perceptions alone, 13% of drawbacks of the farm was attributed to water overuse, although this was a drawback reported by 40% of the interview sample. Even if the interviewee did not report water overuse as being a problem, a mini-game was conducted attempting to establish how high he valued the underground water resources of the village in relation to the farm (See Figure 11). A little more than one-quarter said that, under no circumstances, would they close the farm. Many of these answers were appended by saying that Allah is in control of the water, not them. The remainder agreed they would close the farm if the wells ran dry during their lifetime, and an additional 39% said they would close the wells if they ran dry during their children’s lifetime. Many of these responses were prefaced by comments such as “water is G-d’s gift” or “water is the basis of life” and may indicate a growing anxiety over the rapid water depletion. A more thorough ecologically discussion of the water consumption in Rahme will be discussed in the next section.

### 3.5 Ecological and Social Balance

Of the drawbacks cited by the villagers of Rahme in relation to Al Haq Farms, the issue of ecological sustainability of the project only arose indirectly, in discussions
concerning workers safety, employment efficiency, and water overuse. These discussions are underpinned by the fact that annual per capita share of water in Jordan has dropped precipitously from 3,400 m$^3$/cap/year following Jordan’s independence to 155 m$^3$/cap/year in recent years (Ayesh 2005). As communicated prior, Al Haq Farms is not forthcoming with water usage statistics, although they provided the author with enough consumption information for each individual crop to assemble a coherent picture of aggregate pumping at the farm (see Al Haq Farm Layout in Appendix II). Assuming an 8-month annual growing period (two seasons), Al Haq Farms intends to deliver approximately 733,200 M$^3$ of water to its fields. Allow for a conservative wastage ratio and holding evaporation percentage of 20% combined and add water needs of the windbreaker trees, water consumption nears 1 MCM annual (see Appendix I for specifics of this calculation). All in all, Al Haq is operating on a water efficiency of approximately 0.5M$^3$ water per pound of food.

The question of whether such water consumption is justified can be characterized by comparing this consumption to other alternatives. Specifically, per dunam water consumption by Al Haq will be looked at in reference to a permaculture project southeast of the Dead Sea. This project is unique in that it is completely Jordanian-initiated and is located on a piece of land with comparable characteristics to Wadi Araba.

One of the first references used by Mohammad Ayesh (2005) relates the story of successful participatory water (irrigation) projects in the North of Jordan Valley. These examples were in sharp contrast to the very top-down, distant approach employed by Al Haq Farms—which incidentally teaches the village very little about water resource usage and aquifer depletion. The other social benefits of permaculture vis-a-vis chemical agriculture are clear issues that have a bearing on Al Haq Farms, namely the role played by agriculture in poverty alleviation and hazardous chemical avoidance, waste, and cultural consideration.

The system of agriculture developed for the permaculture project is at once similar and in another radically different than the strategy employed by Al Haq. Crop diversity was employed very heavily as a pest and weed control agent in the permaculture project, and the project even strategically planted useful herbs as alleopathic (weed preventative) and pest repelling agents. Some sort of biological control, primarily using tobacco, onion, garlic, or neem sprays were applied to control residual pests. Al Haq uses the standard agroindustrial approach, namely monocropping in plots and use of generic pesticides. Some of the fertilizer being applied to the Al Haq project is warranted, given the absolute barren quality of the land prior to implementation—although standard agricultural practices would aim to discontinue use after a balance of organic material and natural fertilizing elements are reestablished. While there is a possibility for composting at Al Haq, there is the competing demand from the villagers for green material as livestock fodder.

Education became a key component of the permaculture project. Locals were specifically taught how to understand the methods, use the tools, and actively learned the techniques in such a way that they could do much of the planting, soil conservation, agricultural patterning, composting, and water management by themselves (Ayesh 2005). Al Haq performed a similar noble deed—bringing a handful of Rachme villagers to Kibbutz Yotvata for training purposes. But the overly technical and theoretical nature of the learning experience at Al Haq, combined with the lower level of education found in the Rachme villagers who went, prevented them from taking home anything “useful” home, as a few of the younger villagers reported. The role of women in the two projects is also comparable: women were given special focus and responsibility—which, the author reported, created growing successes. The women at Al Haq, on the other hand, are seasonally employed workers who are not provided any training and have no personal connection to the project.

