



# FOREST

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Sataf, aerial photo, April 2021  
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## English Abstracts

### Canopy height of trees and forests in Israel

Tamir Klein<sup>1, 2</sup>, Eylon Kalev<sup>3</sup>, Michael Sprintsin<sup>4</sup>

Maximum tree height is determined by mechanical stability and the capacity of water transport to the treetop, where water potential is the lowest (hydraulic limitation). Therefore, on a global perspective, tall trees and forests can only exist in wet and humid areas, e.g. in tropical or temperate climates. Indeed, in NASA's forest canopy height map, the world's tallest forest plot, at 69 m, is in Congo. In northern California, single redwood trees (*Sequoia sempervirens*) reach 115.7 m. Water availability, calculated as the difference between precipitation and potential evapotranspiration, is a good predictor of forest canopy height around the globe.

In Israel, as expected from the country's dry climate, tall forests and trees are uncommon. The mean global forest canopy height for such conditions is between 8 and 17 m. According to NASA's map, forest plots taller than 20 m were identified in three major regions: Mount Carmel and Menashe Heights, Upper Galilee (Merom and Western Galilee), and Mount Hermon. These are mostly planted plots of conifers (Pine and Cypress), and broadleaf plots of oak species in Mt. Hermon, Plane in Western Galilee, and Eucalypt species in various sites.

A ground survey found that Israel's tallest tree is *Eucalyptus camaldulensis* growing in a dense plot in the Hula Nature Reserve (51.2 m). The tallest native broadleaf is *Platanus orientalis* growing in Nahal Kziv (25.2 m). *Cupressus sempervirens* growing in Nahal HaShofet is the tallest native species (43.6 m), and the tallest non-native conifer is *Pinus brutia* growing in the Bar'am forest (38.1 m). Considering their high sensitivity and the combination of existing threats, conservation of tall trees in Israel is needed, focusing on native species: *Quercus cerris* on Mount Hermon, *Platanus orientalis* in the upper Galilee, and tall *Cupressus sempervirens* and *Pinus halepensis* in the Galilee and Mount Carmel.

### Consequences of forest management on autumn migrating passerines during stopovers in the Northern Negev

Adi Domer<sup>5, 6</sup> and Eyal Shochat<sup>7, 8</sup>

Each year, millions of birds migrate from their breeding grounds in Europe and Asia, to their wintering grounds in Africa. Many of these birds stop-over in Israel to rest and refuel. Israel is one of the most important stopover areas in the world, owing to its geographic location at the edge of the Sahara Desert, one of the world's largest ecological-barriers for long distance migrants. The fuel for migration is derived from lipids, which are stored subcutaneously in the interfurcular and abdominal regions. Staging at sites with fat-rich food sources might shorten the total migration duration of birds, allowing a safe desert crossing. Atlantic pistachio (*Pistacia atlantica*) trees planted at En Rimon, a grove located in the Lahav forest, bear fatty fruits during autumn; hence, many migrating passerines are attracted to this grove during autumn. Long-term monitoring and research on bird ecophysiology and behavior has been conducted at En Rimon since the early 1990s. In the past few years, we have examined the effect of diet composition and water availability on fat deposition rate of migratory warblers (Sylviidae) and thrushes (Turdidae). Water supplementation increased both fat accumulation rate and gain in body mass. Additionally, supplementing water with simple carbohydrates (sugars) increased the rate of change in body mass. Similar trends were also observed in a controlled captivity experiment with Blackcaps (*Sylvia atricapilla*). Our results shed light on the role of simple carbohydrates and fatty acids in the fat accumulation processes. Therefore, this study has not only theoretical importance, but also applicative relevance, for the site management of En Rimon, as well as other groves in KKL-JNF forests. Based on our results, the KKL-JNF placed permanent water basins and planted various autumn- and spring-blooming plants as supplemental food sources for migrating birds that include all the diet components necessary for optimal fat accumulation.

