

Ecosystem services and socio-economic benefits of Mediterranean grasslands

Edited by:

A. Kyriazopoulos, A. López-Francos, C. Porqueddu, P. Sklavou



OPTIONS méditerranéennes

SERIES A: Mediterranean Seminars
2016 – Number 114



CIHEAM

CIHEAM

**Centre International de Hautes Etudes
Agronomiques Méditerranéennes**

**International Centre for
Advanced Mediterranean Agronomic Studies**

Président / President: Masum BURAK
Secrétaire Général / Secretary General: Cosimo LACIRIGNOLA

11, rue Newton, 75116 Paris, France
Tél.: +33 (0) 1 53 23 91 00 - Fax: +33 (0) 1 53 23 91 01 / 02
secretariat@ciheam.org
www.ciheam.org

Le Centre International de Hautes Etudes Agronomiques Méditerranéennes (CIHEAM) a été créé, à l'initiative conjointe de l'OCDE et du Conseil de l'Europe, le 21 mai 1962. C'est une organisation intergouvernementale qui réunit aujourd'hui treize Etats membres du bassin méditerranéen (Albanie, Algérie, Egypte, Espagne, France, Grèce, Italie, Liban, Malte, Maroc, Portugal, Tunisie et Turquie).

Le CIHEAM se structure autour d'un Secrétariat général situé à Paris et de quatre Instituts Agronomiques Méditerranéens (IAM), localisés à Bari (Italie), Chania (Grèce), Montpellier (France) et Saragosse (Espagne).

Avec au cœur de son action trois missions fondamentales (formation, recherche, coopération), le CIHEAM s'est progressivement imposé comme une référence dans ses domaines d'activité : l'agriculture, l'alimentation et le développement rural durable en Méditerranée.

Founded in 1962 at the joint initiative of the OECD and the Council of Europe, the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) is an intergovernmental organisation comprising thirteen member countries from the Mediterranean Basin (Albania, Algeria, Egypt, France, Greece, Italy, Lebanon, Malta, Morocco, Portugal, Spain, Tunisia and Turkey).

CIHEAM is made up of a General Secretariat based in Paris and four Mediterranean Agronomic Institutes (IAM) located in Bari (Italy), Chania (Greece), Montpellier (France) and Zaragoza (Spain).

In pursuing its three central missions (education, research and cooperation), CIHEAM has become a reference in its fields of activity: Mediterranean agriculture, food and sustainable rural development.

IAM **Instituts Agronomiques Méditerranéens** **Mediterranean Agronomic Institutes** **Bari - Chania - Montpellier - Zaragoza**

IAM-Bari

Dir.: Cosimo LACIRIGNOLA
Via Ceglie, 9
70010 Valenzano, Bari, Italy
Tel.: (+39) (080) 4606 111 - Fax: (+39) (080) 4606 206
iamdir@iamb.it
www.iamb.it

IAM-Montpellier

Dir.: Pascal BERGERET
3191, Route de Mende
34093 Montpellier Cedex 5, France
Tel.: (+33) (0)4 67 04 60 00 - Fax: (+33) (0)4 67 54 25 27
pascal.bergeret@iamm.fr et/and sciuto@iamm.fr
www.iamm.fr

IAM-Chania

Dir.: Giorgios BAOURAKIS
P.O. Box 85
73100 Chania, Crete, Greece
Tel.: (+30) 28210 35000 - Fax: (+30) 28210 35001
baouraki@maich.gr
www.maich.gr

IAM-Zaragoza

Dir.: Javier SIERRA
Avda. Montañana, 1005
50059 Zaragoza, Spain
Tel.: (+34) 976 716000 - Fax: (+34) 976 716001
iamz@iamz.ciheam.org
www.iamz.ciheam.org

Rangeland rehabilitation in the southern part of the Mediterranean basin

M. Louhaichi¹, F. Ziadat², S. Ates¹ and C. Zucca¹

¹International Center for Agricultural Research in the Dry Areas, PO Box 950764, Amman (Jordan)

²FAO, Viale delle Terme di Caracalla, Rome (Italy)

e-mail: m.louhaichi@cgiar.org

Abstract. Rangelands of the southern part of the Mediterranean basin have for centuries provided forage for livestock and wildlife. Now their role as providers of ecosystem services and goods is being widely recognized by local governments and international organizations. But the widespread degraded ecological status of rangelands is causing increasing concern. Over-exploitation of rangeland resources, land tenure issues, conversion of rangelands into rainfed cropping systems, and climate change including drought are the main drivers for this degradation. Several governments are becoming increasingly aware of the magnitude of the problem and have begun to address the root causes through holistic approaches. However, there are major challenges in tackling the issue: the importance of rangelands is generally marginalized, conservation measures are incomplete and often ineffective for the sustainable restoration of degraded rangeland resources. In addition, given the low and slow return on investment, governments are not able to finance large-scale projects to effectively restore and develop rangeland natural resources. Nonetheless, there are ways to improve the situation. In this paper, we propose how to go about this. Not least, we outline how understanding and managing the constraints to widespread adoption of sustainable practices is key to the successful out-scaling of interventions with known potential.

