FOREST AND LANDSCAPE RESTORATION PRACTICES IN THE MEDITERRANEAN

A SURVEY

MAVA FONDATION POUR LA NATURE

MEDFORVAL

OIKOS

SHOUF BIOSPHERE RESERVE
محمية الشوف المحيط الحيوي

© 2021 Medforval / Istituto Oikos

Compiled and written by: Serena Arduino

Edited by: Catherine Roberts

Contributors: Mustafa Ay, José Carreira, Claudio Celada, Alessio di Giulio, Dany Ghosn, Mostafa Lamrani-Alaoui, Marina Paolucci, Fernando Pulido, Mohamed Qarro, Elena Rossini, Massimo Soldarini

Design & layout: Editorial Projects

This survey was produced by Medforval in collaboration with Istituto Oikos within the project 'Mediterranean Knowledge on Forest and Landscape Restoration' led by ACS-Al Shouf Cedar Society and funded by the MAVA Foundation.

It is part of a learning, capacity development and sharing package designed by ACS, Medforval and Istituto Oikos which includes a variety of tools and actions to disseminate and outscale the climate-adaptive FLR lessons learned in the Mediterranean. The package includes a collection of FLR practices in the Mediterranean (2021, this publication), a university teaching module on FLR and the best practices in the Shouf Biosphere Reserve in Lebanon (2020), the Forest and Landscape Restoration Guidelines of the Shouf Biosphere Reserve (2019) and their abridged version (2020), a professional presentation on FLR (2020), and six video clips showing implementation of FLR on the ground in the Shouf Biosphere reserve (2019, 2020).

The author and contributors would like to give special thanks to Pedro Regato, Catherine Roberts and the Task Force on Best Practices of the UN Decade on Ecosystem Restoration for their input on the questionnaire; Lina Sarkis, EFIMED, MAVA Foundation, FAO and especially Silva Mediterranea for disseminating the call for FLR practices; Nesat Erkan, Carmen Ibáñez Torres and again Pedro Regato for providing personal contacts to FLR practices; Valentina Garavaglia and Alvaro Nieto for offering their views on FLR in the Mediterranean.

This publication should be cited as: Arduino, S., 2021. *Forest and Landscape Restoration practices in the Mediterranean: a survey*. Medforval / Istituto Oikos, Italy.

Version 18/1/2021

CONTENTS

Introduction		4
Practice 1	Spain: Abies pinsapo landscape, Andalusia	7
Practice 2	Greece: Juniperus coastal dunes of Crete and the South Aegean	11
Practice 3	Italy: Insubria ecological corridor between the Alps and the Lower Ticino Valley	13
Practice 4	Italy: Aterno Valley, Abruzzo	15
Practice 5	Morocco: mountain forests of the Ifrane Province	17
Practice 6	Morocco: sylvopastoral ecosystems	19
Practice 7	Turkey: Murat River Watershed	21
Practice 8	Spain: Mosaico, Extremadura	23
Conclusions		25

INTRODUCTION

Context

This survey of Forest and Landscape Restoration (FLR) practices in the Mediterranean was undertaken to collect promising and good practices of initiatives contributing to FLR in the region. It was designed to assess the extent to which restoration initiatives in the Mediterranean fulfil FLR principles (see p.5), and includes restoration projects undertaken without an explicit intention to implement formal FLR processes.

The Global Partnership on Forest and Landscape Restoration (GPFLR)[1] defines FLR as "*the process of regaining ecological functionality and enhancing human well-being across deforested or degraded forest landscapes. (…) A means of regaining, improving, and maintaining vital ecological and social functions, in the long term leading to more resilient and sustainable landscapes.*"

The UN Decade on Ecosystem Restoration (UN-DER) 2021-2030[2] defines ecosystem restoration as "*integrated land-use planning, undertaken in a rights-based manner, where all stakeholders are informed of the full range of benefits to be gained through conservation, restoration and sustainable use of natural resources in their local ecosystems*." This definition is in harmony with the FLR principles cited above. For the purpose of this survey, FLR and ecosystem restoration are equivalent.

The survey is part of the project 'Mediterranean knowledge on Forest Landscape Restoration' funded by the MAVA Foundation under their MAVA Learning and Sharing Grant (2019-2020). While the overall project is led by ACS-Al Shouf Cedar Society in partnership with Medforval[3] and Istituto Oikos, the survey is coordinated by Medforval and Istituto Oikos and carried out with the support of the M6 Network[4]. The survey is also undertaken as a contribution to the UN Decade on Ecosystem Restoration; the experts of the UN-DER Task Force on Best Practices welcomed this initiative and contributed to its dissemination.

At the time of this survey a large international effort is underway towards FLR and ecosystem restoration, considered the most appropriate approach to protect and restore ecosystems in the face of climate change and create a balance with socio-economic systems. The Mediterranean is not recognized as an area of significant implementation of FLR – we hope to change this perception.

Objective

The eight practices described here offer inspiration to practitioners and policy makers to help them design, implement and support further FLR efforts throughout the Mediterranean. This will contribute to fulfilling the Agadir Commitment[5] of restoring 8 million hectares of degraded forest landscapes in the Mediterranean by 2030.

Efforts to achieve this target are not homogenous in the Mediterranean; the initiative is left to individual governments and funding programmes. Bearing this in mind, the more approaches and methods which can be made available as examples the better – one of them may provide just the stimulation and insight necessary for the launch of new initiatives.

[1] www.forestandlandscaperestoration.org

[2] https://www.decadeonrestoration.org/

[3] Medforval is the Network of Mediterranean forest landscapes and forests of high ecological value funded by the MAVA Foundation, www.medforval.org

[4] M6 is the Network of Mediterranean mosaic landscapes also funded by the MAVA Foundation, https://mava-foundation.org/wp-content/uploads/2017/11/M6mini-OAP-Board-Mars17-ENG.pdf

[5] The Agadir Commitment was endorsed by 10 Mediterranean countries during the 5th Mediterranean Forest Week in Agadir, Morocco, on 24 March 2017. This effort is supported by several international organizations and driven by FAO's Committee on Mediterranean Forestry Questions-Silva Mediterranea, http://www.fao.org/forestry/45685-0ad87e3a1d4ccc359b37c38ffcbb5b1fc.pdf

FLR principles

The principles of FLR, according to the GPFLR, are as follows:

- Focus on landscapes – FLR takes place within and across entire landscapes, not individual sites, representing mosaics of interacting land use and management practices under various tenure and governance systems. It is at this scale that ecological, social and economic priorities can be balanced.
- Engage stakeholders and support participatory governance – FLR actively engages stakeholders at different scales, including vulnerable groups, in planning and decision making regarding land use, restoration goals and strategies, implementation methods, benefit sharing, monitoring and review processes.
- Restore multiple functions for multiple benefits – FLR interventions aim to restore multiple ecological, social and economic functions across a landscape and generate a range of ecosystem goods and services that benefit multiple stakeholder groups.
- Maintain and enhance natural ecosystems within landscapes – FLR does not lead to the conversion or destruction of natural forests or other ecosystems. It enhances the conservation, recovery and sustainable management of forests and other ecosystems.
- Tailor to the local context using a variety of approaches – FLR uses a variety of approaches that are adapted to the local social, cultural, economic and ecological values, needs and landscape history. It draws on the latest science and best practices, and traditional and indigenous knowledge, and applies that information in the context of local capacities and existing or new governance structures.
- Manage adaptively for long-term resilience – FLR seeks to enhance the resilience of the landscape and its stakeholders over the medium and long term. Restoration approaches should enhance species and genetic diversity and be adjusted over time to reflect changes in climate and other environmental conditions, knowledge, capacities, stakeholder needs, and societal values. As restoration progresses, information from monitoring activities, research, and stakeholder guidance should be integrated into management plans.

