

Reaping the benefits of agropastoralism: A case study of the Mandra system in Lemnos, Greece

Empowering communities, preserving Biodiversity, and safeguarding Lemnos' distinctive landscape through the Mandra system.



Old Mandra in Tsimandria.
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Mediterranean Institute for Nature and Anthropos.
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/// Context ///

The goal of achieving a harmonious relationship between man and nature is being challenged by the climate crisis and the risks posed by uncertain socio-economic development trajectories. As a result, it is crucial to adopt integrated approaches to establish food production systems that show resilience not only to climate change, but also to broader global changes and resource depletion. This is especially imperative for Mediterranean island communities, which are becoming particularly vulnerable to exogenous pressures.

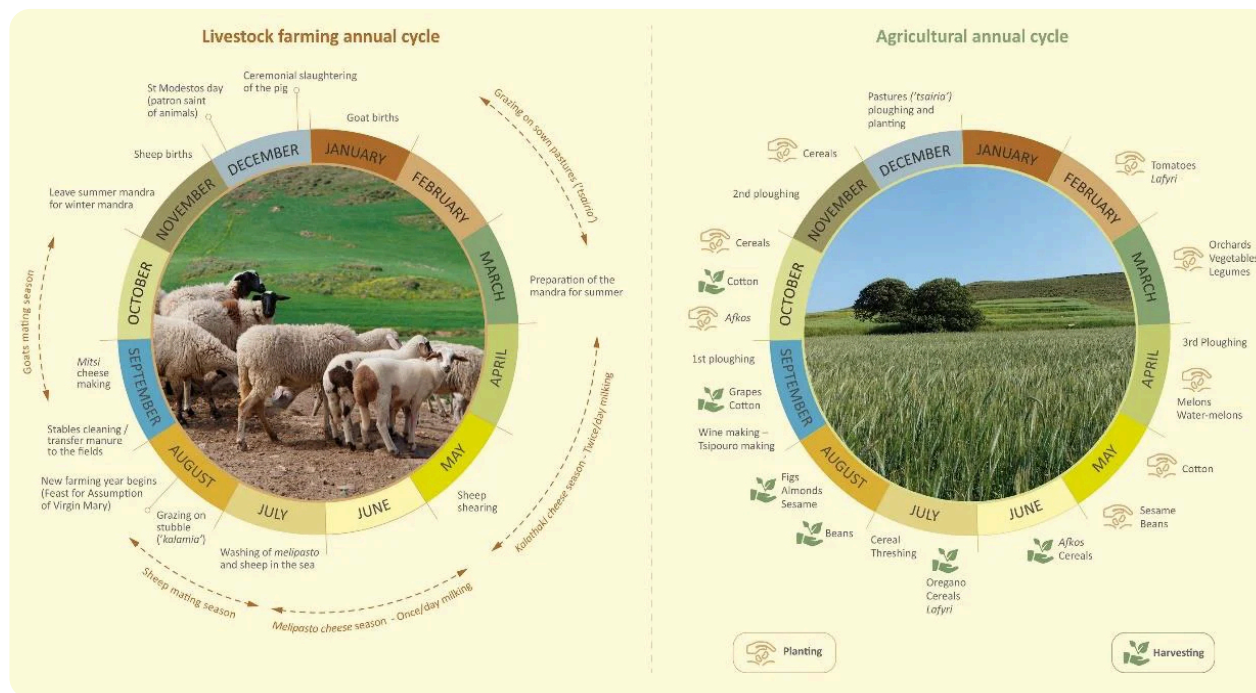
An integrated approach to sustain Lemnos' rural environment, enhance resilience, and tackle resource depletion.

The agropastoral sector can be an essential resource for the well-being and prosperity of the environment and local populations. This importance is particularly evident in Lemnos, where a vibrant farming community is committed to preserving a traditional agropastoral system and maintaining sustainable levels of agricultural production, the "Mandra system".

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The Mandra is a key aspect of Lemnos' heritage that plays a fundamental role in promoting the sustainability of the island's rural environment, addressing some of the main challenges facing Mediterranean agriculture, such as loss of biodiversity, soil degradation, drought, altered fire patterns and scarcity of freshwater resources. It is based on two primary characteristics: diversification and complementarity. Diversification involves the utilization of various crop types and livestock breeds, along with practices such as crop rotation, intercropping, and fallow land usage. These methods serve to preserve and enrich the soil, safeguard biodiversity, enhance landscape structure, and mitigate erosion. Complementarity, on the other hand, revolves around a mixed crop-livestock land use system, wherein livestock graze in arable fields post-harvest, fallow lands, or grasslands. This practice contributes to crop productivity and soil health by providing natural fertilization through green manure and livestock manure. Moreover, it enables farmers to diversify production options, thus minimizing production risks, fostering biodiversity, promoting landscape diversity, and reducing the likelihood of wildfires.



The annual cycle of Mandra practices.
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/// Solution for a Resilient Future ///

In the western region of Lemnos, characterized by rugged terrain and sparse evergreen vegetation, livestock farming predominates, with sheep comprising 83% of the island's livestock. This is supplemented by the cultivation of arable crops, primarily for the production of animal fodder. In contrast, the central and eastern parts, featuring flat landscapes and fertile soils, are dominated by a mosaic of lowland farmland. Here, livestock breeding occurs in smaller areas. These farmlands serve dual purposes: producing fodder for local livestock farms (e.g., barley and oats) and cultivating various commercial (mainly rain-fed) crops like wheat, pulses, vineyards, and sesame.

