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Transhumant sheep and goat farming and the use of rangelands in Greece

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Abstract. The transhumant sheep and goat farming system has a dynamic and multidimensional character which is manifested through its social, economic and environmental impact. Concerning its environmental role, the system contributes substantially to safeguarding biodiversity, as well as to the formulation of the structure of grazed rangelands, influenced by the different nutritional habits of the animals. The purpose of this paper is to provide an overview of rangelands used by small transhumant ruminants in Greece, alongside with the main structural characteristics of the system. For each Greek region the areas grazed by transhumant flocks are presented along side with the area grazed by non-transhumant sheep and goats, categorized by altitude. The results demonstrate the importance of transhumance in the management of pseudo-alpine rangelands, but also in the lowlands. The design of an integrated land use strategy is essential for the Greek livestock sector, especially under the light of the new Common Agricultural policy, and transhumance should be an integral part in designing effective rangeland management schemes.

Keywords. Grasslands – Shrublands – Extensive farming system – Landscape.

Élevage d'ovins et caprins transhumants et utilisation de parcours en Grèce

Résumé. *Le système d'élevage d'ovins et caprins transhumants présente un caractère dynamique et multidimensionnel qui se manifeste à travers son impact social, économique et environnemental. Concernant son rôle environnemental, le système contribue de façon substantielle à sauvegarder la biodiversité, ainsi qu'à la configuration de la structure des parcours pâturés, influencée par les différentes habitudes nutritionnelles des animaux. Le propos de cet article est de présenter une révision des parcours utilisés par les petits ruminants transhumants en Grèce, ainsi que les principales caractéristiques structurelles du système. Pour chaque région de la Grèce, les zones pâturées par les troupeaux transhumants sont présentées en même temps que les zones pâturées par les ovins et caprins non transhumants, classés en catégories selon l'altitude. Les résultats démontrent l'importance de la transhumance pour la gestion des parcours pseudo-alpins, mais aussi des terres basses. La conception d'une stratégie intégrée d'utilisation des terres est essentielle pour la filière grecque de l'élevage, en particulier à la lumière de la nouvelle Politique Agricole Commune, et la transhumance devrait être une partie intégrante pour la conception de schémas effectifs de gestion des parcours.*

Mots-clés. *Prairies – Zones arbustives – Système d'élevage extensif – Paysage.*

I – Introduction

Transhumance involves the seasonal movement of flocks and livestock farm families towards mountainous rangelands in the summer and the opposite movement in winter. Seasonal vertical migration is a good strategy to avoid the severe cold winters in the high mountains and the hot summers at lower altitudes, thus taking advantage of natural vegetation in the highlands (Akasbi *et al*.,

2012). The system is particularly suitable for mountainous and less-favoured areas in Greece (Holechek *et al*., 2004; Ragkos and Lagka, 2014); flocks leave the lowlands in early spring and remain in the mountains for up to 6 months, as the abundant and nutritious vegetation there is able to cover the increased protein demands of animals without additional feed provision (Papanastasis, 2002). In the past all movements occurred on foot, thus shaping landscapes across the paths that the flocks followed, but now most farmers use trucks. Transhumance is practiced in a similar way in other Southern European countries (Pardini and Nori, 2011).

The new rural development policy of the EU (Reg. EC/1305/2013) provides incentives for extensive livestock production systems and also supports the sustainable use of natural resources and mountainous rangelands. Income support schemes (Reg. EC/1307/2013) are linked directly to the conformation with environmental protection standards and additional payments are granted to environmentally conscious farmers ("green payments"). The Greek transhumant sector can benefit from this new framework if its proper environmental role is adequately acknowledged and its management is integrated into a strategic land use design framework.

Transhumance in Greece has played an important role in the formulation of the structure of grazed rangelands. Small ruminants grazing in mountainous rangelands –above the timber line- formulated particular landscapes and pseudo-alpine ecosystems, which coincide with alpine and pseudo-alpine Natura 2000 zones (Ispikoudis *et al*., 2002), particularly affecting plant coverage and diversity, the soil and bird species (Ganatsou *et al*., 2006). As a result of this development, transhumance has become important for the management of the sparse dryland vegetation and the conservation of these fragile ecosystems (Koocheki and Gliessman, 2005).