The eight practices collected in this survey are analysed (in the final chapter) according to these principles.

Method

To collect practices for this survey, we launched a call for experiences of FLR – or partial implementation of FLR – in the Mediterranean. Kind colleagues from Mediterranean countries completed a questionnaire and made information available on eight practices.

The questionnaire, finalized in July 2020, was framed according to the *Good practices at FAO: Experience capitalization for continuous learning* (2013)[6] and the related Good Practices Template (2016). It was circulated among Mediterranean networks and mailing lists (July-September 2020). Questionnaires were filled in by those implementing the individual practices, clarifications were sought where necessary and additional information collected. The Medforval secretariat then drafted a synthesis of each practice, to be revised by the practitioners themselves before being included here.

There was no attempt to ensure representation of the entire Mediterranean area. We simply worked with the practices that were willing to share material with us – a combination of who was reached by our call, who thought theirs was an FLR practice and who had the time to compile and share information. Those included in this survey believe that their individual practice can rightfully be framed as FLR or that it fulfils at least some FLR principles. Through their eyes we also see these as FLR practices, to varying degrees of completeness.

[6] http://www.fao.org/3/a-ap784e.pdf

Eight practices

This survey, then, includes eight practices from five Mediterranean countries: three Northern Mediterranean EU countries (Spain, Italy and Greece), one Eastern Mediterranean country (Turkey) and one Southern Mediterranean country (Morocco):

Practice	Country	Part of
Abies pinsapo landscape, Andalusia	Spain	Medforval network
Juniperus coastal dunes of Crete and the South Aegean	Greece	Medforval network (implemented by CIHEAM-MAICh, Medforval member)
Insubria ecological corridor between the Alps and the Lower Ticino Valley	Italy	Medforval network
Aterno Valley, Abruzzo	Italy	Medforval network & Mediterranean Model Forest Network
Mountain forests of the Ifrane Province	Morocco	Mediterranean Model Forest Network
Sylvopastoral ecosystems	Morocco	wider Mediterranean forest restoration community
Murat River Watershed	Turkey	wider Mediterranean forest restoration community
Mosaico, Extremadura	Spain	wider Mediterranean forest restoration community

Two practices benefitted from EU LIFE funding: Juniperus coastal dunes and Insubria ecological corridor; these plus the Pinsapo programme are focused on ecological restoration only. Some practices are already widely known to experts, others are relatively unknown. All have something vital to offer.

General view of old-growth ***Abies pinsapo*** forest at the Cañada de las Ánimas, in the Natural Park of Sierra de las Nieves, north-facing slopes above 1200m.
© José Carreira

Practice 1

SPAIN: ABIES PINSAPO LANDSCAPE, ANDALUSIA

Description

In the 1950s the Spanish National Forestry Service (ICONA) began the Abies pinsapo Restoration Programme. Management was later transferred to the Andalusian Regional Government (Consejería de Medio Ambiente) which currently runs the programme by means of successive 5-year plans.

Abies pinsapo is a relic circum-Mediterranean fir species catalogued as Endangered by IUCN. *A. pinsapo* forests (habitat type 9520 according to Annex I of the EU Habitat Directive) are found on mid to high coastal mountains, on humid and hyperhumid north-facing slopes. In Spain they are found in the Sierra de las Nieves, Sierra de Grazalema and Sierra Bermeja, western Baetic Range, Andalusia. These are rural areas with small villages, high unemployment rates and significant migration to the Costa del Sol, the nearby tourism hotspot.

During the first part of the twentieth century, *A. pinsapo* landscapes suffered intense degradation due to fires, livestock grazing, logging, wood extraction for construction and coal production and vineyard cultivation. As a result, by the 1950s less than 500ha of forest with *A. pinsapo* presence remained; this included isolated forest stands and areas with scattered trees. Then, agricultural practices were abandoned and people started to leave the area. The remnants of these past land uses and associated farmland habitats (old agricultural terraces, threshing floors, small farm houses) can still be seen throughout the landscape.

In areas where the "natural" upward migration is slow and results in low density of newly recruited pinsapo individuals, pinsapo and mountain oak saplings are enclosed in individual mesh cylinders to protect them from grazing wild ungulates and sheep.

Measures are also taken to avoid erosion and to correct the hydrology.
© José Carreira

Objectives/vision

The initial aim of the Abies pinsapo Restoration Programme was to recover populations of this endangered relic tree species. With time, the programme broadened to include the protection and restoration of *A. pinsapo* landscapes, taking into account associated species of flora and fauna, as well as vegetation formations such as the riparian. There is broad consensus on this objective within the local communities. The area of the restoration programme was defined to include the current, historical and potential future presence of *A. pinsapo*. The programme operates over the whole distribution area of the species, and for this reason is now called the Abies pinsapo Landscape Restoration Programme. In 1989 the entire distribution and restoration area was designated as protected; it includes three regional parks and two Biosphere Reserves.

Protection was the key objective at the beginning of the programme and activities connected to landscape degradation (grazing, logging, wood extraction, agriculture) were either forbidden or spontaneously abandoned by the local people. Later the focus was on restoration and finally on management. Today, the programme uses a combination of these approaches.

The current objective of the programme is to achieve sustainable populations of *A. pinsapo* to improve its conservation status from Endangered to Vulnerable according to the Andalusian Lists of Threatened Species. More specific objectives are to:

- improve habitat conditions
- decrease threats
- increase populations and individual trees
- improve management capacity and tools
- secure the positive attitude of the majority of the population
- establish mechanisms for the participation of all the sectors involved.

Action undertaken – how does it work?

Under the current landscape approach, the Abies pinsapo Landscape Restoration Programme operates in the following ways:

- restores the environmental conditions suitable to other endangered flora and fauna species sharing habitats with *A. pinsapo*
- manages other forest and shrubland communities which are ecotonal with *A. pinsapo* pure forests, promoting mixed forests
- facilitates *A. pinsapo* recruitment in the understory of pine and oak forests that are known to have hosted *A. pinsapo* in the past
- increases connectivity among *A. pinsapo* patches and isolated local populations
- promotes controlled private grazing by domestic livestock in *A. pinsapo* landscapes and surroundings ("pastos cortafuegos"); this increases resistance to large wildfires which are currently the main threat to the species. These successful firewall pasturelands, pioneered in this area, have been exported to other protected areas in Andalusia.