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## The impact of forests and open landscapes on the physical and mental health of the public



Keren Kaplan Mintz<sup>1, 2, 3</sup>, Ofira Ayalon<sup>4, 5</sup>, Orly Nathan<sup>6</sup>, Tzipi Eshet<sup>7</sup>, Asaf Karavani<sup>8</sup>

The Forest Management Policy of Israel (FMP) provides an obligatory professional basis for managing Israel's forests in a goal-oriented and sustainable manner, while stressing the importance of the cultural services they supply. This article presents a literature review as part of a study funded by Keren Kayemeth LeIsrael - Jewish National Fund's (KKL-JNF) Forestry Division, focusing on the contribution of KKL-JNF forests to the physical and mental health of visitors and on the cultural and psychological services they supply. The development of knowledge in this field, and its adaptation to Israeli cultural, will maximize the contribution to public health by: (1) promoting and encouraging informed and focused recreational activities (2) promoting cooperation with civil society and organizations engaged in health, education, and community activities (3) establishing the importance of forest conservation and its economic benefits in the eyes of the public and decision makers. In addition, based on the importance of promoting physical and emotional health and cultural services to all population groups, the study also examines the differences between Jewish and Arab society in Israel concerning the benefits derived from forests, and provides recommendations from a multicultural perspective.

The article provides a broad survey of the beneficial effects of time spent in forests to health and emotional well-being and of how recreational, cultural, and sports activities benefit their participants. The reviewed literature proposes five main channels that explain nature's contribution to promoting physical and emotional health: reducing stress and cognitive burden; an environment (including nature, in general, and forests, in particular) that encourages physical activity; an environment that encourages social ties; better air quality in nature, and specifically forests; and the effect of natural substances, such as essential oils emanating from the trees that improve health.

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The first part of the article reviews the forest's contribution to emotional and physical health, the effect of being in forests on emotional stress, positive and negative emotions and sense of happiness, the effect of being in forests on level of attentiveness and other cognitive measures, and the impact of visiting forests have on physical health parameters. The second part discusses the factors explaining the contribution of forests to emotional and physical health, and the third part demonstrates applications for promoting well-being based on the research findings.

## Eucalyptus and rain-pools in Israel – Can they function side by side as they do in Australia?



Avital Gasith<sup>9, 10</sup>

The Jewish National Fund (KKL-JNF) introduced the exotic eucalyptus as early as the beginning of the last century. The tree is well established over the Mediterranean region of Israel. In its native land (Australia), the tree is a natural element integrated in aquatic and terrestrial ecosystems with no ill effects. However, increasing evidence indicates that this is not the case outside Australia.

In the past two years, the KKL-JNF has devoted special efforts to protect the endangered ecosystem of rain-pools (temporary ponds) in Israel. The lack of sufficient knowledge regarding the adverse ecological effects of the eucalyptus leads to a lack of awareness regarding the importance of preventing eucalyptus growth near water bodies. The following review aims to inform KKL-JNF foresters and managers of the ill effects of eucalyptus litter in freshwater ecosystems outside Australia, focusing mainly on rain-pools.

Rain-pools are unique ecosystems, seasonally alternating between wet and dry phases. The latter, is an obligatory state that determines the uniqueness of these water bodies, reflected by the specific plant and animal communities that flourish in these ecosystems. Opportunists enjoy the pools in the wet phase only (e.g. aquatic insects); however, the pools are specifically recognized by plants and animals that are adapted to survive the dry phase in dormant stages (e.g. resting eggs – crustaceans; estivation in the ground – amphibians). Although research on the impact of

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eucalyptus litter on rain-pools is lacking, I provide evidence in this context from my long personal experience in studying these ecosystems. The major impacts of accrued eucalyptus litter are the reduction of dissolved oxygen and the release of dissolved organic compounds (humic substances) that color the water dark and have toxic effects. The outcome is a decline of biodiversity, reflected, for example, by the dominance of a few tolerant invertebrates, such as certain crustaceans that can survive because they are able to increase their body hemoglobin (oxygen binding pigment). Others, such as mosquito larvae flourish because they are able to take in atmospheric oxygen. Most of the understanding of the adverse effects of eucalyptus trees in

aquatic ecosystems originate from stream research, mostly abroad and partly in Israel. The findings show that relative to native trees, eucalyptus litter is an inferior food source, less attractive to invertebrates, further limiting pool biodiversity. The answer to the opening question of this review: can eucalyptus and rain-pools in Israel coexist side by side as they do in Australia, is clearly answered: they cannot. Hence, a suitable policy of keeping eucalyptus trees as far as possible from freshwater ecosystems should be adopted in Israel. We may continue to enjoy eucalyptus ecosystem services as long as it does not interfere with the integrity of natural ecosystems.