Keywords. Drylands – Climate change – Regeneration – Resting – Participatory approach.

Réhabilitation des parcours dans la partie sud du bassin méditerranéen

Résumé. Les parcours situés au sud du bassin méditerranéen ont fourni pendant des siècles du fourrage pour l'élevage et la faune. Récemment, leur rôle en tant que fournisseurs de biens et services écosystémiques est largement reconnu par les autorités locales et les organisations internationales. Toutefois, leur statut écologique très dégradé est de plus en plus alarmant. Surexploitation, problèmes fonciers, conversion des terres de parcours les plus riches en culture pluviale et les changements climatiques, y compris la sécheresse, sont les facteurs les plus importants responsables de leur dégradation. Plusieurs gouvernements sont de plus en plus conscients du problème et ont commencé à traiter les causes en utilisant des approches holistiques. Néanmoins, il existe des obstacles majeurs; l'importance des parcours est marginalisée, les mesures de conservation sont incomplètes et souvent inefficaces, et peu d'attention est attribué à la connaissance scientifique pour la restauration durable de ces ressources. Étant donné le faible et lent retour sur l'investissement, les gouvernements ne sont pas en mesure de financer des projets de grande envergure pour restaurer et développer les ressources pastorales d'une manière efficace. Dans ce contexte, nous proposons des solutions pour améliorer la situation. En effet, comprendre les causes de dégradation nous permet de surmonter les obstacles et atteindre une adoption à grande échelle des mesures durables et prometteuse.

Mots-clés. Zones arides – Changement climatiques – Régénération – Repos – Approche participative.

I – Introduction

Rangelands of the southern part of the Mediterranean basin are very important ecologically, economically, and socially. They provide a range of ecological services, including nutrient cycling, pollutant filtering, and biodiversity preservation. They also serve as a resource base for livestock production – a key source of income and livelihoods. Additionally, they hold special cultural and heritage value for pastoral and agro-pastoral communities (Sincich, 2002).

Much of the southern part of the Mediterranean region is arid or semi-arid with shallow and low-fertility soils and poor plant cover. Over time, various human activities have altered the natural vegetation cover, which mainly comprises very sparse steppe species (Louhaichi *et al.*, 2012a). During the last few decades, complex political, social, and environmental factors and management practices have degraded large areas of rangeland; this calls into question rangelands' long-term sustainability under current usage practices. The major causes of rangelands degradation, habitat change, and biodiversity loss are conversion of natural ecosystems to farmland, exploitation through selective grazing, fuel wood removal, charcoal production, and livestock overgrazing (Reyers, 2004). Disturbances caused by these activities and, by climate change, influence ecosystem dynamics, structure, and composition. This occurs at both local and regional scales (Hubbell *et al.*, 1999).

II – Challenges and constraints

1. Weak institutional and policy arrangements

Communication and coordination between the various institutions servicing and supporting grasslands in rangeland regions has tended to be weak, with agro-pastoral communities rarely being consulted when projects are first formulated. As a result, the majority of past efforts directed to the development of grasslands have been mostly technical with no consideration for social aspects such as tribal rules and land tenure. Nowadays, as decentralization and local empowerment gain momentum, community participation can no longer be ignored. Further, land tenure in rangeland regions is a major issue in the management and restoration of degraded, extensive communal rangelands (Louhaichi and Johnson, 2008). Uncertainties of land tenure and land-use rights cause agro-pastoralists to feel insecure, with little incentive for adopting stewardship responsibilities of protecting resources within the local ecosystem.

2. Climate change

Grassland ecosystems in the southern part of the Mediterranean basin are sensitive to changes in climate and land use. Such changes have meant that, over the last three decades, permanent grassland areas have reduced by 5% in North Africa, while in West Asia they have increased by 18%. Climate change increases the negative impacts of drought on rangeland vegetation. These impacts include low levels of emergence of annual species, changes in phenology and the timing of reproduction, reduced biodiversity, low levels of plant cover, and a decline in productive capacity in pastoral systems (Ouled Belgacem and Louhaichi, 2013). Climatic changes could also lead to a shortage of water resources, widespread land degradation, and increased desertification. These threats would impact negatively rangeland biodiversity, the life cycle of plants, and crop/livestock productivity. Overall, climate change may greatly reduce the resilience of rangeland ecosystems.