Activities include ex-situ production of seeds (to be used in the event of natural disasters), thinning of thick stands, planting of new seedlings in burnt areas (250 seedlings/ha of *A. pinsapo* and other tree and shrub species), temporarily fencing young seedling areas and discouraging the use of hybrid Abies in gardening. Phytopathogens are monitored and controlled through the Pinsapo Surveillance Network, which also assesses the effects of pollutants. These activities involve private landowners and raise awareness in local communities.

Local workers on their way to a remote area in the Sierra de las Nieves Natural Park to make repairs and to check automated sensors for the continuous registration of environmental data.

The pinsapo landscape of Sierra de las Nieves.
© José Carreira

The Programme's 5-year plans describe all these activities and more, tailoring them to the various *A. pinsapo* landscape units. The plans emphasize the importance of research and monitoring which are implemented through the Biological Equilibrium Monitoring Network, a set of permanent observation field plots which are visited at least once a year. Scientific results are continuously fed back to the Programme to support the natural regeneration of the populations and the overall forest landscape restoration effort.

Governance and participation have evolved through the decades of the Programme. Initially there was a top-down approach by the National Forestry Service, traditional land uses and practices were prohibited and sanctioned. Later, management of resources became more participatory and sustainable uses such as grazing, rural tourism and collection of non-timber forest products were encouraged. The last two decades have seen remarkable progress in stakeholders' engagement, public participation and agreement with the vision for the landscape to be restored. Those involved in the Programme today include the Environmental Protection Agency of the Andalusian regional government, several universities and research centers, local councils, the governing boards of the protected areas, landowners, rural development groups, agricultural associations and NGOs. There is also an Abies pinsapo Expert Group that supports the development of the 5-year plans and monitors the outcomes of the Programme.

Exchange visits took place with Morocco (2011-2014) regarding the restoration of Moroccan relic fir forests (*Abies maroccana*) in the framework of the creation of the western Mediterranean Intercontinental Biosphere Reserve. Additional exchanges took place with Turkey. The universities affiliated to the Abies pinsapo Landscape Restoration Programme regularly carry out scientific monitoring and the results are made available through scientific papers. All the research and experience gathered by the Programme is described in a rich enthralling monography (see sources below).

In the words of our survey respondent, José Carreira, the lower photo on the left here sums up the philosophy and history of the Abies pinsapo Landscape Restoration Programme. "*It shows an old and abandoned threshing floor at 1500m asl, on top of a mountain ridge, in the middle of the pinsapo landscape of Sierra de las Nieves. This area was dedicated to marginal agricultural activities, among other traditional land uses now disappeared. The man in the foreground is the enthusiastic current director of the Natural Park. The woman in the white shirt is a phytopathologist professor at the Forestry Technical school of Córdoba - she is talking to a group of young researchers... In the background, to the right on the north-facing slope, you see one of the already recovered pinsapo forests (Pinsapar del Caucón); when you walk inside this forest you still see the stone walls of small terraces where local people cropped barley and chickpeas until the 1940s and 50s (subsistence economy after the Spanish civil war); only the big pinsapo trees whose crowns can be seen isolated near the ridge remained at that time*."

Exchange visit of the Turkish forestry service to the *Abies pinsapo* landscape.

Field trip to the pinsapo forests, an annual event with students from the University of Jaén.
© José Carreira

Benefits to ecosystems and local communities

The Programme has been successful for both ecosystems and local communities. *A. pinsapo* forests have been on the way to recovery for quite some time and the area with pinsapo forest has increased from less than 500ha in the 1950s to about 4000ha today. At lower altitudes (1100-1600m asl) forests are thick with little undergrowth; higher, they are open with bushes. Neither the growing risk of fire, the increase in pests or climate-driven dieback episodes threaten this firm trend. The provision of ecosystem services has significantly increased. This applies to supporting services (biodiversity and habitat provision, soil production, nutrient cycling and primary production), regulating services (hydrological regulation) and cultural services (aesthetic, recreational, scientific).

Employment in the area directly linked to the Abies pinsapo Landscape Restoration Programme is significant: about 30 permanent employees work in the management of pinsapo forests and in the corresponding protected areas (forest guards, forest engineers, administration personnel); 500-1000 contracts a year are generated for non-permanent positions such as fire prevention, treatment against pathogens in the forests (insects and fungi) and restoration activities.

The Programme does not work alone: it interacts with other programmes making it more articulated and far-reaching. For example, EU rural development funds are directed here to create jobs related to ecotourism and grazing, which in turn depend on the landscape. Ecotourism now represents a significant portion of local income, just below 10%; the success of the Programme has significantly contributed to the development of this sector, which is still growing.

The Abies pinsapo Landscape Restoration Programme clearly identified an icon, a flag species, and local people now consider pinsapo forests as part of their identity. Many local businesses (camping sites, local food producers, stores) now use the word “pinsapo” and its derivatives as trademarks, as well as the tree in their logos. This goes hand in hand with the support local people give to the Programme. This cultural change is one of the Programme’s main successes.

Sources

Interview and correspondence with José Carreira, September and November 2020

Programa de Actuación del Plan de Recuperación del Pinsapo Años 2015-2019 Anexo V

López-Quintanilla, J. (coordinator), R.M. Navarro, J.A. Carreira, M. Coca & C. Rodríguez (research editors), 2013. Los pinsapares (Abies pinsapo Boiss.) en Andalucía: Conservación y sostenibilidad en el siglo XXI. 576 pp. Junta de Andalucía y Universidad de Córdoba. ISBN: 978-84-92807-74-1, 978-84-9927-137-8

https://dialnet.unirioja.es/servlet/libro?codigo=545036

Coastal dunes with Juniperus species, Agios Ioannis, Gavdos Island.
© George Kazakis/Ilektra Remoundou

Practice 2

GREECE: JUNIPERUS COASTAL DUNES OF CRETE AND THE SOUTH AEGEAN

Description

Junicoast is a LIFE+ project which aims to conserve coastal dunes (2250*) with Juniperus species and to halt the degradation of this priority habitat type in Crete and the South Aegean, Greece. A variety of conservation and restoration actions have been implemented in an area of around 240ha encompassing sand dunes with *Juniperus macrocarpa* and *J. phoenicea* and their catchment at four separate sites in Crete during the project (2009-2013). These coastal dunes are of outstanding beauty and very popular for outdoor recreation, especially nature-based tourism in the summer months. To a great extent ecosystem degradation comes from the visitors themselves: unaware or uncaring, they trample on seedlings, damage old trees to make camp fires – whilst unwittingly causing forest fires – and abandon their rubbish which in turn becomes additional fuel for fire.

Objectives/vision

Natural regeneration of these coastal dunes is difficult and slow due to the harsh environmental conditions (salinity, winds and scarce fresh water). The dunes are also threatened by livestock browsing and grazing and – most of all – the growth of uncontrolled tourism and lack of awareness of the fragility and importance of these ecosystems. The main objective of the project was to halt the natural and anthropogenic threats that contribute to the long-term degradation of this habitat. Socio-economic benefits were not an explicit objective of the project, but achieving the ecological objective was supported by working on the human dimension of ecosystem degradation, addressing the dune users and the local communities: people are more inclined to accept restrictions when they know the reasons for the rules.

