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TRANSHUMANCE AND ITS ECOSYSTEM SERVICES: THE FUTURE OF PASTORAL LANDS IN THE ALPS

THE CONTEXT OF TRANSHUMANCE IN THE ALPINE REGIONS OF ITALY

Industrial development in Italy in the last century contributed to depopulating alpine valleys and to concomitant land-parcelling through hereditary succession. Agricultural practices in the mountains, including transhumance, have been gradually and extensively abandoned as a result. The Italian alpine arc is a century-old anthropic cultural landscape which in the last century has been transformed by the reduction of pastoral farming and the intensification of other livestock activities.¹ Farming has been dismissed where terrain and climatic conditions were less favourable, and abandonment has persisted even in more recent years. Seasonal mountain farming, which has not been affected by socio-economic trends, has preserved high-altitude pastures, and made them steady and cheap food resources.

Across the alpine arc, nomadic or semi-nomadic herding has always been important for the preservation of specific habitats, as well as for the "care" of areas in-between urban and rural, or mountains and plains. In the basic scheme of seasonal pastoralism, such as vertical transhumance, flocks are transferred to mountain pastures during the summer. Several farms today still follow this type of animal management strategy. These pasture systems are mainly characterized by sheep grazing, and by continuous migration

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along long trails. These systems have been called, in fact, "perpetual tramping," and herders "permanent wanderers."² In northern Italy, this practice is carried out between autumn and spring, along shallow rivers or in regions with low hills.

Nomadic pastoralism remains one of the simplest methods to farm livestock, based on rustic and resilient sheep breeds. It is a form of extensive farming that, thanks to continuous movement, makes the most out of existing plants in different ecosystems, relying on the shepherd's ability to identify the availability and quality of grazing areas, as well as knowledge regarding the physiology and health of sheep.³ Nomadic sheep farming, while being modest, bears some peculiarities, such as rearing autochthonous breeds found only in the Italian alpine region (e.g., Biellese-Bergamasca and Sambucana for lamb production, and Frabosana-Roaschina for cheese).

The social capital of shepherds is based on a series of shared values, regulations, and codes, as well as on the use of available resources and the management of resulting conflicts.⁴ Since they just own their herds, shepherds do not have full entitlement to the land they use. The itinerant shepherd must therefore be able to act in abandoned territories, such as mountains, as well as industrialized and densely populated agricultural plains. Each transhumant shepherd follows the same route every year, adapting movement to weather and vegetation conditions. Spaces, however, are shrinking due to the growth of urban areas.⁵

The main managerial requirement is feeding the herd. Animals almost exclusively graze spontaneous plant-based forage and crop residues (when farmers allow it). Shepherds may have to integrate diets more consistently when snowfall makes pastures inaccessible. Routes along rivers make drinking easy for animals during the journey. Any veterinary control and animal care operation, such as shearing, is carried out on-site where flocks roam.

Nomadic herding practices, even if affected by industrial farming and limited economic competitiveness, could in a near future prove to be a relevant means for the sustainable development of rural areas through the ecosystem services they provide, as described below.

ECOSYSTEM SERVICES: THE SUSTAINABILITY OF TRANSHUMANCE

The definition of ecosystem services is relatively new. It was ratified in 2005 by the findings of a vast group of experts involved in the Millennium Ecosystem Assessment.⁶ According

to this definition, ecosystem services are direct and indirect benefits people obtain from ecosystems, and are divided into four categories. *Provisioning services* that supply material, water and energy, such as food, wood, fibres, medical and mineral resources, etc. *Regulating services* of several processes that regulate ecological balances, such as those linked to climate conditions and carbon-capture, hydrogeological risk⁷ and other catastrophic events, polluting agents in water, soil and air, diseases or animal and plant invasive species, etc. *Cultural services* including benefits in terms of science (research and innovation), culture (landscape and heritage, art inspiration, folklore), recreation (sports, hiking, wildlife watching) and spirituality (belonging, religious significance) that human beings perceive in relation to different ecosystems. Finally, *supporting services* such as nutrient cycles, soil formation, photosynthesis, and pollination, that allow ecosystems to function and provide the other three types of services.

Regulating, cultural and supporting ecosystem services are often referred to as *non-provisioning services* and are public insofar as they cannot be privatised, unlike provisioning services. Everyone is entitled to use them. Use, moreover, does not make them unavailable to someone else.⁸ While provisioning services are measurable and quantifiable on the market, it is hard to quantify or assign indirect value to non-provisioning services since they are not on the market.

