THE NATURE OF THE NEGEV

Assessing a National Experiment in Drylands Afforestation

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ABSTRACT

Countries across the globe are undertaking afforestation projects in order to manage and restore drylands and combat desertification. Israel has been doing so for over a century, and some of its largest feats have been in planting the Negev, an arid to semi-arid desert. These planted forests are part of a national strategy to restore the Jewish homeland and recover the quality of its deteriorated land. The Yatir Forest, planted in 1964, is the largest of these planted forests, and it has endured in a landscape that many did not think could sustain it. Keren Kayamet L'Israel or the Jewish National Fund (KKL-JNF), the organization responsible for planting, has long touted its successes in afforestation, holding up Yatir and other afforestation projects as exemplars of restoring a degraded landscape. The forest, they argue, has combated soil erosion and stormwater runoff, sequestered surprising amounts of carbon from the atmosphere, cooled the environment for human enjoyment, and provided a new habitat for a rich variety of animals. Other ecologists, though, have criticized not only Yatir Forest but the approach of Negev afforestation in general, maintaining that planting trees fundamentally alters the character of the ecosystem in damaging ways, accelerating soil erosion via the use of heavy machinery, warming the area because of the dark canopy's heat island effect, and pushing out native species because the new forests both fragment and decrease the area of the loess plains and steppe shrublands and allow Mediterranean animal and plant species to colonize land that previously could not support them and thus outcompete the local species. Comparing these sets of arguments side by side exposes the difficulty in assessing ecological management practices in the Negev; the root of their disagreement is in their respective ideas about what the "nature" of this landscape should be. While KKL-JNF sees a treed landscape as indicative of the kind of environmental health the land would have had tens of thousands of years ago, opponents to afforestation see the Negev's loess plains and steppe shrublands as a rare and important landscape worth conserving itself. Attitudes towards the success or lack thereof of afforestation depend on particular understandings of what "nature" is in the Negev. And, these notions about the natural landscape are conditioned by long, culturally dependent histories and political contexts.

"The planting of Yatir Forest, now the largest forest in Israel, started in 1966. It was created at the insistence of Yosef Weitz, a principal visionary of KKL-JNF to use trees to roll back the desert. His single-mindedness gained Weitz the affectionate title "the father of forests". His vision has proved itself: The magnificent Yatir Forest has completely changed the arid landscape of the northern Negev despite opinions of many experts who declared then that the project would totally fail."

- Keren Kayemet L'Israel - Jewish National Fund

"...The afforestation activities in the northern Negev constitute a significant threat to the unique biodiversity of the loess plains and steppe shrublands, while the alleged "environmental" justifications, such as enhancing ecosystem services, are problematic and raise serious doubts."

- Society for the Protection of Nature in Israel

BACKGROUND

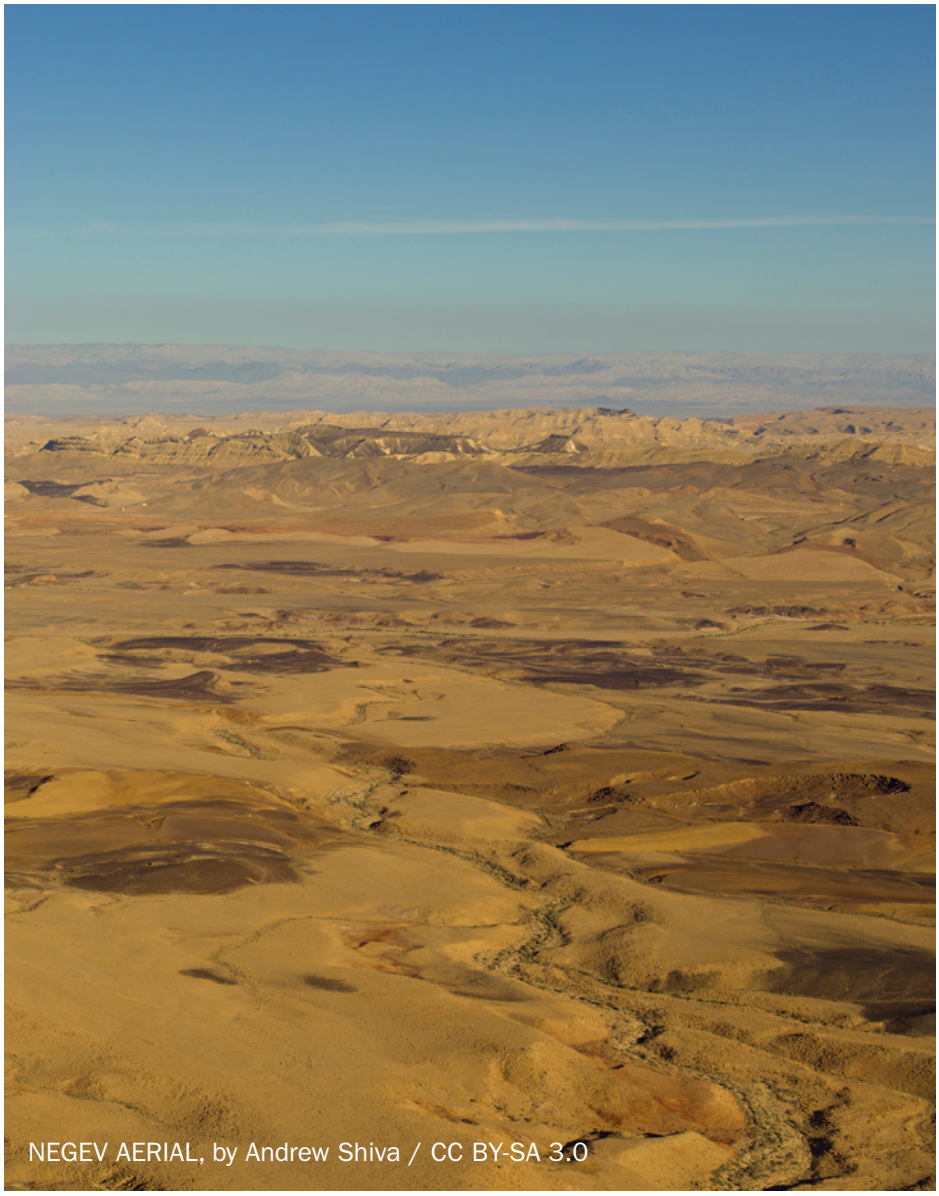
Since its founding in 1901, *Keren Kayemet L'Israel* or the Jewish National Fund (KKL-JNF), a non-governmental organization with strong governmental influence and interaction and perhaps the most influential planning and development body in Israel, has been continually engaged in managing Israel's lands. KKL-JNF was founded to buy land for Jewish development in Palestine, but it quickly expanded its mission and began to focus on "greening the landscape." Now, the organization engages in a multitude of planning activities, including road development, dam and reservoir construction, and open space planning, but its most recognized work has been planting trees. Using money collected from across the globe in its iconic *pushkes*—the small tin collection boxes that are ubiquitous in many Jewish households—and more recently revenue from the Israeli Land Administration (ILA), KKL-JNF has planted an impressive 240 million trees in just over a century, reforesting and afforesting 100,000 acres of land (KKL-JNF).