Sand traps, Chrysi Island.

Board walk, Chrysi Island.
© George Kazakis/Ilektra Remoundou

Action undertaken – how does it work?

At the beginning of the project a wide range of stakeholders together defined the threats to the coastal dunes and the actions needed to address them, thus creating a shared framework for – and ownership of – conservation, management and communication activities. Conservation and restoration activities and tourism management practices were implemented at four sites on Crete. Field restoration measures included:

- enhancement of Juniperus regeneration through protection of juvenile plants and seedlings, placing light fences around them and producing new plantlets in the nursery from seedlings or cuttings taken from the field
- restoration of the flora, planting female plants to balance the sex ratio, eliminating alien species and confining the non-typical plant species having invaded the habitat (Pinus)
- restoration of the foredunes through sand traps.

In addition, seeds and plantlets of the keystone species of this habitat were conserved ex-situ for their future propagation. Tourism management included habitat demarcation, information panels, boardwalks, signs to keep visitors off fragile ground and bins for correct waste disposal.

In both Crete and the South Aegean awareness raising and communications focused on tourists and school communities. Meetings and events were organized on-site at the coastal dunes with visitors and campers, and in the villages with those involved in tourism. Education packages were produced for teachers and events and campus weeks organized for the students.

Benefits to ecosystems and local community

The project focused on ecosystem restoration and habitat conservation. An evaluation of the short-term results before the end of the project showed the following successes:

- the regeneration percentage of Juniperus plantlets increased by 8-40% depending on their location
- alien plant species were removed from two sites and Pinus confined at five sites
- the density of habitat keystone species was enhanced, with a 45% survival rate
- vegetative propagation of female plants from cuttings succeeded for 10% as expected (while the planting of female plants was not very successful due to dry conditions)
- protocols for seed germinations of various taxa were developed.

A monitoring plan with protocols is available, but no After-LIFE monitoring was undertaken at the end of the project, and the long-term conservation of the habitat has not yet been evaluated. Improving local livelihoods was not an objective of the project. However, success in the conservation of Juniperus dunes contributes to the high aesthetic value of this habitat and to attracting visitors interested in outdoor recreation. This in turn generates revenue locally, and improves livelihoods. As the main message of the project states, “the economic growth of the local communities depends on the conservation and sustainable management of coastal dunes with Juniperus spp.” This was successfully demonstrated and one of the project sites won the Gold Quality Coast award in 2013.

Sources

Interview and correspondence with Dany Ghosn, September and October 2020

www.junicoast.gr

Final report on enhancement of Juniper regeneration, 2013 (English summary)

Final report on restoration of 2250 composition & structure, 2013 (English summary)*

Final project report LIFE07NAT/GR/000296, 2014

The project area seen from Campo dei Fiori.
© Archivio Lipu

Practice 3

ITALY: THE INSUBRIA ECOLOGICAL CORRIDOR BETWEEN THE ALPS AND THE LOWER TICINO VALLEY

Description

Between 2008 and 2015 a series of interlinked projects – of which the LIFE TIB Trans-Insubria Bionet was the culmination – succeeded in restoring the Insubria ecological corridor between the Alps and the Lower Ticino Valley in Northern Italy. The Insubria forest landscape extends over 17,000ha and includes coniferous and deciduous forests, wetlands, agricultural land and urban areas. There are several protected sites and biodiversity is still rich, but not at its full potential given that forest habitat connectivity is threatened by urbanization and excessive infrastructure.

Objectives/vision

The overall objective was the restoration of the ecological corridor. The motto “Moving to live!” (“Vive solo chi si muove!”) summerizes the vision, referring in particular to the free movement of animals through the corridor.

Action undertaken – how does it work?

Extensive work was planned and undertaken in the field and at the policy level to ensure restoration of the functionality of the Insubria corridor in one of the most densely inhabited and productive areas in Italy.

Concrete habitat restoration interventions were planned and implemented focusing on target wildlife species. A broad range of actions were designed to ensure that mammals, birds, herpetofauna and invertebrates were able to find suitable habitats throughout the corridor and therefore move freely. Natural habitats were made

Wildlife monitoring with camera traps along the corridors.
© Archivio Lipu

Little bittern (*Ixobrychus minutus*).
© M.Mendi / Archivio Lipu

more complex and diverse and thus more attractive to wildlife: wetlands were connected to one another and their ecological status improved, dry stone walls were rebuilt or cleared of overgrown vegetation, forests were enriched with hollow trees and nursery logs. Invasive alien plant species were removed making room for new species, and increasing soil fertility. Infrastructure was "defragmented" and made permeable to wildlife: power lines were made conspicuous and harmless to avoid bird electrocutions, animal underpasses were placed under roads to avoid road kills of migrating amphibians and mammals, wildlife paths were built under bridges above flood level to allow animal movement in times of high waters.

Further, extensive effort was dedicated to policy and governance, and on mainstreaming the preservation of the corridor in community planning. To this purpose, extensive work was carried out by two urban planners, consultants on the project, who interacted with each and every community council in the corridor, visiting them, explaining Natura 2000 and the Regional Ecological Network, assessing the planning documents at their disposal.

Benefits to ecosystems and local community

Short-term monitoring has already shown positive results with increased and healthier populations of the target species using the corridor. Medium-term monitoring 5 years after the end of the project (beginning in 2020) will provide quantitative data to this effect; long-term monitoring started in 2016 and will continue, making it possible to evaluate the durability of the corridor restoration interventions.

The ecological corridor is now recognized in the land use plans of all the municipalities in the area, with the obligation to perform an impact assessment anywhere in the corridor where it may be necessary, not only inside Natura 2000 sites and other protected areas. Furthermore, in 2014, 45 municipalities, the provincial government (Varese), the protected areas, LIPU-BirdLife Italy and Fondazione Cariplo entered a voluntary Network Contract (*Contratto di Rete*) formally committing to protecting the ecological corridor. The Network Contract idea came from the River Contracts existing elsewhere in the country, and it is the most important result of the project.

Socio-economic benefits were not explicitly addressed. However, municipal staff and their technical advisors were trained to develop community plans that take the needs of biodiversity into account. The restoration of the corridor supports more robust wildlife communities, which in turn ensures that the whole system of exchange between human communities and their environment is more resilient and economically viable. The series of interlinked projects contained the seeds of what has become the transnational Italian-Swiss Ticino Initiative launched in 2019 to restore the entire Ticino landscape corridor.