Awareness and promotion regarding provisioning services is commonplace today. Non-provisioning services, on the contrary, are only unconsciously experienced and are not marketed, despite being vital for our wellbeing. The conceptual framework of ecosystem services tries to reconcile ecology (functions of ecosystems and their preservation) and economy (benefits to humanity, in a comprehensive way that is not purely monetary), with the goal of maximising benefits to society, while preserving ecosystems and the processes which engender them. One of the ecosystem services usually associated to transhumance is wildfire prevention, since animals graze shrub species—which easily catch fire—and prevent natural overgrowth. A well-organised pasture also has positive impacts on biodiversity and on the landscape because it slows down snowslides and reduces hydrogeological risk.⁹ Another positive effect is that root structures of plants in pastures capture carbon and contribute to the reduction of greenhouse gasses.¹⁰ Therefore, herders practicing transhumance do maintenance work for the environment by simply managing their flock, but also by keeping pastures

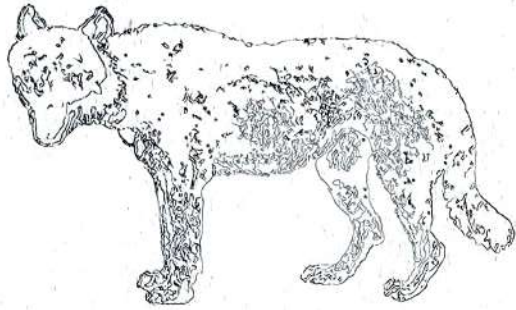




... ancient transhumance routes, data collected by N. Esperquin, 2004, Musée Dauphinois, Grenoble.



SHEPHERD DOG



WOLF

cut and ditches clear, thus contributing to regular surface water regimentation and, overall, keeping an active and lively ecosystem. An interesting example are the long transhumances of large herds of Biellese sheep in the Po reserve and in the hills around Turin, which are part of the MAB UNESCO, Biosphere Reserve.¹¹ From these distribution areas along the Po river, transhumance brings sheep up to alpine pastures, in part with the help of vehicles—specifically, to the Moncenisio pass, on the border between Italy and France. This kind of mobility attests to the strong connection between transhumant herding and the environment. In fact, ecosystem services related to these activities contribute to the formation and preservation of cultural landscapes of great aesthetic qualities.¹²

TRANSHUMANCE AND BIODIVERSITY: HOW TO PROVIDE A BASIC ECOSYSTEM SERVICE

The dismissal of transhumance and related herding activities has caused an evident loss of biodiversity. In terms of plant biodiversity, numerous plant species used for fodder have been lost following the abandonment of small farming activities or management changes of

many alpine pastures. In these areas, nighttime sheltering made necessary by the presence of predators, as well as reduced soil fertility because of the localised distributions of dejections, have impoverished biodiversity. This has also entailed a simplification of vegetation, and compositions of floral species of pastoral and environmental interest have disappeared. On the contrary, in territories where, thanks to herding, human activity has not fully retreated, vegetation has preserved the environment despite fragile hydrogeologic conditions.¹³

Farm-animal biodiversity refers to the number of different breeds per species. An important genetic heritage of breeds has been preserved thanks to transhumance. This is because transhumant breeds have had to be kept *in situ*, thanks to their flexibility even under harsh conditions. These breeds have rather diverse morphological and productive characteristics.

More than thirty sheep breeds and twenty goat breeds are currently farmed in the Alps—most of which are either critically endangered or vulnerable. In fact, the number of these breeds has gradually decreased since the 1950s. Most times, the survival of some of them has solely been the result of what is often the only support to conservation: local tradition and culture. In recent years, many consumers developed a sensibility that has provided new opportunities for local produce to start over and, as a result, to promote several breeds. Rediscovering the links between herding environment, autochthonous breeds and local products is an effective tool in the conservation of threatened breeds, while, together with this awareness in farmers and consumers, public funding has increasingly contributed to conservation efforts through prizes and bonuses (European CAP).¹⁴

ISSUES WITH PASTORAL MANAGEMENT AS AN OBSTACLE TO ECOSYSTEM SERVICES

Recent awareness regarding the importance of these farming practices is triggering renewed interest in the dire problems faced by herding, as an activity with deep historical roots. These issues range from grazing and transit interdictions to pastoral land rent; from the inadequacy of shelters for shepherds to the presence of large predators such as wolves. In this sense, giving herding agricultural, social, ecological and cultural roles in the preservation of hills and mountains is fundamental nowadays. Herding is not an agricultural activity for its own sake: the importance of herding lies beyond its still limited economic relevance.