The choice of plants chosen by the two extremes of agriculture are also telling of their local community impact. Permaculture is predicated on extremely high diversity of species,
with consequential high diversity of plant uses (herbs, spices, religious plants) as opposed to agroindustry, which is focused primarily on food crops such as tomatoes, cucumbers, and peppers. Examples of permaculture include: olive, fig, date, guava, pomegranate, eucalyptus, jasmine, albizia, various legumes, eggplants, tomatoes, onion, garlic, Jew’s mallow, barley, sesame (in total there are at least 30 “major” species under cultivation, with minor alleoplastic plants planted for pest control). *Al Haq Farms* cultivates approximately 8 products—all primary or staple food plants. In effect, *Al Haq* achieves less local usefulness and opens its monocropped products up to pest invasion and, given inclement conditions, widespread failure. The question, however, is how are the yields per water inputs from the permaculture project lacking artificial fertilizers and those of an industrialized farm? Unfortunately no direct crop comparisons are available—although most of the products under permaculture cultivation were between 0.2 and 0.6 m³/dm/day, while most products at *Al Haq* were in the range 4.0 to 10.0 m³/dm/day—about a savings of over 1000%. Should direct plant-to-plant comparisons be made, all water costs included, the water savings from permaculture might would lower but still significantly better than those from conventional agriculture.

Water saving practices undertaken by *Al Haq* and the permaculture project are a good comparison, because the permaculture system still relied on irrigation (some are naturally propagated). Ayesh (2005) managed to bring irrigation scheduling down to once per week, used mulching to prevent evaporation and salt accumulation, and estimates he saved 40% of water used in conventional agriculture. This is an epic savings, but comes at no surprise given the goals of the project. According to the agronomists at *Al Haq*, irrigation schedules ranged from 3 times per week to every day, although granted the humidity conditions are harsher in the southern *Wadi Araba*.

### 3.6 Israeli Cooperation

![Figure 12](image.png)

For many parties, the agriculture project in Rachme is only a noteworthy project because of the Israeli-Jordanian involvement that engendered it. But despite Israeli confidence that the project would not have gotten off its feet without Israeli support, there was already movement at the Jordan Valley Authority that was making Rachme a potential...
farming site. The JVA had failed to successfully execute a project in Rachme before, but there is no reason to believe that the JVA would try again unless they had proper reason to believe they would succeed. The Israeli assistance, then, was a guarantee that the project would work—technically. And herein lies the major distinction between Israeli assistance and Israeli technology sharing. Israeli assistance would first have involved more funds than the Israelis actually put toward the project and would also have involved a deeper level of participation. That being said, it is not clear that a true “cooperation,” in every sense of the word, was even technically feasible at the time. A technology sharing arrangement was the most Israel could hope for.

One of the main problems that develops under a technology transfer development situation is the failure or unwillingness to recognize that a technology is replete with the social implications of its holder. Yes, the technology is better, but is the social arrangement embedded in the technology appropriate or even just to transplant into a foreign cultural milieu? Optimism in technology transfer lies on the so-called “leapfrog” phenomenon, wherein non-technical civilizations skip wasteful or inefficient steps in technological development and “catch-up” with modern civilizations. It has been proved that this can be done—cell phones work better in developing countries than the burden of installing landlines…but can a social system leapfrog just as the technology? In the context of the traditionally conservative Bedouin society, is this hope even more unlikely? And besides, what about the fact that these Bedouins hold a non-neutral, probably antagonistic view toward the bringer of the technology?

Extracting how the Bedouin feel about the Israeli involvement in setting up (and a little continual assistance) Al Haq Farms in Rachme is not an easy task. In the case of a Caucasian interviewer, there is a clear reason to be suspicious of both the intentions of the interviewer and for the interviewer to be suspicious of the responses he receives. That being noted, the results of this portion of the interview is as follows (see Figure 12): 60% have no problem with Israeli involvement or even encourage it, while 30% are reticent about the involvement but not against it, and 10% were not aware it was happening. Given the Bedouin penchant for talk, it unlikely a single person in the village did not know that Israel, of all places, was involved in the new farm. But the genuine honesty and willingness to share of most interviewees shows that, for the most part, this is indicative response. More interesting are the responses and prefaces furnished to the interviewer. Many remarked that, “any help is good” – the desperation answer, also given in reference to female labor in the farms. Others said, “if I had the choice, I might have done a cooperation with another Arab country, but it’s not that big of a deal.” And yet others, including the mukhtar, remark that, “smart people than us made the decision to have peace with Israel. If they say we should normalize relations with the Israelis, then we will.” This is a very dignified response, representing either the trust in the national government’s strategic decision-making abilities, or the need to avoid speaking freely.

The level of knowledge about the Israeli involvement, and even the interest level, seems to have gone down. For many of the Bedouins, the Israelis working with Al Haq are just as inaccessible and ephemeral as the upper management of Al Haq. In other words, the Bedouin can only appreciate the idea that Israel is involved in their village, but not understand the implications of it.