Local farmers in Lemnos have adapted to the island's environmental and socio-cultural conditions by establishing a mixed crop-livestock land use system centered around the traditional concept of the 'Mandra'. The Mandra encompasses a multifunctional area enclosed by dry-stone walls. Within the Mandra, there are facilities such as animal sheds, farmer's/shepherd's huts (referred to as 'kehayias' by locals), and barns. Surrounding the Mandra are pastures and/or arable lands cultivated with cereal and leguminous crops for both fodder and human consumption. The Mandra serves as the central functional element around which Lemnos' traditional extensive agro-pastoral practices revolve.

Agropastoralism as a sustainable alternative to specialized agriculture. A case study from Lemnos, Greece

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The two main characteristics of this traditional 'Mandra system' are diversification and complementarity.

Diversification occurs by means of the coexistence of cultivated fields and pastures, generating a mixture of land uses even in the predominantly pastoral areas of Lemnos. This diversification results from both the mosaic-like land-use pattern and island-specific practices such as crop rotation between cereals and legumes, selection of native crop types, intercropping, and fallow land management.

These practices have been used in order to sustain soil quality, reduce soil erosion, and increase biodiversity. Crop rotation represents a biodiversity-friendly weed and pest control strategy. In addition, the interchange of cereals and legumes in cultivation allows to preserve fertility of cultivated soils. Microorganisms that form tubercles in the roots of legumes, can capture nitrogen (N) from the atmosphere, enriching the soil with this valuable component. Finally, the practice of fallow land management enhances moisture retention and promotes the colonization of fields by diverse species of wild plants and animals.

Complementarity is evident in the intricate mosaic of land use, where farming and livestock systems are intertwined. Farmers have historically maximised land



Traditional Mandra in Repanidi.
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conditions for a wide array of habitats and species, particularly birds and invertebrates. The production of fodder contributes to the productive use of rural areas and to crop diversity, indirectly protecting natural grasslands from overgrazing. Furthermore, grazing animals on cultivated land not only naturally fertilize the soil with their manure but also facilitate the dispersal of various living organisms across extensive areas, including seeds and other organisms. This grazing activity helps mitigate the accumulation of combustible vegetation, such as grasses and shrubs, while also establishing firebreaks.

Another noteworthy aspect is the management of natural and semi-natural elements. The "trafoi" of Lemnos are uncultivated strips of land, typically elevated, that act as boundaries between fields. These strips serve as biodiversity hotspots with indigenous vegetation, providing habitat and refuge for numerous animal species, particularly invertebrates. Additionally, they contribute to pest control by harboring beneficial insects that prey on pests.

productivity by integrating livestock farming into primary agricultural practices. This approach, characterized by semi-extensive animal husbandry, entails livestock grazing within fallow arable fields or feeding on straw and stubble left on fields post-harvest. Additional grazing needs are met by using neighbouring grasslands.

Free-range grazing has played a pivotal role in preserving natural grasslands, which harbour a substantial portion of European biodiversity. These grasslands offer optimal

/// Always Moving Forward ///

In recent decades, changes in the global food system, combined with European policies, in particular CAP reforms, have to a large extent led to the intensification and simplification of agriculture or the abandonment of rural and less productive areas. Consequently, the industrialisation of agricultural production has led to the decline of traditional farming practices, characterised by labour-intensive, environmentally specific, multifunctional, and complementary land management.

The main challenge facing Lemnos today is to effectively address all aspects of sustainability, striking a delicate

Governance innovations to strike a delicate balance between environmental, social and economic objectives.

balance between conservation and economic objectives through a development strategy tailored to the area. Such a strategy requires a comprehensive approach that:

- Carefully considers local landscape realities and resource management systems.

- Advocates a nuanced set of legal, political and support mechanisms.
- Ensures land tenure and access to crucial resources and inputs (e.g. water, seeds, etc.)
- Cultivate value-added products, including their marketing and branding.
- Encourage the growth of local businesses, agro-tourism, and similar activities.

MedINA (Mediterranean Institute for Nature and Anthropos) has been instrumental, particularly through its involvement in the Terra Lemnia project, concluded in 2022, in fostering a shared vision for the sustainable development of Lemnos. This vision centers on the conservation and restoration of extensive agropastoral practices that not only support local biodiversity but also define the distinctive landscape of the island.

As part of the Terra Lemnia project, MedINA and its partners developed a Guide and Standard of Good Practices, showcasing the traditional farming techniques embraced by Lemnos farmers, which have shaped the island's agricultural landscape. The Standard served a



Terra Vita Certification Label.

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dual purpose: laying the groundwork for the creation of the Land Stewards Network, a voluntary alliance of farmers dedicated to implementing these practices, and establishing the foundation for the Terra Vita Certification System.

This certification is unique, as it seeks to safeguard food produced in Greece using traditional agricultural management methods that benefit biodiversity and the landscape, while also promoting the local gastronomic identity of each region. It encompasses two types of businesses: those in the primary sector of agricultural and livestock production, as well as enterprises in the secondary sector engaged in processing, packaging, and preparing agri-food products using raw materials. Currently, the certification is operational in Lemnos and

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Kythira. Over 40 producers have expressed interest, with 14 already certified and others undergoing evaluation.

Given the challenges faced by the Mandra system, including its low economic viability, and resulting rural depopulation, the market and governance innovations outlined above offer potential solutions to these pressing issues. The certification system holds the promise of revitalizing rural areas economically, motivating individuals to engage in agriculture, and facilitating the intergenerational transmission of traditional knowledge or attracting new entrants to the field. Recognizing the remarkable contributions of farmers and incentivizing them through market-driven mechanisms may serve as a pathway to environmental conservation while ensuring the economic sustainability of agropastoral systems, as evidenced by the initiatives spearheaded by MedINA.

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Further information

All data presented in this factsheet originate exclusively from MedINA publications (<https://med-ina.org/publications/>) and the resources developed within the framework of the Terra Lemnia project (<https://terra-lemnia.net/en/reports/>).

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