It's important to bear in mind that today a herding system with ecological goals still

implicates a negative balance between the costs and income of farming. The gap widens when the system needs shelters for animals and, eventually, facilities to produce milk, as well as costs for food during cold periods or unusual and adverse climatic conditions. From the point of view of ecological conservation, transhumance in alpine and pre-alpine environments could be financially more sustainable than other practices. This way of herding, which usually takes place over large areas, produces positive ecological effects—such as enriching biodiversity and lowering the risk of wildfires—which make up for transport and feeding costs in the winter.

In the Italian alps—but elsewhere too—this type of herding responds to management needs that have come up in recent decades since the return of the wolf, which has provoked great damage particularly during transhumance. More than 3,500 predations for almost 9,000 heads, mainly sheep and goats, every year, with an increasing trend are signalled.¹⁵ This critical aspect has already been highlighted by and assessed through a range of effects. Predation has caused management difficulties, such as passive defence methods (bordering, long distances), fewer opportunities for shepherds to use herding resources (reduced timeframes for herding, lack of accessibility to certain areas), as well as the need to monitor diseases due to an increasing lack of animal welfare.¹⁶

Economic damage produced by wolves has pushed farmers to put animals together in fewer, larger flocks, to use electrified fences and livestock guardian dogs, or to radically change herding techniques. This has triggered the abandonment of a considerable extent of pastoral land and, consequently, the exploitation of other, larger areas—which are easier to manage, but actually impact and reduce plant biodiversity.

BETWEEN CONTINUITIES AND NEW EXPERIENCES

In the context of the recent and rapid socio-economic, political and environmental changes, it is vital for companies who practice mountain transhumance to assess the synergies and drawbacks—the so-called “externalities”—of ecosystem services. As well as generating income, complementary activities such as tourism, training, education and handicraft positively impact and increase social sustainability and life-standards for workers.¹⁷

Moreover, many distinctive features of transhumant herding are linked to human life, either to productive functions or cultural services. Ethnographic research in some western

alpine valleys has shown a strong correlation between these activities and the local cultures of families who historically were involved in shepherding and still are entitled to use these resources. In other cases, younger generations have gone back to these activities after their parents had given them up and moved to manufacturing and service industries. There are however “new highlanders” who are turning to herding and becoming the heirs of pastoral local knowledge.¹⁸

Areas poorer in agronomic terms could be recovered through specific herding practices. In these territories, the movement of transhumant flocks would survive despite the high-pressure of domesticated animals. Yet, while considered to be more profitable, domesticated animals are also more dependent on “external” resources which are increasingly less sustainable. Transhumant animals on the other hand are more versatile, since they can live on spontaneous fodder from poor pastures, without presenting particular impediments to health or reproduction.

These advantages were once considered to be “rustic” and now “resilient.” If farming these flocks were oriented toward more specialised productions, and products were set toward recognisable qualitative goals—including wool¹⁹—what is today a neglected product, could benefit local microeconomies. For this reason, there is a need in medium and long-distance transhumance to consolidate the relationship between farmed animals, territory and local production, precisely because of the social, economic, environmental and cultural implications it can foster. At the moment, there is renewed awareness regarding the importance of rationalising uses of herding resources, to manage and preserve territories, ecosystems and landscapes of great ecological importance, beyond the mere economic functions associated with these farming practices.

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- 16 Recent studies have found that it is possible to measure the level of cortisol, and thus of stress, in wool fibres. It is a non-invasive method and alternative to blood or salivary sampling. Overall, this analytic could show when exactly stress has appeared, in the case of a specific event such as a predator attack. Andreas Geß, Irene Viola, Silvia Miretti, Elisabetta Macchi, Giovanni Perona, Luca Maria Battaglini, and Mario Baratta, "A New Approach to LCA Evaluation of Lamb Meat Production in Two Different Breeding Systems in Northern Italy." *Frontiers in Veterinary Science* 7, no. 651 (28 September 2020): 1-11.
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