Today, several countries around the world are implementing afforestation programs to restore the ecosystem functions of drylands and combat their desertification. Drylands make up over 41 percent of the world's landmass, and, as these lands get hotter and drier in the face of climate change and land use change, it is critical that we understand the ecological implications of afforestation (IUCN). While the Israeli Negev is a comparatively small piece of desert, afforestation projects on it have been so intensively planted and monitored that they warrant attention as case studies by which to understand afforestation's effects.

But, evaluating this collection of afforestation projects proves to be a difficult task. While the KKL-JNF, backed by prominent scientists, loudly touts the success of these planted forests (KKL-JNF), other ecologists attack not only the management and implementation of these specific projects but also the approach of afforestation in the Negev as a whole (Rotem).

Why do ecologists and environmental scientists fail to reach a consensus about the merits of Negev afforestation projects?

The Negev desert's precipitation gradient ranges from approximately 50 mm to 300 mm of annual rainfall, or arid (pictured) to semi-arid.



NEGEV AERIAL, by Andrew Shiva / CC BY-SA 3.0

YATIR FOREST, mondoweiss

The Yatir Forest consists primarily of densely planted Aleppo or Jerusalem pines.

"Of all the lands there are for dismal scenery, I think Palestine must be the prince. The hills are barren, they are dull of color, they are unpicturesque in shape. The valleys are unsightly deserts fringed with a feeble vegetation that has an expression about it of being sorrowful and despondent. The Dead Sea and the Sea of Galilee sleep in the midst of a vast stretch of hill and plain wherein the eye rests upon no pleasant tint, no striking object, no soft pictures dreaming in a purple haze or mottled with the shadows of the clouds…It is a hopeless, dreary, heart-broken land…Palestine is desolate and unlovely."

- Mark Twain, **The Innocents Abroad**

"Here before our eyes the remarkable red earth soil of Palestine was being ripped from the slopes and swept into the blue of the Mediterranean to a dirty brown as far as the eye could see. We could well understand how many centuries this type of erosion had wasted the neglected lands. It is estimated that over three feet of soil has been swept from the uplands of Palestine after the breakdown of terrace agriculture."

- Walter Clay Loudermilk, **Palestine: Land of Promise**

RESTORING A DEGRADED LANDSCAPE

Before attempting to evaluate the impacts of afforestation in the Negev, it pays to contextualize it within the broader history of afforestation projects, tree planting, and the history of the Negev landscape in general.

The Negev desert makes up about 55% of Israel's land area, or about 4,700 square miles. The Negev is arid and semi-arid, ranging from 50 mm annual precipitation in the south to up to 300 mm annual precipitation further north. Typically, these figures are not considered enough to cultivate without irrigation. Geographically, the Negev is critical as it is the only land bridge between Africa and Asia.

Inhabited in some form or another since at least four thousand years ago, we know quite a bit about the history of the Negev from various narratives and texts. First, the Negev was occupied by nomadic tribes, but around the ninth century B.C.E., it became an important mining region with Beer Sheva, the city that is still the metropolitan center of the region, as its capital. Around the 4th century B.C.E., the Nabateans were the primary inhabitants of the Negev, and they developed irrigation methods that allowed them to cultivate the land. The Byzantines took over in the 4th century C.E., and economic activity increased throughout the area through the 9th century C.E. The Negev came under Bedouin rule in the 10th century C.E., and so it remained for the next several hundred years until Ottoman rule began.