The purpose of this paper is to provide an overview of rangelands used by small transhumant ruminants in Greece, alongside with the main structural characteristics of the system (number of farms and animals reared per Greek Region) and to point out possible implications for the ecosystems affected by the operation of the system in various Greek Regions.

II – Materials and methods

Data from the Greek Payment and Control Agency for Guidance and Guarantee Community Aid (OPEKEPE) for the year 2011 were gathered and analyzed in order to account for the number of transhumant farms and the number of reared animals as well as the acreage of rangelands used by transhumant (T) and non-transhumant (NT) flocks categorized in terms of their altitude. Data were processed with Veterinary Services throughout Greece in order to discern co-located farms, which are cases of more than one farm registered to various members of the same family but are under the collective managerial control of the whole family. The central coordinates of the officially declared pastures were also provided by OPEKEPE (Fig. 1). For further analysis, they were analysed in combination with the ASTER GDEM V2 digital terrain model, which is freely distributed by NASA, and stratified based on their elevation [lowland (L): 0-600 m; semi-mountainous (SM): 600 m-800 m, and mountainous (M): 800 m-3,000 m].

III – Results and discussion

Central Greece and Thessaly are home to more than half of transhumant farms and animals in winter, but in summer the centre of transhumance is shifted towards Macedonia and Epirus (Table 1), where the mean size of flocks is higher than the national average and the number of grazing animals is increased accordingly. On the other hand, the use of mountainous and lowland rangelands by transhumant animals in Peloponnese, Thrace and the islands is relatively balanced.

Table 1. Winter and summer domiciles of transhumant farms

	Winter					Summer				
	Farms	%	Animals	%	Mean size	Farms	%	Animals	%	Mean size
Central Greece	787	25.8	214,328	20.9	272.3	659	21.6	171,151	16.7	259.7
Thessaly	805	26.4	337,967	33.0	419.8	452	14.8	139,785	13.7	309.3
Peloponnese	601	19.7	172,157	16.8	286.5	618	20.3	176,851	17.3	286.2
Epirus	339	11.1	101,796	9.9	300.3	470	15.4	160,666	15.7	341.8
Thrace	96	3.1	32,050	3.1	333.9	96	3.1	32,050	3.1	333.9
Crete	172	5.6	62,493	6.1	363.3	172	5.6	62,493	6.1	363.3
Macedonia	230	7.5	89,004	8.7	387.0	563	18.5	266,799	26.1	473.9
Islands	21	0.7	13,747	1.3	654.6	21	0.7	13,747	1.3	654.6
TOTAL	**3051**	**100.0**	**1,023,542**	**100.0**	**335.5**	**3051**	**100.0**	**1,023,542**	**100.0**	**335.5**

All rangelands are affected by the seasonal changes in the structure of the system (Table 2), but the degree of these implications change among regions. In general, the pressures of transhumance on biodiversity are relatively more important for Thessaly, Peloponnese and Epirus, where the acreage of rangelands grazed by transhumant animals compared to the ones grazed by non-transhumant flocks exceeds the national average. An examination of the use of rangelands by altitude reveals that transhumance plays a constrained but not trivial role in lowland rangelands, as was expected, with the exception of Thessaly; in all other regions, including Central Greece, non-transhumant flocks prevail in the lowlands thus playing the most important role in rangeland development. The situation does not change substantially in semi-mountainous areas, although in the islands the relative importance of transhumant animal is considerable. Nonetheless, when it comes to mountainous rangelands the situation is radically different, as the acreage used by transhumant flocks stands for a substantial part of the total land grazed in most regions.