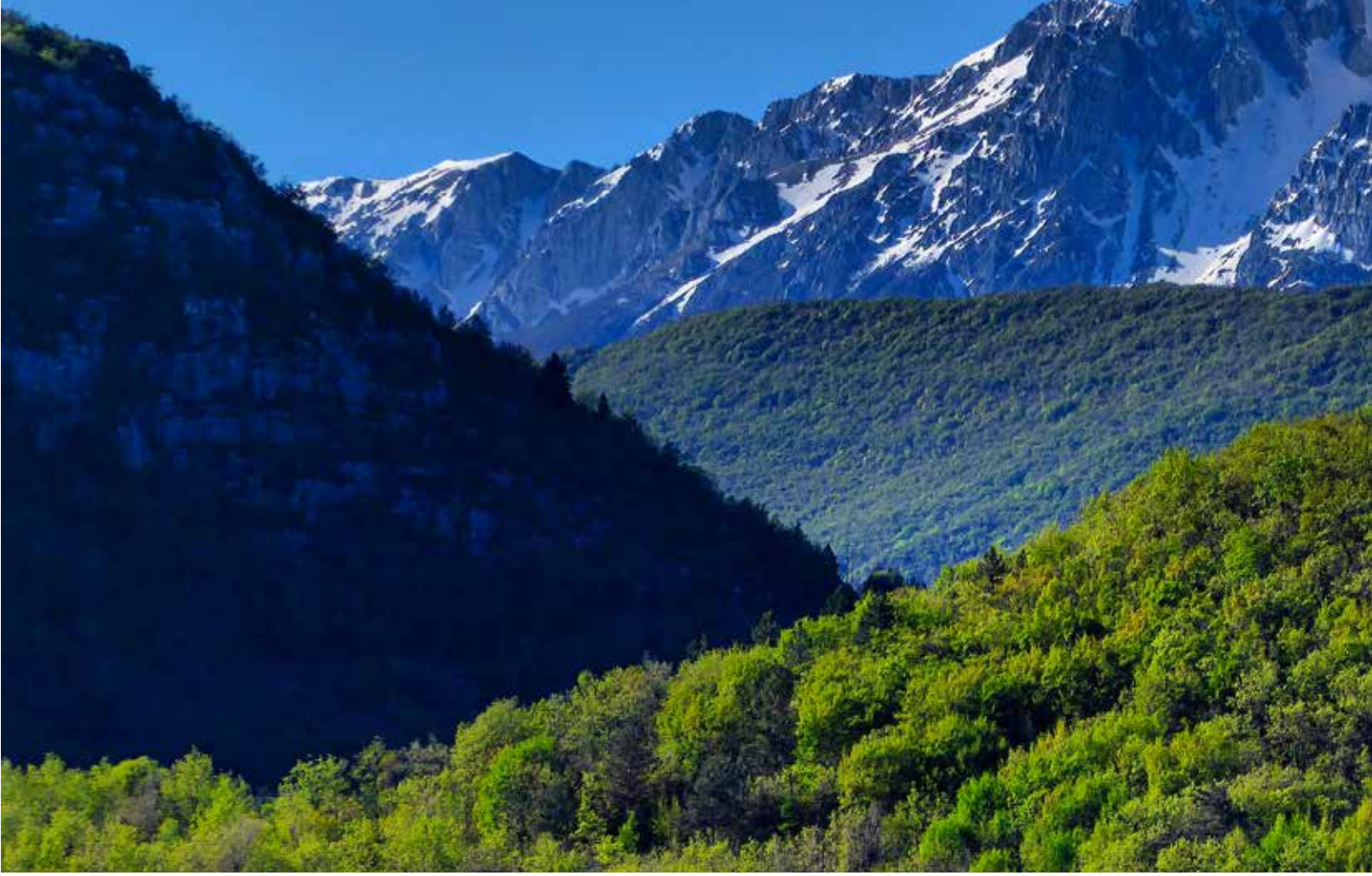
Sources

Interview with Claudio Celada and contributions from Elena Rossini and Massimo Soldarini, October and November 2020

www.lifetib.it

Network Contract (Contratto di Rete, in Italian only), 2014

Casale F., Barbieri S., Luoni F., Rossini E., Soldarini M., Zaghetto E. (a cura di), 2015. Life TIB. Un corridoio ecologico fra Pianura Padana e Alpi (Life TIB. An ecological corridor between the Po Plain and the Alps). Provincia di Varese and LIPU-BirdLife Italy



View of the Sirente and the Aterno valley in spring.
© Julian Civiero

Practice 4

ITALY: THE ATERNO VALLEY, ABRUZZO

Description

This initiative covers the mid-Aterno Valley in Italy's Abruzzo, considered the Green Region of Parks. It concerns 30,000ha of montane forest landscape with a typical Mediterranean mosaic pattern at the valley bottom. The land has been largely abandoned – a process which started well over 100 years ago, due to the scarce resources of the rural montane economy. The declining population and unmanaged reforestation go hand in hand. Forests cover 60% of the area, and many small, formerly productive plots and terraces have become broadleaf forests – with alien species in the valley bottoms – resulting in the loss of micro-ecosystems and the mosaic landscape, and heightened fire risk. Abandonment of the land can also be traced back to the present-day weakness of the local economy, where the little that is produced locally is usually sold on for processing, thus missing a major opportunity for local development connected with a growing niche market for high quality traditional produce.

The preparatory phase for the establishment of the Aterno Valley Model Forest (2016-2020) was made possible by a combination of individual projects. The projects pre-dated and prepared for the designation of the Model Forest – in a sense, the Aterno Valley Model Forest (FMVA) can be seen as the evolution of prior projects, with more mature and consistently regulated governance. These projects have paved the way for the full implementation of the landscape restoration initiative on a large scale in 2021.

Objectives/vision

The Model Forest seeks to revive the mid-Aterno Valley, to counteract the negative effects of depopulation and abandonment, promoting environmental, economic and social sustainability. It supports the conservation of a lively and dynamic "rural mosaic" landscape, responding to the challenges of climate change and globalization.

The main objectives are to maintain and restore the diverse cultural mosaic landscape and revitalize the local economy and cultural life. This will anchor local communities more firmly to their land, reduce fire risk and increase the resilience of the area to climate change. Initiatives will proceed in five interlinked sectors:

The seasonal mountain settlement of the Pagliare di Tione.
© Julian Civiero

Group of participants in the "rediscovery of the valley woods" program, plateau of Prati del Sirente.
© Alessio di Giulio

- restore the mosaic landscape, preserve biodiversity and use forest resources sustainably
- promote local value chains, create a network of local producers and improve the quality of irrigation water from the Aterno river
- develop coordinated and integrated sustainable tourism
- support and capitalize on the tangible and intangible cultural heritage
- capacity building, exchanges and fundraising.

The key to the success of the enterprise is the participation, on an equal footing, of all interested parties. Local agriculture, handicraft, tourism and forestry hold great potential for providing sustainable livelihoods to local communities.

Action undertaken – how does it work?

So far the Model Forest initiative has focused on planning and enforcing governance of the area, meticulously preparing for the implementation of the landscape restoration initiative. In 2018 and 2019 the Abruzzo regional government joined the International Model Forest Network and took steps to establish the FMVA. The foundation documents for the FMVA association were drafted and the founding members delivered their commitment: 15 municipalities, the regional government, protected areas and private and non-profit entities and individuals are ready to formally establish, in 2021, the legal body which will coordinate and facilitate the implementation of the multi-annual plan to restore the Aterno mosaic landscape. A fundraising plan is underway and potential funding streams have been identified. The wider International Model Forest Network and its Mediterranean secretariat have provided support and feedback during this phase, exemplifying the benefits of working together. Local stakeholders visited the Montagna Fiorentina Model Forest in Tuscany, and were able to observe best practices and see that a positive change is possible in declining rural areas. From the outset this process has included a wide spectrum of partners, with more joining along the way.

