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# Rangeland rehabilitation in the southern part of the Mediterranean basin

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**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.

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## **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.

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