III – Sustainable practices

1. Monitoring and assessment

Any rangeland rehabilitation and management activity should be preceded by an inventory, an assessment, and appropriate mapping of the condition and use of the rangeland. To ensure that these lands can provide sustainable products for future generations, their ecological condition should be monitored against specific standards. Both short- and long-term monitoring are necessary – in order to account for the dynamic nature of plant community responses to climate fluctuations (drought and wet conditions) and manmade disturbance. Advances in technology

such as GIS and remote sensing enable large areas to be rapidly mapped and monitored if appropriate technologies are used (Louhaichi *et al.*, 2012b).

2. A participatory approach

Sustainable rehabilitation of degraded rangelands that are dominated by collective and/or tribal ownership is a challenging task for the southern part of the Mediterranean region. The policy responses to this complex issue have been sectorial and fragmented. Previously, the 'top-down' approach, which puts forward technical solutions and neglects the social context, was the more common form of intervention. But in response to frequent failures of the top-down approach, international development turned during the 1970s towards 'participatory development' as an alternative approach. National governments have been slow to adopt this participatory approach, but recent experiences suggest that integrated and participatory approaches may lead to more sustainable resource management. This kind of development aims to organize people on a decentralized basis and to apply participatory tools in order to effectively empower local people (Nefzaoui *et al.*, 2014).

3. Water harvesting

Water is an important resource in arid and semi-arid rangelands, but often it is wasted or allowed to erode the landscape. One way to address this is through simple, cost-effective water harvesting techniques (WHT) that can be easily adopted by pastoral and agro-pastoral communities. This practice has been used for thousands of years in arid and semi-arid regions of the world to supplement scarce water resources. In general, the interventions are used to increase soil moisture content, vegetation cover, and productivity can improve the productivity of rainwater, and maintain productive and sustainable agro-pastoral systems in marginal environments (Van Wesemael *et al.*, 1998). WHT can also control soil erosion and reduce the impact of drought. Experience of the last two decades provides increasing evidence that WHT can mitigate the increasing variability of rainfall.

4. Grazing management

For centuries, pastoral nomads were the main users of land in arid and semi-arid parts of the southern Mediterranean region. The basic management problem for most pastoralists is that there is rarely enough forage and water in one place to sustain the pastoral community and their livestock year-round; becoming mobile was the only way for these communities to meet their livestock feeding needs (Abu-Zanat *et al.*, 2005). More recently, the nomadic system has been disappearing in most of the region due to changes in agricultural practices and climatic factors. In addition, there has been a major shift in the attitudes of pastoralists towards an increasing interest in educating their children and in benefiting from social services. Under appropriate management, livestock grazing can be manipulated to enhance not only natural vegetation productivity, but also other rangeland resources such as soil and water.

Furthermore, there are several efficient techniques for rangeland improvement such as using herbaceous annual and perennial species, shrubs, and trees are continually being developed. Techniques with great potential but requiring fine-tuning are deferred grazing, soil surface preparation (e.g. scarification and pitting), and direct seeding (Louhaichi *et al.*, 2014).

IV – Conclusions

Reversing the trend of rangeland degradation, and increasing forage production in a sustainable manner, requires better management. If management and rehabilitation are to be sustainable in the long term they must also be conducted in a participatory manner. Using this approach, developments that improve the productivity of rangelands involve a set of policies to assure

pastoral communities that they will benefit from the improvements made. Ownership, whether in legal terms or in practice, needs to be cultivated and respected so that pastoralists become guardians of their resource base, thus encouraging long-term sustainable management. Further research on land tenure arrangements is required to encourage best management practices throughout the rangelands. Pastoral communities and governments need to clearly identify the rights and responsibilities of all rangeland users. This can ensure that those with the right to manage land are aware of their management responsibilities.

Acknowledgements

This research was supported by the International Center for Agricultural Research in the Dry Areas (ICARDA) and the CGIAR Research Program on Dryland Systems (CRP DS).