Although few field activities have so far been started, important preparatory work is underway. Existing and new value chains, functioning as models, were supported through demonstration projects, and producers joined together to form local networks. The expectation is that there will be an increase in the organic cultivation of ancient plant varieties (saffron, cereals, legumes, truffles), with lower productivity but higher income generation, and improvement of the value chains linked to husbandry (cheese, meat). Ancient varieties of apples and pears are currently grown in nurseries in preparation for commercial production within the Model Forest initiatives. Individual projects undertaken before the Model Forest was conceived have contributed to rebuilding dry stone walls, clearing ancient footpaths, reforesting an area near the Aterno river (80% success rate in the first year), restoring amphibian habitat, holding guided forest walks and producing an exhibition.

Benefits to ecosystems and local community

Preparation for the establishment of the Model Forest and the foundation documentation has already improved cohesion between the involved parties. Not enough has yet been implemented to allow for benefits to be measured. Monitoring and Evaluation is planned for the near future. An FAO delegation who visited the Aterno Valley in October 2019 acknowledged the potential of the FMVA for local development.

Sources

Interview and correspondence with Alessio di Giulio and Marina Paolucci, September and November 2020

https://www.forestamodellovalleaterno.it

Piano Strategico 2020-2025 dell'Associazione Foresta Modello della Media Valle dell'Aterno (Strategic Plan 2020-2025, draft March 2020, in Italian only)

Recovery of vegetation after protection (in the foreground) compared to the degraded land (background) in the same plot in Ifrane province. © S. El Khiyari

Practice 5

MOROCCO: THE MOUNTAIN FORESTS OF THE IFRANE PROVINCE

Description

The 'Management and Protection of the Mountain Forests of the Ifrane Province' project started in 2002 and lasted 6 years. It focused on the 163,000ha in and around the Ifrane National Park in the Middle Atlas of Morocco and cost over 20 million euros. Ifrane Province is the water tower of the country and hosts the main forests (cedar and *Quercus rotundifolia*) and important freshwater habitats. It relies on a rural economy based mainly on livestock (sheep) and wood for fuel and construction. Ecosystems are threatened by climate pressure (summer drought), wood collection and excessive grazing, which cause soil erosion and diminish water availability. The co-management approach with protection (*mise en défens*) and compensation – here called "social sylviculture" – has been implemented since 2002, proving fairly successful. Co-management has brought about social and economic benefits for the local communities and contributed to restoring forest resources, the ecosystem services depending on them and the availability of water.

Objectives/vision

This project was conceived in recognition of the importance of the natural resources of the mountain forests of the Ifrane Province and the need to reverse their degradation while benefitting local communities. Participatory governance is central to the social sylviculture approach. This vision was subsequently extended beyond the Ifrane National Park with the establishment of the Ifrane Model Forest in 2011, which capitalized on the project's preliminary good results. The Ifrane Model Forest covers the entire Ifrane Province (an area of 357,300ha) with the Ifrane National Park at its centre. It is a member of the Mediterranean Chapter of the International Model Forest Network, the coordinating body is a partnership of national and regional institutions, civil society and private entities.

Cedar plantation under closure and subject to compensation in Ifrane National Park.

A meeting of the beneficiaries of the grants for compensation for the closures set up in their pastureland by the local forest engineer.
© S. El Khiyari

Action undertaken – how does it work?

The project in the Ifrane National Park established an integrated system, central to which are associations of users of sylvo-pastoral resources. There were 11 such associations in 2020, each connected to a specific forest area. Associations are legally established, and governed according to a partnership agreement with the High Commission for Waters and Forests and the Fight against Desertification (HCEFLCD). The associations embody the modern equivalent of traditional solidarity practices and management of the commons; forest users act collectively under the guidance of professional foresters and according to the terms of the partnership agreements. A participatory process is the keystone of this system, and is being monitored closely. Weaknesses have been exposed in the system in a few communities, the causes of which have been identified. The ensuing recommendations emphasize the importance of good communication and skilled staff and allowing the process sufficient time to build trust and evolve at its own pace. These recommendations shape the current social sylvicultural practices.

Benefits to ecosystems and local community

In return for setting aside forestland long enough to allow it to recover, association members benefit from fuel wood and forage coming from forest thinning. Monitoring and evaluation in 2009 showed that thinning and pruning of the *Q. rotundifolia* forests in Ifrane alone satisfied on average 63% of households' wood-for-energy needs (branches) and 50 MAD-worth of additional forage for livestock (leaves), representing 32% of households' average rural annual income, a significant contribution indeed. In addition, improved and efficient multi-use stoves have reduced wood use for cooking and heating by 70-85%. Communities also benefit from the goods and services funded through the compensation mechanism, which range from infrastructure for the provision of drinking water to solar panels and improved roads. Forest restoration, protection and patrolling have directly generated employment and indirectly supported new economic activities such as production of improved stoves, cultivation of fruit trees and recently also saffron. Old traditional practices, such as transhumance, are being reintroduced, lessening the impact of sedentary herding and overgrazing.

An analysis of the social sylviculture implemented during the 2002-2008 project demonstrated that participatory governance was the winning approach. Applied on a broader landscape scale and treasuring lessons learned, this approach is contributing to the development of other sectors, including tourism, and is restoring ecosystem services on a larger scale and providing even greater benefits in terms of livelihoods and quality of life.

Sources

Interviews and correspondence with Mohamed Qarro, August 2020, and Mostafa Lamrani Alaoui, November 2020

Qarro, M., no date. Evaluation des Opportunités de Restauration des Paysages et Forêts de la Province (Territoire de l'AFM Ifrane)

Sghir, A., 2009. Analyse de quelques projets forestiers et évaluation socio-économique des opérations du dépressage de chêne vert dans le cadre du Projet Ifrane. Mémoire.

https://imfn.net/regional-networks/ifrane-model-forest/

Goats browsing on the canopy of argan trees while sheep graze on the understory of the trees in the Argan Biosphere Reserve.
© M. Lamrani-Alaoui

Practice 6

MOROCCO: SYLVOPASTORAL ECOSYSTEMS

Description

The restoration of sylvopastoral ecosystems in Morocco is a long-term, nation-wide programme which has been running since 2005 to restore forests and sylvopastoral ecosystems while improving livelihoods. Livestock grazing in Morocco tends to be extensive, on communal pasturelands and in forests. Nomadic livestock pastoralism makes a major contribution to national income, especially in rural areas; pastureland therefore plays a key role, including forest pastureland. Pasture in forests provides, on average, 30% of the livestock feed nationally, with peaks of 70-90% in mountain areas.

