Achieving sustainable small ruminant farming on Samothraki

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Introduction

The Greek island of Samothraki has undergone rapid changes in recent decades.

The consequences are a wide variety of environmental but also social problems which the island community is currently facing. One of the major threats is the sharp increase in free roaming small ruminants since the 1960s, which has led to overgrazing, soil erosion and infrastructure destruction (Biel and Tan 2014). This development threatens the conservation goals of the large NATURA 2000 sites and future core area of the planned UNESCO Biosphere Reserve (Fischer-Kowalski et al. 2011), covering more than two thirds of the mountainous island and parts of the adjacent marine area (Fig.1). In this presentation, we focus on our work with the local farming community in order to reduce grazing pressure on the island's ecosystems and restore areas highly affected by erosion.

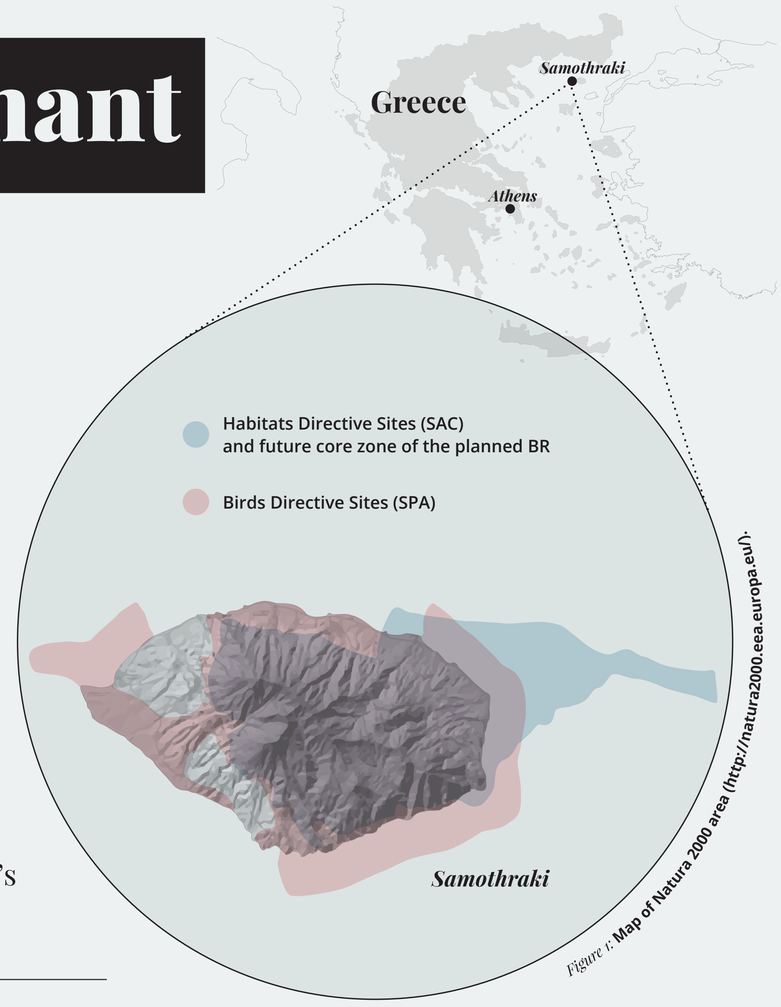

Figure 1: **Map of Natura 2000 area (http://natura2000.eea.europa.eu/).**

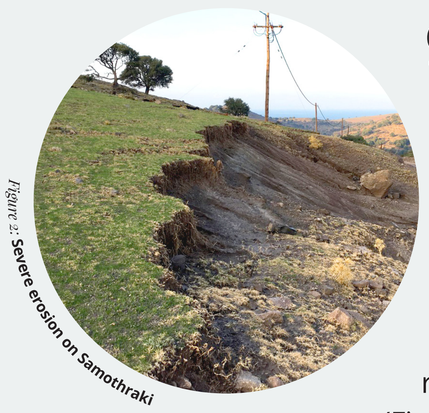

Figure 2: **Severe erosion on Samothraki**

OVERGRAZING & EROSION

Our findings indicate that particularly since the introduction of the EU "headage payment" for small ruminants around 1990 (Hadjigeorgiou 2011), farmers have increased their animal numbers to unprecedented levels but initially did not increase the feed supply (Fig.3). This resulted in a feeding gap during the 1990s (Fig.4) and consequently in unsustainably high grazing pressure on the local ecosystems (Fetzel et al. Under revision). Regionally obscure subsidy schemes, the lack of proper production and marketing chains for livestock products and the ongoing Greek financial crisis has increasingly put farmers in an economic deadlock situation. How to achieve a sustainable agricultural system is one key question for the future sustainable local development of the island.