By the late period of the Ottoman rule over Palestine, explorers to the region found it highly deteriorated from its condition under the Roman Empire. Once fertile, the landscape had undergone dramatic desertification, with coastal dunes moving further and further inland, burying towns and agricultural areas under desert sand. As these dunes expanded, they blocked the flow of water to the sea, which allowed swamps to form inland (Kark and Levin). 19th century travelogues, later corroborated by aerial imagery and soil science, paint a picture of the Negev landscape as severely depleted due to massive soil loss and deforestation.

Aerial images show the impact of afforestation projects, particularly around the southern edge of the West Bank, where the Yatir Forest has delineated a clearly visible physical boundary.

The Negev makes up the Southern part of Israel, and, as is obvious from aerial images, it is mostly semi-arid or arid loess plains or steppe shrublands, with areas of planted forests.

PLANTING TREES IN ISRAEL

Modern tree planting efforts began with a group of German Templars who emigrated to Ottoman-ruled Palestine and established small, European-style enclaves in Haifa. In the 1880s, they planted cypress and pine trees along the main streets of Haifa and Jerusalem followed by some groves of stone pines on the slopes of Mount Carmel. Their efforts, while not enormous in scale, were important in demonstrating that introducing trees to the dry landscape was possible.

In the 1890s Jewish settlers took up their own planting efforts in earnest. They began with eucalyptus, which they imported from Australia to dry up the mosquito-infested marsh areas. The eucalyptus trees take up large amounts of water, which then evaporated through their leaves. Just after, the newly founded KKL-JNF began its own planting projects and experienced a series of small failures.

At this point, there were still several existing forests in Israel, particularly in the North around Mount Carmel. During World War I though, the Ottoman Empire cut down a lot of local trees for the new railway infrastructure of the war. These trees both made room in which the new railway lines could run and provided fuel for the rail's operations. The clearing included 60 percent of the country's producing olive trees, and by the end of the Ottoman rule of Palestine

after the war, less then two percent of the land in Palestine remained wooded (Tal 24-26). The British Mandate recognized the extent of landscape deterioration in Palestine and instituted policies to prevent soil erosion and maintain existing forests as reserves, although these were primarily in the north.

After Israel gained its independence in 1948, KKL-JNF could begin to undertake planting projects at a large scale. Through the 1960s, 70s, and 80s the KKL-JNF experimented with forestry at quite a large scale, learning only by trial and error. As Alon Tal writes, "It is well to look charitably at a great deal of Israel's first forty years in afforestation as an experiment. Not only did it take decades for the results to arrive—but sometimes foresters didn't even know what questions they should be asking" (Tal 89). Still, many forests were planted that still stand today.

The earlier forests were planted densely, and they were not only used for land restoration but also for commercial forestry. Many of these earlier forests still stand today, including the Negev's Yatir Forest, planted in 1964. In the 1980s, though, the KKL-JNF changed its forestation strategy. Ultimately KKL-JNF realized that commercial forestry made no economic sense because of the country's limited rainfall and poor soils. Thus, in the 1990s the KKL-JNF forestry approach shifted to focus more on the environmental and recreational benefits of afforestation.

AFFORESTATION PRACTICES

As KKL-JNF's strategy changes, so did its forestry methods. Over the decades, the organization shifts its techniques to keep step with its changing approach and goals or to respond to new environmental observations and data. Its Negev afforestation projects fall generally into three categories: limans, coniferous forests, and savannization projects (Tal; Brand).