Table 2. Rangelands grazed by transhumant and non-transhumant flocks

	Total ($x10^3$ ha)		Lowland ($x10^3$ ha)		Semi-mountainous ($x10^3$ ha)		Mountainous ($x10^3$ ha)	
	Non trans-humant	Trans-humant	Non trans-humant	Trans-humant	Non trans-humant	Trans-humant	Non trans-humant	Trans-humant
Central Greece	202.1	32.8	148.4	9.2	23.8	5.0	29.9	18.6
Thessaly	159.4	59.8	84.7	23.2	25.9	5.1	48.9	31.5
Peloponnese	150.8	36.8	58.6	11.8	29.0	5.7	63.2	19.3
Epirus	114.2	48.9	58.5	11.3	22.9	5.7	32.9	31.9
Thrace	79.4	6.2	59.0	4.6	11.0	1.0	9.4	0.5
Crete	220.7	10.3	106.2	5.9	35.2	1.0	79.3	3.5
Macedonia	277.0	51.6	135.8	9.9	43.8	3.9	97.3	37.9
Islands	131.3	6.9	123.3	4.2	6.3	1.4	1.8	1.2
TOTAL	**1334.9**	**253.3**	**774.5**	**80.1**	**197.9**	**28.7**	**362.5**	**144.5**

Due to the structure of the system it can easily be concluded that future developments in the sector entail problems which stem from over- or under-grazing, if appropriate measures are not taken. Over-grazing entails a reduction in the diversity of broad-leaved forbs and legume species (Papanastasis *et al*., 2002), while under-grazing favours the expansion of some types of grasses over the ones more preferred by animals grazing in pseudo-alpine areas.

These implications can also be seen in Fig. 1. The difference between rangeland use by transhumant and non-transhumant flocks is highly visible in the semi-mountainous area but less severe in the mountainous one. It is important to notice, however, that non-transhumant livestock farming is dispersed throughout the country, but transhumance is mainly practiced in the western part of the country. This depicts the changes in the sector, as in the 1950's there were many flocks spending the summer in high elevation rangelands of the central-eastern part of the country. This development brought about a decrease in grasslands in favour of shrublands, ultimately formulating forests (Sklavou *et al*., 2014).

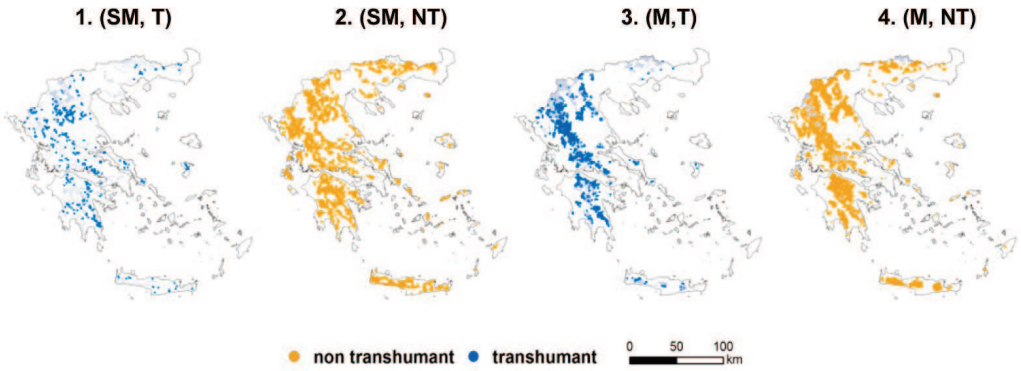

Fig. 1. Use of semi-mountainous (SM, 600 m -800 m) and mountainous (M, 800 m-3,000 m) rangelands by transhumant (T) [(1), (3)] and non-transhumant flocks (NT) [(2), (4)].

IV – Conclusions

Decreases in transhumant flocks grazing in mountainous rangelands threaten these ecosystems in regions where transhumance plays a relatively important role. The particular consequences of over- and under-grazing on pseudo-alpine ecosystems have not yet been fully examined in all Greek Regions. An integrated strategic plan of land uses in Greece, including mountainous rangelands, could develop these valuable natural resources and provide a new dynamic to transhumance.

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