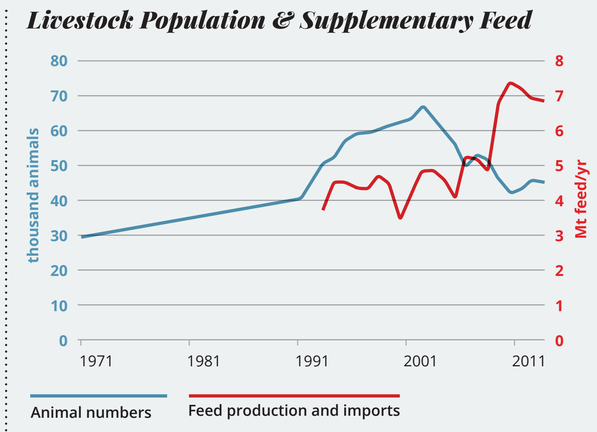

Figure 3:
Small ruminant population development and fodder supply on the island of Samothraki from 1971 to 2013. Source: Small ruminant population numbers and local feed production (EL.STAT); Feed imports (Expert interview 2017).

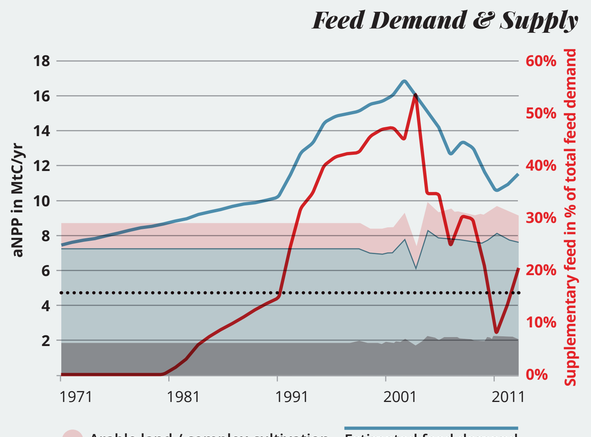

Figure 4:
Feed balance in MtC/yr. Feed demand estimations are based on the average nutritional requirements for a good animal condition, feed supply estimations are based on local NPP (assumption of sustainable use levels). The cross-compliance maximum refers to the feed demand of the maximum animal density of 1.4 head/ha (Hadjigeorgiou 2011) allowed by the EU. The fraction of supplementary feed represents the difference between the feed demand covered from the presented sources and the total feed demand.

RESEARCH OBJECTIVES

ISLAND SOCIAL METABOLISM
Modelling a sustainable small ruminant system on the island level

AGRICULTURAL TRANSFORMATION
Work with farmers towards more sustainable farming practices with fewer animals

ECOSYSTEM RESTORATION
Restoring overgrazed areas with Sown Biodiverse Pastures

SECURING FOREST REGROWTH
Involving local citizens in the ecological assessment and rehabilitation of forests

TRADITIONAL MEETS DIGITAL

We are currently conducting an App-guided survey (Fig.5) with small ruminant farmers on Samothraki.

The above-mentioned data enable us to carry out a socio-metabolic assessment (Haberl et al. 2004) of the local livestock system in order to outline scenarios towards more sustainable farming practices on a system level.

