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ENVIRONMENTAL IMPACTS OF BEEKEEPING PARKS IN GREECE

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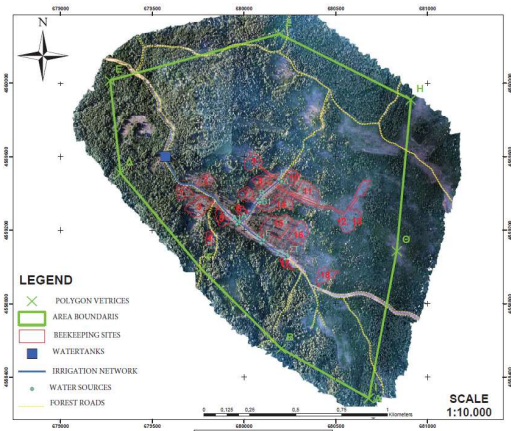
Introduction

In Greece, agricultural and forest land use policy, encourage apiculture in public land. However, traditional bee forages such as the pine forests of Thasos Island, Halkidiki and recently those of Evia Island, reduced dramatically because of forest fires. With 10 hives/km^2 and 147 hives/beekeeper, Greece ranks first in density and number of hives per beekeeper, compared to other European countries. Competitive relations between beekeepers, who are now looking for organized beekeeping sites to place their beehives, are more than ever, a reality. The purpose of this study is to investigate and assess the environmental impacts of a newly emerged category of infrastructure projects for primary beekeeping activities in Greece: the beekeeping parks. In year 2022, the first pilot beekeeping park was constructed at the Dadia-Lefkimi-Soufli Forest National Park.



Picture 1- Topographic map of the first beekeeping park in to the Dadia-Lefkimi-Soufli Forest National Park.

Materials and methods

We summarized the requirements of Governmental Decision no. 170225/14 (135B'), article 9. Adverse and beneficial environmental impacts were assessed through literature review and presented for certain environmental parameters for three project stages: construction, operation and termination. The adverse impacts were assessed based on the following criteria: Probability of occurrence, intensity, synergistic action, reduction ability.

	Adverse Impacts	Beneficial Impacts
None	0	0
Low	1	1
Moderate	2	2
High	3	3

Table 1- Impact score definition.

Results and discussion

We defined the impact score, as presented to the table 1. Table 2, presents in summary, the results of our assessment.

Beneficial impacts which appear mainly in the stage of operation, are no doubt numerous and significant (table 2). The construction of apiary sites with enrichment bee flora, will improve the morphology of the wider area and the beehive siting capacity [6]. Beekeeping activities have a positive impact on the prevention of erosion and stimulate biological diversity, landscape health and leisure [5]. The role of bees as pollinators is of crucial importance in natural habitats [2]. Beekeeping takes advantage of the existing flora and vegetation of an area in a manner that protects the area from deforestation or competition with other alternative land uses [3]. Overall, honey bee, is an insect at the interface between human and ecosystem health as among other things, enhance crop yield and quality, provides humans with raw materials and pharmaceuticals and linked to cultural services such as api-tourism [8]. Beekeeping parks are also beneficial for socio-economic environment both for apicultural and agricultural economics. A study conducted in Regional Unit of Pella, North Greece, demonstrated that the commercial value of pollination services from pollinating insects was estimated at €89.34 million euros [7]. It is worth mentioning that GHG emissions of the honey supply chain were attributed mainly to migratory beekeeping [10]. Beekeeping parks support non migratory beekeeping and thus, reduce GHG emissions by the transportation that would be needed otherwise. The beekeeping parks are also equipped with water tank for watering plants which could also be used for firefighting needs, while beekeepers will be appropriately trained in fire prevention practices [1].

Low intensity ***adverse impacts*** concern those on natural habitats & flora, forests and woodlands, air quality and noise in the stage of construction, and surface and groundwater resources (higher water needs for irrigation) and fauna in the stages of construction and operation, as studies have underlined that honey bees affect native bee communities through floral resource competition [9]. However, mitigation of wild bee populations decline in agro-ecosystems may benefit more by the re-introduction of perennial vegetation found in woodland and grassland habitats comparatively, than the restriction of apiculture itself [11]. Additionally, beekeepers can publicly share their knowledge about pollination, wild bees and biodiversity and help to avoid competition between honey bees and wild pollinators, when selecting the apiary site [4].