4.0 CONCLUSIONS

Due to the rapidity of the farming development and the simultaneous response by the government to make long-needed infrastructure improvements in Rachme village, it is a
unique place to examine the social, ecological, and economic impacts of a rural development initiative. The variable of Israeli cooperation is an added dimension that makes the project particularly interesting from a geopolitical perspective. What is clear is that the advent of *Al Haq Farms* in Rachme has spawned a series of new social changes in Rachme, influenced the economy slightly for the better, and challenged the way the Bedouins see their community developing into the future.

As a catalyst for change, the farms have had a very fast influence. Egyptian workers invaded the village for a time, female labor sprouted and even proliferates, and new entrepreneurial projects have been created in the wake of the farm. The ostrich farm, the very possibility of the all-women Rachme Charity Association, and new plans for a youth club, and dairy seem to have grown out of the idea that, “yes, some pioneering spirit can get something done out here in the desert.” And it helps that the political and economic inertia of the farming company pushed the government to put in place a qualified set of basic services in Rachme.

But the top-down, overly technological approach of the farm has also spawned some difficult ecological and social questions. It is clear that the benefits of the farm are not accruing locally—enormous amounts of vegetables and money are exported out of Rachme, while the pests and the drained aquifer remain in. Some villagers have jobs, but the opportunities for advancement are low and, for some disgruntled workers, even diminishing. The idealized benefit of emancipating women has been realized in a particularly rough manner for the female laborers at *Al Haq Farms*... but one could always say it is a start. Israeli involvement has been seen as a neutral to positive factor for many of the Bedouin, although it is clear that parts of the agricultural system transplanted to Rachme was a social stretch for the Bedouin villagers. Most unfortunate is the poor ecological performance of the farms: fertilizers, pesticides, nuisance pests in the town, aquifer drain, and no real benefit of the farm operation itself to the town (employment is a given; the park being built is external; green animal fodder is too marginal).

**Figure 13** Overall Change in Living Conditions

<table>
<thead>
<tr>
<th>Did conditions in Rachme village improve and</th>
<th>People worked</th>
<th>Public services</th>
<th>Businesses did</th>
<th>Good</th>
<th>No improvement,</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>17.5%</td>
<td>12.5%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Source: Rachme Labor Survey
The deeper question is what will the younger generation do with this institution in their midst. Will it engender more progressive social movement, cause more yearning for cosmopolitan, bustling towns, or serve as an economic or entrepreneurial hub for the future development of Rachme. Villagers report widely varying accounts of their predictions for the younger generation—although all agree that the fate of education, transparency of the farm, and success of current entrepreneurial arrangements will play a major role.
Bibliography


Arava Research and Development Agriculture Information Center. Weather Monitoring Station. Web: http://yair.arava.co.il/climatic/makl.htm


Appendix I

Using information gathered from Al Haq agronomists, it is possible to assemble a cubic meter ($M^3$) demand for each dunam of every crop. The values are as follows:

<table>
<thead>
<tr>
<th>Crop Type</th>
<th>$M^3$/Dunam/Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dates (all varieties)</td>
<td>6</td>
</tr>
<tr>
<td>Tomatoes (cherry)</td>
<td>12</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>7</td>
</tr>
<tr>
<td>Sweet peppers</td>
<td>13</td>
</tr>
<tr>
<td>Cucumber</td>
<td>7</td>
</tr>
<tr>
<td>Table grapes</td>
<td>4</td>
</tr>
<tr>
<td>Lemon</td>
<td>8</td>
</tr>
<tr>
<td>Mango</td>
<td>8</td>
</tr>
</tbody>
</table>

Daily Consumption: 3,055 $M^3$ / Day (733,200 annual)

Based on average yields for each crop as reported by the Jordan Department of Statistics for 2004, Al Haq farms produced approximately 744 tons of diverse produce. A very rough ratio of water efficiency is 0.5$M^3$ Water per pound of produce.
Appendix II

FIGURE A. Al Haq Agricultural Zone - Rachme Village, January 2006

KEY:
- Mejoul Date Palm - 30 dm
- Berhai Date Palm - 30 dm
- Cherry Tomato - 5 dm
- Cucumber - 5 dm
- Bell Pepper - 5 dm (x2)
- Tomato - 10 dm (x3)
- Cucumber - 5 dm (x2)
- Table Grapes - 4 dm (x5)
- Table Grapes - 10 dm (x4)
- Berhai Date Palm - 60 dm (x2)
- Lemon - 11 dm (x2)
- Mango - 12 dm (x2)

Aqaba

Amman

Israeli Border