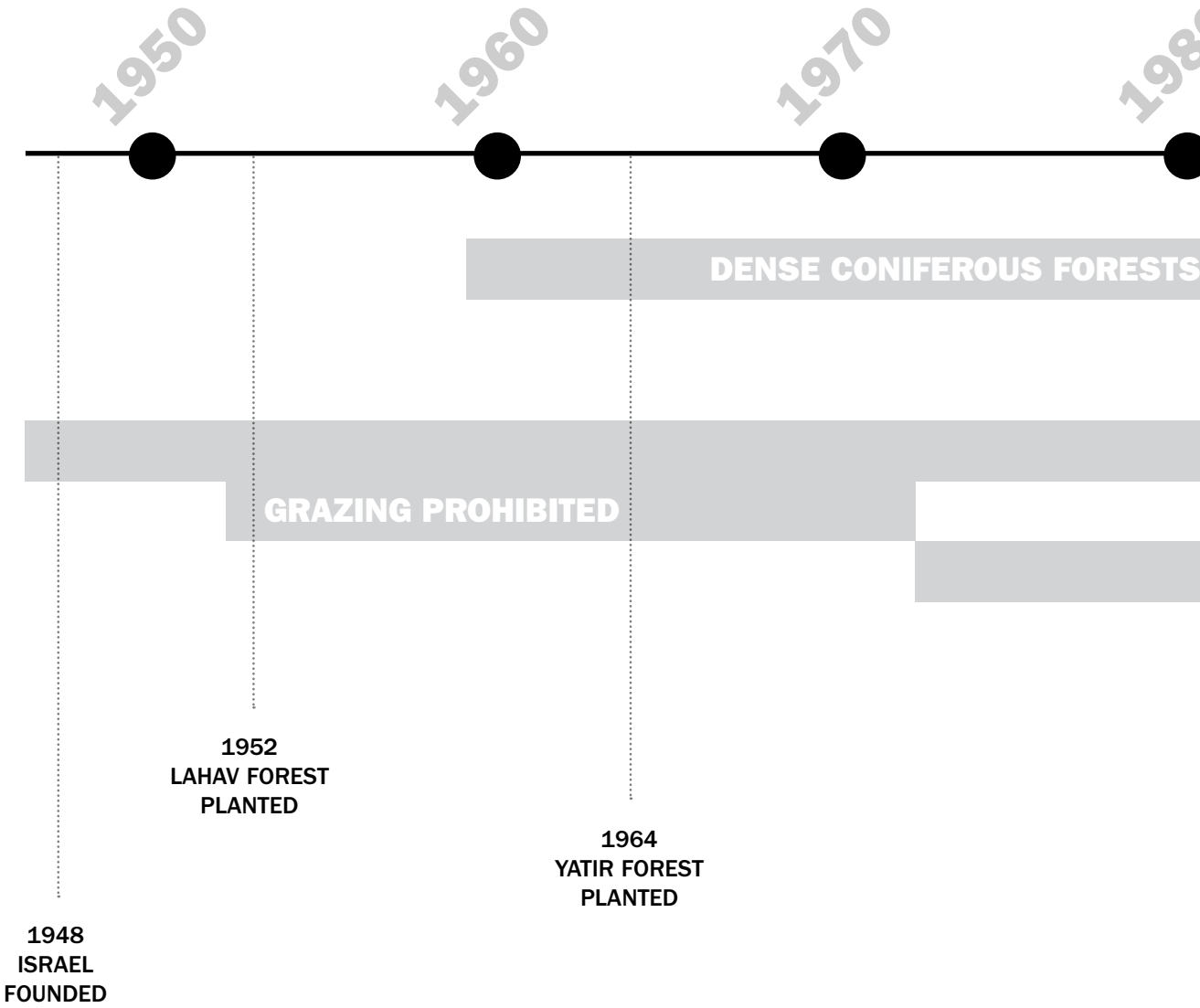
Limans. Limans have been built throughout the Negev since the 1940s. These are artificial estuaries or lakes formed by blocking water flow. The collection of water infiltrates the soil and can sustain several trees. Originally, these trees were planted to shelter travelers through the Negev on their way between Eilat, the city at Israel's southernmost tip, and Northern Israel. At the time, roads were unpaved, and the long trip through the desert could be harsh and even dangerous. As the road to Eilat was improved though, the trip became faster, and so limans became less necessary as protection. Still, nowadays they provide shelter for occasional hikers, camels, and other animals. They can be planted in the most arid areas that only receive less than 100 mm annual rainfall. The area of a liman itself ranges from .2-.6 hectares, but it is supported by a watershed 10-100 times that size. There are some 400-500 of these throughout the desert, but their ecological impact is not as significant as that of the KKL-JNF's other afforestation efforts.

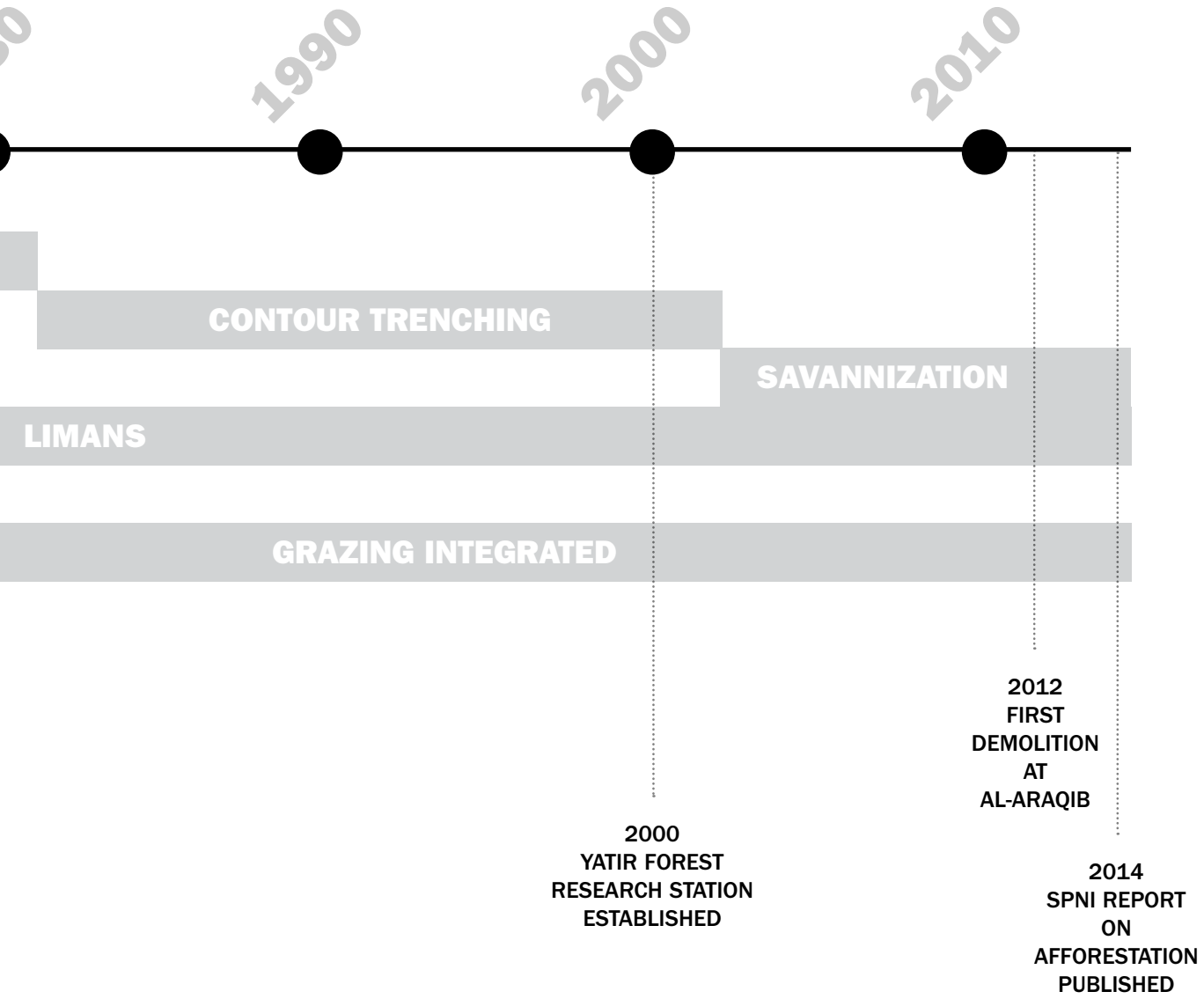
Coniferous forests. Israel's earliest afforestation projects consisted primarily of coniferous saplings, densely planted on north facing hillsides where they were exposed to less direct harsh sunlight and water runoff was sufficient to support them without irrigation. Throughout the 1960s, under the purview of KKL-JNF Forestry Department head Yosef Weitz, 40 million Aleppo pines were planted at this high density. Most of these were in the Yatir Forest. Today, these forests are thinned to a greater extent than in their earlier days to about 300-500 trees per hectare.