Objectives/vision

The objective of the restoration programme is to counteract land degradation and its negative impacts on the rural economy and wellbeing, by restoring a balance between the carrying capacity of pasturelands and the requirements of livestock. Reforestation and restoration undertaken before 2005 had success rates of around 60%, prevented from higher success rates largely by anthropogenic pressure. The new programme, launched in 2002 (with decree n. 1855-01, although effectively starting in 2005) was based on three mutually-reinforcing pillars:

- co-management of forest resources by the communities
- the temporary closure or protection (*mise en défens*) of forest plots (*parcelles*) from grazing to allow for the recovery of the natural, diverse vegetation cover and increase of biomass
- a compensation mechanism to offset the temporary prohibition on using forests as pasture ground.

Rangers' settlement with crops within an oak forest in the Middle Atlas.

Sheep grazing in the clearings in a cedar and green oak mixed forest in the Middle Atlas, surrounded by the Habri and Hebri mountains.
© M. Lamrani-Alaoui

Action undertaken – how does it work?

At the basis of this system are associations of users of sylvopastoral resources, and partnership contracts signed between the HCEFLCD and the associations themselves (221 by 2017). Around 120,000ha of forestland were restored between 2005 and 2018, involving 180 associations representing about 20,000 users and mobilizing 25 million MAD/year (over 2.3 million euros) in compensation from the government for foregone pasture. Compensation to users' associations amounts to 250 MAD/ha/year, or 350 MAD for argan forests; associations then decide how to spend their funds, whether on projects benefitting the entire community, or through distribution to individual users. On top of this, 289 million MAD (over 26 million euros) are spent every year on restoration. Local people participate in planning, restoration and management of natural resources, allowing for consensus, better livelihoods for local communities and landscape restoration. Over 4 million days of work were dedicated to forest restoration by the users' associations in the first decade of the programme.

Benefits to ecosystems and local community

The compensation mechanism provides an incentive for forest restoration while triggering rural development. Associations of forest users receive compensation for the (otherwise inalienable) pasture rights that are temporarily foregone in the areas that are set aside for reforestation and restoration. Compensation money generates direct income to those who are employed as stewards of protected forests; the money generates indirect benefits when it is reinvested in projects of community interest such as:

- diversified livelihoods (agriculture, traditional crafts, hospitality, rental of equipment)
- irrigation and drinking water supply
- road access
- building and maintenance of infrastructure
- improved stoves
- health
- transportation
- literacy
- awareness raising.

Monitoring undertaken 10 years after the introduction of compensation measured the following tangible improvements:

- success rate of reforestation (up to 80%) in the forests of the Middle Atlas
- decreased illegal use of forests (up to 75% fewer reports of illegal activities)
- carbon sequestration (equivalent to over 8 tonnes of CO_2/ha/year)
- increased family income (economic activities linked to timber and non-timber forest products have improved the monthly income of households by an average of around 2,000 MAD)
- community solidarity and wellbeing.

Monitoring has also identified some dissatisfaction with and obstacles to the efficient implementation of the compensation mechanism, leading to recommendations for policy improvement. After the first 10 years (2005-2014), a new phase of the compensation programme is ongoing (2015-2024), capitalizing on the lessons learned from the first decade for which results are not yet available.

Sources

Interview and correspondence with Mohamed Qarro, August 2020, and Mostafa Lamrani-Alaoui, November 2020

Qarro, M., I. Hamzaoui, 2016. Evaluation de la cogestion et partenariat avec les usagers des forêts. Noor publishing

Qarro M., 2018. Analyse des coûts et bénéfices de la restauration des forêts et paysages au Maroc

Planting seedlings; natural strong species are planted in the forestry areas by the local people employed by the project. © Duygu Arduç

Practice 7

TURKEY: MURAT RIVER WATERSHED

Description

The Murat River Watershed Rehabilitation Project (MRWRP) is a large-scale, 61-million-USD effort of the Turkish government, the International Fund for Agricultural Development (IFAD) and local administrations to reduce poverty and restore degraded forests and rangelands. The project started in 2012 and will end in 2022. It involves 35 micro-catchments for a total of about 289,000ha located in remote mountainous areas in the provinces of Elazığ, Bingöl and Muş, in eastern Turkey. This is mostly government land being used by local people who are involved in all phases of the project. Natural causes of degradation are landslides, soil erosion and flooding exacerbated by the climate conditions combined with soft soil and steep landscape. The main anthropogenic cause of degradation is intensive land use by the local people.

Objectives/vision

The project's main objective is to restore the ecosystems and manage natural resources sustainably, while improving the living conditions and the livelihoods of the local people. In particular, the project aims to:

- reduce pressure on marginal areas and protect and improve forests, pastures and water resources while increasing land productivity
- reduce soil erosion, landslides and flood damage
- ensure rural development, provide employment and reduce migration from rural to urban areas
- improve the living conditions of the local people and increase their welfare
- provide diversity in agricultural production and spread environmentally-friendly agricultural practices
- build capacity and raise awareness.

Dry wall thresholds are the preferred natural restoration method applied in fields with enough stone. After these thresholds are filled with soil, seedlings will be planted in these areas.

Terracing is applied to cultivate the soil and plant seedlings in these terraces. This is the most widespread afforestation method in Turkey as it both retains water and prevents erosion.

© Duygu Arduç

Action undertaken – how does it work?

The MRWRP includes a wide range of activities. Micro-catchment plans are prepared in consultation with the local communities and other stakeholders. Degraded forests are rehabilitated through afforestation and are then protected and forestry is not allowed in these areas for a specified period. There has been some conflict, as these areas were used by the local communities. Issues have been addressed by means of participatory presentations and demonstration activities and with exchange visits between micro-catchments.

Species selected for afforestation are mostly cedar, larch, oak and almond, based on their suitability to the weather conditions and geomorphology. On public land, orchards are improved or planted anew for the benefit of the communities. Degraded rangelands are rehabilitated and made suitable for grazing through seed sowing and fertilization; local crop types and genetic varieties are used. Water is managed for agriculture and livestock use.

The project fights poverty. It creates employment by engaging local people in rehabilitation and protection activities – especially women, engaged in seedling planting and in nurseries. MRWRP also supports other income-generating activities in agriculture and livestock keeping: horticulture, orchards (almond, walnut, apple, jujube) and strawberries, barn rehabilitation, provision of greenhouses and communal livestock facilities. Links to markets are put in place for local products.

The MRWRP provides house insulation, solar panels for hot water and energy-efficient stoves to reduce wood collection and thus decrease pressure on forests by the local people. It has also established communal bakeries, which consume far less wood than that needed for individual family tandoors.

Benefits to ecosystems and local community

Monitoring started at the beginning of the project and will continue until 2025. Annual outcome surveys are undertaken in the field and in the local communities, and regular meetings are held with all stakeholders. An evaluation and cost-benefit analysis of the biophysical and social impacts of the project is foreseen. Lessons learned will be collected. Meanwhile, reports from the field indicate that some outcomes have been better than anticipated. About 28,000ha have been restored so far; the survival rate of forestry seedlings is reported to be 80%. Local people have been recruited for rehabilitation work and are involved in diverse productive revenue-generating activities.

Mostly women are employed in afforestation activities and in the forestry nurseries; their income has increased by 60% and household chores have significantly decreased thanks to technology for energy saving and production. This is also linked to local wood consumption which has diminished by 50%. Communal bakeries allow bread to be baked in a healthy and convivial environment. For all these results, the MRWRP was awarded the IFAD Gender Award in 2019.