Environmental Parameter	Project stage	Adverse Impacts: B.Probability of occurrence	Adverse Impacts: C.Intensity	Adverse Impacts: D. Synergistic action	Adverse Impacts: E. Reduction ability	F. Beneficial Impacts
Climatic and bioclimatic conditions	Construction	0	0	0	0	0
	Operation	0	0	0	0	0
	Termination	0	0	0	0	0
Landscape morphology	Construction	0	0	0	0	0
	Operation	0	0	0	0	2
	Termination	0	0	0	0	0
Soil morphology	Construction	0	0	0	0	1
	Operation	0	0	0	0	2
	Termination	0	0	0	0	0
Natural habitats & flora	Construction	1	1	0	0	0
	Operation	1	1	0	0	3
	Termination	0	0	0	0	0
Forests and woodlands	Construction	1	1	0	0	0
	Operation	1	1	0	0	3
	Termination	0	0	0	0	3
Fauna	Construction	1	1	0	0	0
	Operation	1	1	0	1	3
	Termination	0	0	0	0	3
Bird fauna	Construction	0	0	0	0	0
	Operation	0	0	0	0	0
	Termination	0	0	0	0	0
Spatial planning/land use	Construction	0	0	0	0	0
	Operation	0	0	0	0	3
	Termination	0	0	0	0	3
Functions of Anthropogenic environment (Cities and settlements)	Construction	0	0	0	0	0
	Operation	0	0	0	0	0
	Termination	0	0	0	0	0
Cultural heritage	Construction	0	0	0	0	0
	Operation	0	0	0	0	3
	Termination	0	0	0	0	0
Socio-economic Environment	Construction	0	0	0	0	3
	Operation	0	0	0	0	3
	Termination	0	0	0	0	0
Technical infrastructures	Construction	0	0	0	0	0
	Operation	0	0	0	0	0
	Termination	0	0	0	0	0
Correlation with anthropogenic environmental pressure	Construction	0	0	0	0	0
	Operation	0	0	0	0	3
	Termination	0	0	0	0	0
Air quality	Construction	1	1	0	0	0
	Operation	1	1	0	0	1
	Termination	0	0	0	0	1
Noise	Construction	1	1	0	0	0
	Operation	0	0	0	0	0
	Termination	0	0	0	0	0
Vibrations	Construction	0	0	0	0	0
	Operation	0	0	0	0	0
	Termination	0	0	0	0	0
Electromagnetic fields	Construction	0	0	0	0	0
	Operation	0	0	0	0	0
	Termination	0	0	0	0	0
Surface and Groundwater resources	Construction	1	1	0	0	0
	Operation	1	1	0	0	0
	Termination	0	0	0	0	0
Risk of serious accidents or disasters	Construction	0	0	0	0	0
	Operation	0	0	0	0	3
	Termination	0	0	0	0	0

Table 2- Adverse and Beneficial Impacts of Beekeeping Parks in Greece.

Conclusions

Beekeeping parks are environmental-friendly infrastructures, strongly beneficial for nature conservation and society, with low impact and intensity adverse effects. They also strongly support the development of apiculture at local scale and thus should be supported by agriculture, environmental and forest policy.

References

[1] Χαριζάνης, Χ., Κανταρτζής, Α., Μαρνασίδης, Σ., Αραμπατζής, Γ., & Χαριζάνης, Π. (2022). Μελισσοκομικά πάρκα και κανόνες λειτουργίας τους. Περιοδικό Μελισσοκομική Επιθεώρηση, 285, 297–302.
[2] Aslan, C. E., Liang, C. T., Galindo, B., Kimberly, H., & Topete, W. (2016). The Role of Honey Bees as Pollinators in Natural Areas. Natural Areas Journal, 36(4), 478–488. https://doi.org/10.3375/043.036.0413.
[3] Brown, J. C. (2001). Responding to deforestation: Productive conservation, the World Bank, and beekeeping in Rondonia, Brazil. The Professional Geographer, 53(1), 106–118. https://doi.org/10.1111/0033-0124.00273.
[4] Driesen, K., & Van Gossum, H. (2020). Business and nature working together: Action by the apiculture sector to protect wild pollinators. Arcadis Belgium. https://doi.org/10.2779/04852.
[5] Etxegarai-Legarreta, O., & Sanchez-Famoso, V. (2022). The Role of Beekeeping in the Generation of Goods and Services: The Interrelation between Environmental, Socioeconomic, and Sociocultural Utilities. Agriculture, 12(4), Art. 4. https://doi.org/10.3390/agriculture12040551.
[6] Kantartzis, A., Marnasidis, S., Daoutis, C., Moulogianni, C., Tampekis, S., & Arabatzis, G. (2023). The contribution of the forest road network to the spatial organisation of nomadic beekeeping. International Journal of Sustainable Agricultural Management and Informatics, 9(1), 41–55. https://doi.org/10.1504/IJSAMI.2023.127537.
[7] Marnasidis, S., Arabatzis, G., Malesios, C., Hatjina, F., Kantartzis, A., & Verikouki, E. (2021). Economic valuation of honeybee pollination services. Proceedings of the 6th Conference Economics of Natural Resources & the Environment, 11-12 June 2021 (Virtual). 6th Conference Economics of Natural Resources & the Environment, Virtual. http://envecon.econ.uth.gr/main/eng/images/6th_conference/6th_Conference_Proceedings.pdf.
[8] Papa, G., Maier, R., Durazzo, A., Lucarini, M., Karabagias, I. K., Plutino, M., Bianchetto, E., Aromolo, R., Pignatti, G., Ambrogio, A., Pellecchia, M., & Negri, I. (2022). The Honey Bee Apis mellifera: An Insect at the Interface between Human and Ecosystem Health. Biology, 11(2), Art. 2. https://doi.org/10.3390/biology11020233.
[9] Page, M. L., & Williams, N. M. (2023). Honey bee introductions displace native bees and decrease pollination of a native wildflower. Ecology, 104(2), e3939.
[10] Pignagnoli, A., Pignedoli, S., Carpana, E., Costa, C., & Dal Prà, A. (2023). Greenhouse Gas (GHG) Emissions from Honey Production: Two-Year Survey in Italian Beekeeping Farms. Animals, 13(4), Art. 4. https://doi.org/10.3390/ani13040766.
[11] St. Clair, A. L., Zhang, G., Dolezal, A. G., O'Neal, M. E., & Toth, A. L. (2022). Agroecosystem landscape diversity shapes wild bee communities independent of managed honey bee presence. Agriculture, Ecosystems & Environment, 327, 107826. https://doi.org/10.1016/j.agee.2021.107826.