Savannization. In the 1980s, Itzik Moshe, the deputy director of KKL-JNF's Southern district branch, found that the Yatir forest was losing a lot of water through surface runoff. He researched the water conservation methods of the Nabateans, which they began to employ in the Negev around the 4th century B.C.E. The Nabateans used a system by which trenches dug along landscape contours would create a collection of land terraces. During floods, water would cascade from one terrace to another and collect in the trenches where it could infiltrate into the ground instead of running off. At about 240 trees per hectare, the plantings using this strategy tended to be much sparser than earlier ones such as Yatir's. The technique of contour trenching was expanded into a broader landscape strategy called savannization, which has been KKL-JNF's standard since the 2000s. Water is channeled to create rich landscape patches, and these patches are planted even less densely—120 trees per hectare—than earlier contour trenching projects. They are also planted with much richer diversity, incorporating native broadleaf trees and fruit trees as well as coniferous species.

Grazing. The attitude of Israeli foresters to grazing has changed greatly over the decades. In 1913, agronomist Aaron Aarohsohn began to research Israel's forests from his new research station. In his assessment, he identified nomadic grazing as the single biggest threat to both Israel's still existing forests and the establishment of new ones (Tal 25). The British mandate also blamed the Bedouin's and Arab *fellaheen's* grazing of livestock for the deterioration of the land and passed laws tightly restricting grazing on public lands, laws that Israel inherited. As a result, grazing was outlawed in Israel's forests through the 1950s and 60s. Eventually, though, it became clear that grazing could reduce the risk of forest fires, to which Israel's dry pine forests were especially prone. Thus, in the 1970s, grazing programs began to be integrated into the forest management plans.

AFFORESTATION STRATEGIES, TACTICS, AND EVENTS




1990
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CONTOUR TRENCHING
SAVANNIZATION
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2014
SPNI REPORT
ON
AFFORESTATION
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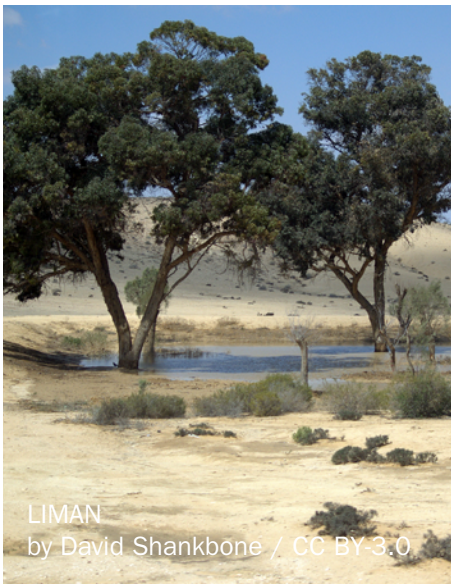
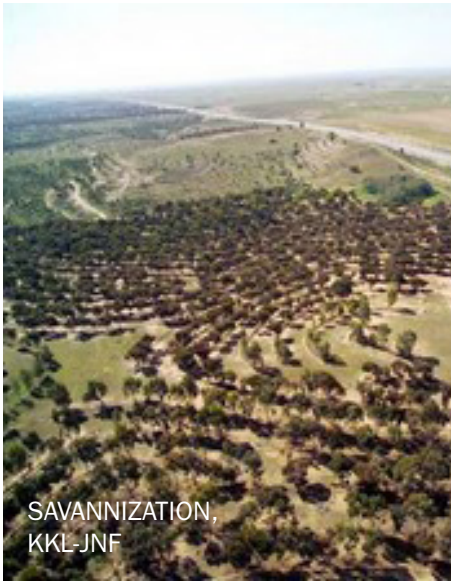
A variety of planting methods have been used throughout the Negev. Their relative densities of planting have changed throughout the years, with earlier efforts being much more densley planted and later ones being much sparser.