Simultaneously, we encourage social learning among local farmers, by engaging them into a process of better coordination and collaboration.

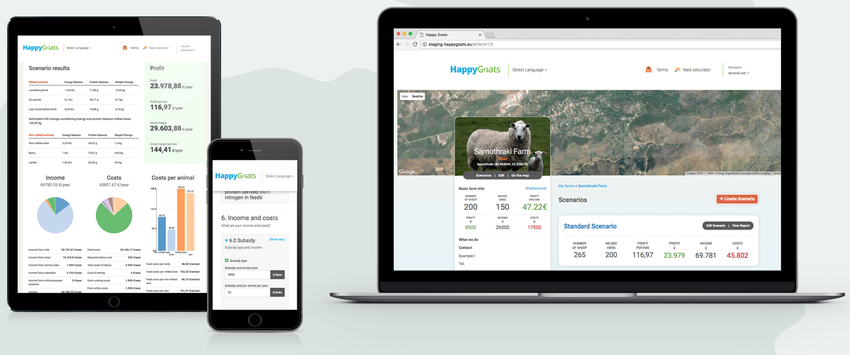

Figure 5:
The Happy Goats App is a decision support tool for small ruminant farmers, developed in collaboration with the Aristotle University Thessaloniki and the Athens based firm Integrated ITDC (www.happygoats.eu).

INITIAL RESULTS

ANIMAL NUMBERS Farmers could do better with fewer animals and higher per animal production – this is confirmed by the first results from the Happy Goats App guided interviews.

SUBSIDY SCHEMES Most farmers do not know how subsidies are being calculated and payed and often still believe the headage payment to be in place.

Figure 6: **Free roaming goats on Samothraki.**

DAIRY CAPACITY All milk-producing farmers depend on one single dairy that lacks capacity for all potentially produced milk (Fig.7). If farmers are too far away from the dairy, it is impossible for them to sell their milk commercially (Fig.8).

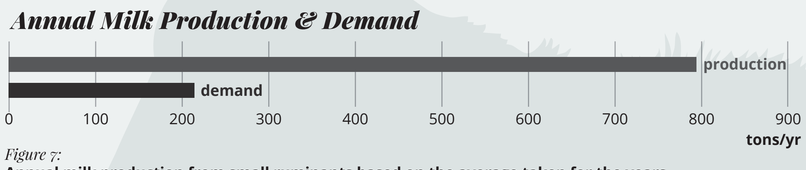

Figure 7:
Annual milk production from small ruminants based on the average taken for the years 2011-2013 (EL.STAT); Annual milk demand from the local dairy (Expert interview 2017).

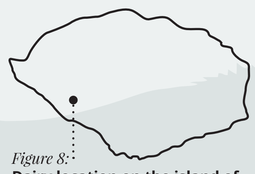

Figure 8:
Dairy location on the island of Samothraki.

PRICE FOR MEAT The lack of local farming cooperatives makes farmers vulnerable to downward pressures of price for meat in negotiations with buyers.

ANIMAL HEALTH Most of the free roaming animals are severely underfed.

SEEDS FOR CHANGE

In collaboration with the University of Lisbon, its private partner Terraprima (http://www.terraprima.pt) and interested local farmers, we are performing a pilot project on Samothraki: sowing SBP on selected plots.

So far, annual pastures have been applied on 6 plots with a total of 3.1 ha, and permanent pastures were applied to 7 plots with a total of 4.2 ha. The farmers were highly satisfied with the outcome.

Depending on available funding, we plan to sow permanent pastures on a larger scale. This will increase the island's forage production and allow for a reduction of grazing pressure on sensitive areas.

Figure 9: **Sown Biodiverse Pastures (SBP) are rich in legumes, consist of 6-20 different species, provide a two-to-five-fold increase in biomass production and have been tested sufficiently in Mediterranean climate zones. The seed variety used in the permanent pastures always contains the legume Trifolium subterraneum (1), the grass Lolium multiflorum (2) and a variation of other leguminous species (examples 3-6).**

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