References

- Abu-Zanat M.M., Migdady H.A. and Tabbaa M.J., 2005.** Production systems of small ruminants in the Middle Badia of Jordan. In: *Dirasat, Agricultural Science*, 32(2), p. 205-214.
- Hubbell S.P., Foster R. B., O'Brian S.T., Harms K.E., Condit R., Wechsler B., Wright S.J. and de Lao S.L., 1999.** Light-gap distribution, recruitment limitation and tree diversity in a neotropical forest. In: *Science*, 283, p. 554-557.
- Louhaichi M. and Johnson D.E., 2008.** Rangeland management policy in western North Africa. In: *Abstracts of Papers, 61st Annual Meeting Society for Range Management*, Reno, Nevada.
- Louhaichi M., 2011.** ICARDA's research strategy for rangeland ecology and management in non-tropical dry areas. In: *Rangelands*, 33(4), p. 64-70.
- Louhaichi M., Clifton K. and Hassan S., 2014.** Direct seeding of *Salsola vermiculata* for rehabilitation of degraded arid and semi-arid rangelands. In: *Range Management and Agroforestry*, 35(2), p. 182-187.
- Louhaichi M., Ghassali F., Salkini A.K. and Petersen S.L., 2012a.** Effect of livestock grazing on rangeland plant communities within Syrian landscape depressions. In: *Journal of Arid Environments*, 79, p. 101-106.
- Louhaichi M., Johnson M.D., Clark P.E. and Johnson D.E., 2012b.** Developing a coherent monitoring system for Mediterranean grasslands. In: *Options Méditerranéennes, Series A*, 102, p. 47-51.
- Nefzaoui A., El Mourid M. and Louhaichi M., 2014.** The tribe – platform of participatory local development and management of communal rangeland resources. In: *Journal of Arid Land Studies*, 24(1), p. 57-60.
- Ouled Belgacem A. and Louhaichi M., 2013.** The vulnerability of native rangeland plant species to global climate change in the West Asia and North African regions. In: *Climatic Change*, 119, p. 451-463.
- Reyers B., 2004.** Incorporating anthropogenic threats into evaluations of regional biodiversity and prioritisation of conservation areas in the Limpopo Province, South Africa. In: *Biological Conservation*, 118, p. 521-531.
- Sincich F., 2002.** Bedouin traditional medicine in the Syrian steppe. FAO Plant Production and Protection Division, Rome, Italy, p. 114-115.
- Van Wesemael B., Poesen J., Sole Benet A., Cara Barrionuevos L. and Puigdefabregas J., 1998.** Collection and storage of runoff from hill slopes in semi-arid environments: geomorphic and hydrologic aspects of the Aljibe system in Almería Province, Spain. In: *Journal of Arid Environments*, 40, p. 1-14.

OPTIONS

méditerranéennes

SERIES A: Mediterranean Seminars

2016 – Number 114

Ecosystem services and socio-economic benefits of Mediterranean grasslands

Edited by:

A. Kyriazopoulos, A. López-Francos, C. Porqueddu, P. Sklavou

Mediterranean grasslands (including rangelands, pastures, meadows, and fodder crops) are important resources covering up to 48% of the whole region. Although these ecosystems are a key element in the production of high quality animal products and in the livelihoods of producers, they also provide a range of ecosystem services besides forage production, such as biodiversity conservation, habitat for wildlife, carbon fixation, prevention of erosion and nutrient storage.

There are socio-economic and environmental differences between the different Mediterranean regions, but they share common issues on grasslands sustainability and research. Multidisciplinary investigations are needed to identify the best-adapted and most productive grassland species and mixtures along with the most appropriate grazing management to produce high-quality livestock products. Multidisciplinary research is also needed to monitor the pastoral resources, environmental outputs and ecological services associated with Mediterranean grasslands, to ensure a better understanding of their complexity and to make informed management decisions and take measures for climate change mitigation. More on-farm experimentation and participatory knowledge transfer to farmers are also required.

This publication is an outcome of the 15th Meeting of the FAO-CIHEAM Inter-regional Cooperative Research and Development Sub-Network on Mediterranean Pastures and Fodder Crops titled “**Ecosystem services and socio-economic benefits of Mediterranean grasslands**”, organised in Orestiada (Greece) from 12 to 14 April 2014, by the Mediterranean Agronomic Institute of Zaragoza/International Centre for Advanced Mediterranean Agronomic Studies, the Democritus University of Thrace, the Aristotle University of Thessaloniki and the Hellenic Range and Pasture Society. These Proceedings include 90 papers presented at the Meeting, covering a range of topics allocated into four sessions: (1) Managing ecosystem services and livestock production in the Mediterranean region; (2) Improvement of range, pasture and forage species including alternative uses; (3) Socio-economic benefits of sustainable grassland management; (4) Rehabilitation of Mediterranean grasslands; and a Round Table on “Connecting research, policy and stakeholders challenges for the sustainability of grasslands”.



ISBN: 2-85352-556-2
ISSN: 1016-121-X

OPTIONS
méditerranéennes