DENSE CONIFEROUS FOREST
KKL-JNF



LIMAN
by David Shankbone / CC BY-3.0

CONTOUR TRENCHING,
KKL-JNF



SAVANNIZATION,
KKL-JNF

GRAZING IN YATIR, A. Sergev

Today, grazing is recognized as an integral part of of Negev forestry management. Shown left, flocks control underbrush and reduce the risk of forest fires.

THE POLITICS OF PLANTING

While Israeli planted forests are meant to serve important ecological functions, the motivations for planting them have not been exclusively ecological. Alon Tal finds three main reasons for the State of Israel's prioritization of afforestation projects. First, Zionism has always been attached to a romantic notion of restoring a neglected and declining homeland state—planting trees is part of this mission to restore Israel to its Biblical condition; second, they are valued for their utilitarian economic and environmental value, as they provide important ecosystem services; and finally, the forests served both a symbolic and practical strategic purpose, namely they both staked a claim for the state on otherwise uninhabited land and they covered military installations and movements.

I address the first two motivations throughout, but the latter is important context, as it informs our evaluation of the others. Many have decried KKL-JNF planting practices as land grabs thinly veiled behind ecological goals. One story that illustrates what is at stake in this accusation is the story of Al-Araqib, a Bedouin village in the Negev (pictured above right). Hundreds of thousands of Bedouin live in unrecognized villages on state-owned land in the Negev (picture below right), land that is currently locked up in legal disputes. The state claims it is public, while the Bedouin claim ancestral title and hundreds of years of inhabitation.

One such village, Al-Araqib, was on land designated as part of a planted forest, and as such it was demolished. Its Bedouin inhabitants quickly rebuilt it, after which the government demolished it again, and so a cycle of insurgent building and demolition was started. Thus far, the structures at Al-Araqib have been destroyed and rebuilt over 70 times. At the same time, KKL-JNF is planting trees nearby, trees that are the frequent target of vandalism, and so the dueling practices of building and planting act out a kind of political theater on the desert landscape (Adalah).

"During the interim period 'Holding the land' was a key goal so that it shouldn't go back to foreign hands. Those lands that were abandoned actually ended up reverting to Arab ownership. No activities could achieve this as inexpensively as forests. Just a year or two's work, and the trees didn't need any more help."

- Alon Tal, **All the Trees of the Forest**

UNRECOGNIZED BEDOUIN VILLAGES, mondoweiss

Unrecognized Bedouin villages have spread throughout the Negev, as pictured left. They are often built out of flimsy, cheap, and readily available materials, and they lack public infrastructure.

THE NATURE OF THE LANDSCAPE

Since 2000, the Yatir forest has been carefully monitored via a monitoring station that collects data on a wide array of factors: precipitation, moisture, growth, gas emissions, air composition, and more.

Part of this research has been conducted in the context of global studies on absorbing greenhouse gases via afforestation. Surprisingly, the Yatir Forest has been demonstrated to sequester carbon at the same level as Northern European coniferous forests. Within Yatir's first 35 years, soil carbon content doubled. The primary research team claims that the high levels of carbon dioxide have actually helped the trees adapt to the arid environment, as to absorb what they need they do not need to open their stoma the entire way, which allows them to reduce water evaporation.

KKL-JNF emphasize several other important landscape functions that these planted forests perform. They control soil erosion and increase rainwater penetration into the soil. Between 2001-2005, for instance, the Yatir Forest showed no runoff leading the watershed.

The new forests serve as habitats for birds and other species; new species are moving into them, including gazelles, foxes, wolves, caracals, and even jackals, which are not native to the landscape. KKL-JNF also proclaims the value of these forests for human quality of life: They help reduce the temperature in the summer by providing shade; they increase property values; and they add beauty to the landscape.

As KKL-JNF reports, "The very existence of Yatir Forest, on the edge of desert regions, is a prime ecological instrument, having already halted desertification on the heights northeast of Beersheba. Now, it is an undisputed fact: The forest has significantly affected the quality of its environment." To this organization, there is no doubt that Negev afforestation efforts have been an ecological success, restoring hydrological and vegetative systems to a once barren desert.

These claims to success do not go unchallenged, though. In 2014, the Society for the Protection of Nature in Israel (SPNI) released an extensive report arguing against the use of afforestation in the Northern Negev. The report details the ways afforestation has caused ecological disruption at several scales. At the landscape level, afforestation replaces loess plains and a flat, steppe landscape with embankments, trees, and other vertical structures. Loess plains and steppe shrublands, they argue, are integral and increasingly rare in the Israeli landscape. Arid loess landscapes are typically flat, with few trees, supporting herbaceous grasses and low shrubs, with occasional trees in tributaries. In the Negev, there are several species, some of which are endangered, that are adapted to loess lands—the Beer Sheva fringe-fingered lizard, plants including Coleman garlic and the dark brown iris, birds including McQueen's bustard and the cream-colored courser, and a small rodent called the greater Egyptian jerboa. Semi-arid steppe shrublands are also characterized by low shrubs and grasses. In the Negev, the steppe landscape supports several unique species as well, including birds, such as the spectacled warbler and the long-billed pipit, and a variety of plants, such as Jerusalem sage, mitnan, Jerusalem spurge, thyme, and thorny burnet.

At the level of a patch—a discrete ecological unit with consistent habitat characteristics—afforestation fragments habitats to a greater extent, which makes survival harder for the species that inhabit desert patches. SPNI cites studies of bird populations north of Beer Sheva that have demonstrated declining species richness correlated to decreasing habitat size. Further south, plant species have exhibited similar decline. Afforestation also increases the amount of edges, and thus harmful edge effects by which the presence of the forest negatively affects the neighboring desert landscape, by, for instance, allowing competing species to hop from patch to patch. Thus, altering the habitat conditions allows non-native species such as tits, jays, and crows to expand into the Negev, where they can push out the local species.

At the local level, planting trees requires disrupting the soil surface, especially due to the use of heavy machinery. It also dramatically alters runoff and hydrological characteristics. While other researchers claim that these forests increase soil retention and prevent flooding, the SPNI stresses that the act of planting forests is hugely erosive and that, during the early years after afforestation, the land can undergo enormous furrowing and erosion.

Finally, spatially, afforestation has introduced non-native trees. The new habitat structure has allowed Mediterranean plant species to colonize the planted forests and replace the species that had previously survived in the Negev landscape.

Not only does the SPNI challenge KKL-JNF's assessment of afforestation impacts on water, soil, and species richness, but the organization also questions the sustainability of these forests and their climate change mitigation potential. SPNI does not contest the Yatir Forest's high level of carbon dioxide absorption, but they find that the forest's heating effect due to its dark canopy outweighs its carbon sequestration value and will continue to do so for up to eighty years, when the balance between increased heating and cooling from carbon dioxide absorption would be expected to switch. Moreover, in the face of climate change, the forest's chances of survival are uncertain. Already, they say, no natural regeneration has occurred at the Yatir Forest. Furthermore, the forests need irrigation in their early years, and sometimes even older trees require some irrigation. As the region grows hotter and drier with climate change, the SPNI claims the viability of these forests will decrease further.

These two sets of arguments, for and against Negev afforestation, rely on the same data, the same observations. They do not disagree about the physical details

of what is taking place in the Negev. Rather, the difference lies in the assessment of these details, in a judgment of their value.

As the SPNI reports, forests have not been part of the Negev landscape for over two thousand years. KKL-JNF claims, though, that afforestation efforts are not meant to restore the two thousand year old landscape, rather their goal is to recover the *ten thousand* year old landscape (Tal, *All the Trees*).

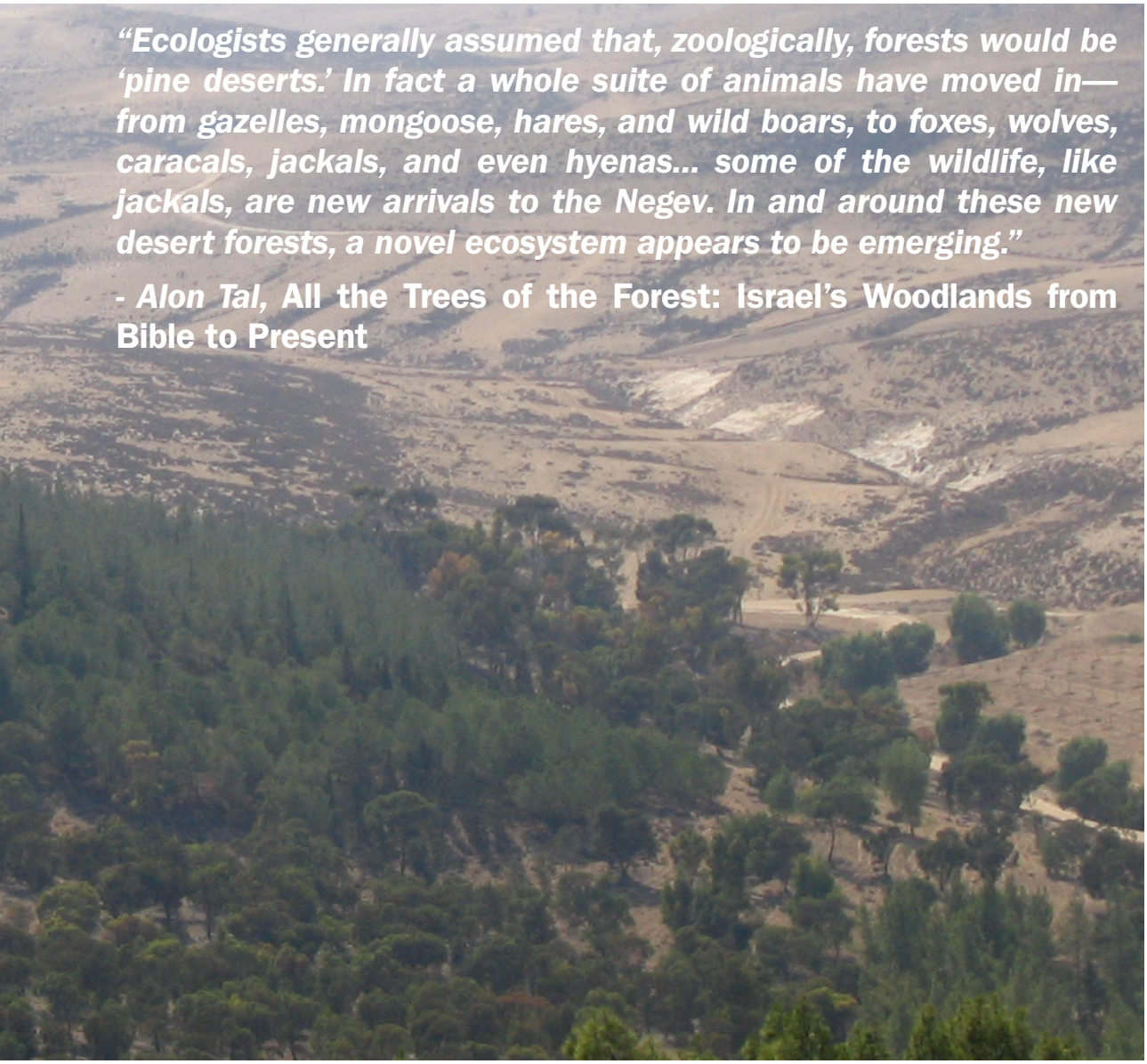
KKL-JNF claims that these new afforestation projects are in the process of becoming a new ecosystem. On the other hand, SPNI claims that "the natural desert ecosystem has undergone years of evolution that has resulted in a community biodiversity that is resistant to various types of stress."

"Historically, trees were found mainly within tributaries, and the majority of the area was characterized by sloping terrain supporting grasslands and shrubs. The few trees that grew here were typical native species to the northern Negev such as Twisted Acacia (Acacia raddiana) and Jujube (Ziziphus spinachristi), and did not include Mediterranean species like Jerusalem [or Aleppo] pine (and certainly not nonnative species like Eucalyptus, Victoria Acacia, etc.)."

- Society for the Protection of Nature in Israel

The dramatic difference between the two landscapes - deserted and forested - is evident. This difference is not only experiential but signifies entirely different ecosystems.

YATIR FOREST, by Okedem / CC BY-SA 3.0



"Ecologists generally assumed that, zoologically, forests would be 'pine deserts.' In fact a whole suite of animals have moved in—from gazelles, mongoose, hares, and wild boars, to foxes, wolves, caracals, jackals, and even hyenas... some of the wildlife, like jackals, are new arrivals to the Negev. In and around these new desert forests, a novel ecosystem appears to be emerging."

- *Alon Tal,* All the Trees of the Forest: Israel's Woodlands from Bible to Present

"Agriculture has occurred in this region for the past few thousand years, however, this agriculture was limited to within tributaries, and trees could not be planted on the dry slopes, which comprises the majority of the area. Furthermore, archaeological, ecological and historical evidence from maps and aerial photographs clearly shows the arid character of the area, and the historic lack of forests. Conversely, evidence suggests that the area was grazed extensively for thousands of years."

- Society for the Protection of Nature in Israel

LOESS PLAINS, by Andrew Shiva / CC BY-SA 3.0

In the loess plains shown at left, trees tend to grow only in tributaries, while the rest of the landscape is characterized by its lack of vertical structures.

CONCLUSIONS: ASSESSING SUCCESS

Ultimately, these disagreements stem from two opposing understandings of what the landscape is and of what its history is. In other words, SPNI and KKL-JNF reach different conclusions because they are comparing to two different baselines. These two baselines are in fact culturally conditioned, politicized conceptions of what the nature of this landscape is. And, the divergence of opinions about these natures means that there is no consensus to be reached about what the landscape *should* be.

Untangling these opinions from their assumptions about the natural landscape is further complicated by their political contexts. The idea of a green homeland, and an aesthetic appreciation for trees, has been central to the Zionist conception of Israel, which has an enormous stake both in planting these forests and in attributing the land's deterioration to the mismanagement of both the Arab *fellaheen* and the Bedouin nomads. The idea of preserving the desert as a scarce natural resource, and placing aesthetic value on its particular visual and experiential characteristics, is in tune with a notion of a landscape that holds the Arab *fellaheen* and the Bedouin nomads as the desert's longtime stewards and indigenous inhabitants.

Does assessing the success of these afforestation projects require reconciling these two conflicting ideas about the Negev landscape? Evaluating the ecological arguments for and against planting forests to restore the Negev provides us with few answers about how to discern the best course of action. The one thing that this case study makes clear is how great an impact our notions of "nature" and "the natural landscape" have in shaping our decisions, our policies, and our physical impact on the land. Understanding the cultural foundations of our environmental policies does not answer the question of whether Negev afforestation is successful or not; on the contrary, it raises more questions than it answers.

How do the different cultural narratives of the Negev's inhabitants form their attitude towards the landscape? What is the relationship between political beliefs about the landscape's history and use and conceptions of its "natural" equilibrium? Should we include the land's human inhabitants in our ecosystem assessment in order to better inform our landscape management decisions? These are large questions, but perhaps following these lines of inquiry can help us approach a clearer understanding of how to manage, preserve, or change the desert ecosystem.

"The argument that this ecosystem has degraded beyond a restorable threshold is highly debatable and unproven. Furthermore, no clear criteria have been set for defining what constitutes a "degraded" ecosystem. Also the connection between grazing and soil erosion, and degradation of the ecosystem, often cited as the reason for afforestation work, is unclear. Some argue that in Israel, a region that has been under heavy grazing pressure for thousands of years, excessive grazing is not an issue. Therefore, if the problem of desertification is intensified by grazing, the best solution would be an appropriate grazing management for preventing soil erosion, and not a complete change in the natural ecosystem."

- Society for the Protection of Nature in Israel

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