At the ecosystem level, the MRWRP has succeeded in reducing landslides and preventing floods, conserving soil and increasing groundwater. Indirectly, it has contributed to clean air and oxygen production, providing people with a healthy natural environment. The Murat River Watershed Rehabilitation Project has become a model for new projects in Turkey and abroad.

Sources

Interview and correspondence with Mustafa Ay, September and November 2020

https://www.ifad.org/en/web/operations/project/id/1100001623/country/turkey

Low density woody crops are productive fuel-breaks against fire in strategic areas. Villasbuenas de Gata.
© Greenpeace

Practice 8

SPAIN: MOSAICO, EXTREMADURA

Description

The Mosaico project in northern Extremadura, Western Spain, started in 2016 to prevent the fires which had devastated the area in 2015. Uninterrupted, abandoned, non-managed thick forests, rich in fuel wood provide the perfect conditions for megafires. Over the last decades this landscape has degraded due to population loss and fire damage. Most forest land is owned by municipalities but managed by regional government, leading to some tension and causing further abandonment. The project, coordinated by Universidad de Extremadura and funded by the Junta de Extremadura, is a landscape restoration effort aimed at reversing the abandonment of mountain and rural areas. It focuses on recreating the diverse mosaic pattern of the landscape, once so common, capitalizing on the traditional knowledge that has secured this landscape over the years. Small land owners and land users need to join forces to restore such a large landscape. The Mosaico Association was established to strengthen this participatory process, easing communication, capacity building and exchanges. Association members – producers, technicians, activists, cooperatives – have become a network of actors for change.

Objectives/vision

The main objective is to prevent forest fires through agro-sylvo-pastoral practices that create and maintain productive (green) firebreaks at no cost to the community. The idea is to interrupt the fuel-rich forest cover by inserting managed firebreak areas, which in turn are used as productive landscapes (“cortafuegos productivos”).

Landscape mosaic with cherry-olive-chestnut crops after a 2009 fire in Las Hurdes.

Volunteers help a goat herder near grazed firebreak in Sierra de Gata.
© Fernando Pulido

Action undertaken – how does it work?

Three types of activities are being carried out to thin the forest, making it less prone to fire and creating firebreaks: forest management, agriculture and livestock keeping. Economic activities that provide sustainable livelihoods are underway, contributing to defragmenting the forest and making it resilient to large fires. In forests, biomass is removed, non-timber forest products (resin) are harvested, and the composition and structure of species are diversified to reduce fuel accumulation. Fire risk is reduced and fire fighting – when fires do happen – is made easier. Farmers are growing fruit trees (chestnut, walnut, almond, pistachio, cherry, olive), small fruits or aromatic plants, or converting abandoned or burnt forests into low-density plantations. As for livestock keeping, wood biomass is removed from the forests (removing certain species while respecting others) to make room for animals. Milk and cheese provide important local income while grazing prevents reforestation and reduces the risk of fire on a large scale.

Integrated forest, agricultural and livestock management is planned carefully over the landscape. Farmers and shepherds take care of abandoned land and shape the landscape. Shepherds are paid for the fire prevention services they provide based on the quality and extension of their grazing in and around firebreaks. They ensure that fuel wood is at a minimum and firebreaks at maximum performance when the fire risk is highest. Field technicians listen to their needs and expectations and provide administrative, technical and legal support for economic activities that deliver on the fire prevention objective.

Benefits to ecosystems and local community

After the first four years the project was already able to report success in various fields:

- 250 entrepreneurial initiatives were received and supported, and a third of them have already been implemented
- local people were aware of the importance of mosaic landscapes and the importance of their own role in preventing fires
- forest owners worked together aggregating their individual plots
- herders were open to cooperating with one another
- the price of goats' milk increased by 50%
- there was increased variety in fruit tree cultivation
- a trend emerged in the local processing of products, thus increasing income and local employment.

Challenges have included the lack of available land to meet all requests from new entrepreneurs, and inadequate planning of grazing to secure safe firebreaks during the highest fire risk. End-of-project formal monitoring and evaluation is currently underway and more will be known about the extent to which the Mosaico project has contributed to rural development and fire reduction. Meanwhile, about one third of the proposals received for creating productive firebreaks has been implemented and fire risk is deemed to have decreased. The experience so far has contributed to improving land governance and regional regulations, bringing them in line with fire prevention requirements, with easier access to private land to fight or prevent fires, and easier clearing of forest land and – around villages – conversion of land for agricultural use. The approach is being transferred to other regions of Spain.

Sources

Interview and correspondence with Fernando Pulido, Project Coordinator, October and November 2020

https://www.mosaicoextremadura.es/ and *Project video*

CONCLUSIONS

The eight practices – common aspects, notable differences

The eight practices described here are those that practitioners in the Mediterranean have been willing to share with us. They represent the experiences that these generous colleagues took the time to describe, after concluding themselves that these practices indeed fulfil FLR principles.

When we set out to survey the extent to which FLR is implemented in the Mediterranean we imagined that we would gather enough detailed information to allow for precise and quantified conclusions. We thought we would be able to state that a certain FLR principle is being fully implemented everywhere, for example. The questionnaire was designed to collect data on all FLR principles in a manner that would allow aggregation and cross-comparison in both implementation and outcomes. The information we received, however, is entirely diverse regarding implementation, time spans, indicators and outcomes which has made it impossible to formulate clean, clear and comparative conclusions. As a result, this survey has evolved to provide a general, qualitative description of the eight practices that were brought to our attention. We have considered the extent to which they address the FLR principles, highlighting common features, significant successes or smart solutions when possible.

Looking at the eight practices collectively, we are thus able to make some general observations on FLR in the Mediterranean.

Some general observations

The eight practices use the terms restoration, rehabilitation, conservation, reforestation, improvement: for the purposes of this survey, this is all considered "restoration". If activities in the field address specific problems caused by land or ecosystem degradation, then the initiative is restoration. If it is a diverse landscape, with room for different uses (agro-sylvo-pastoral, for example) and stakeholders have an important role, then the initiative is FLR.

The main causes of ecosystem degradation identified by the eight practices are overuse (grazing, wood collection) and natural factors (erosion, drought). The reasons most often cited for the loss of the traditional diverse cultural landscape are the marginal rural economy and abandonment of the landscape, which go hand in hand.

Public funds are by far the main source of funding for all practices: from regional and national administrations to bilateral cooperation (the French Facility for Global Environment) and international bodies (the EC via the LIFE Programme or the Rural Development Funds, IFAD). Complementary funds have come from private foundations (MAVA and Cariplo) and from the local communities or other local stakeholders. This is in line with very recent surveys of funding for restoration projects in Europe[7].

In the majority of cases, restoration initiatives with a specific focus and duration evolve into programmes with broader focus and timespan. In only one case (Juniperus coastal dunes) is there an individual time-limited project. Generally, individual projects add to each other and evolve into full programmes. This is positive news, given that it is generally recognized that it takes at least 15 years to see some of the results of restoration efforts and 30 years to receive meaningful feedback.

Focus on landscapes

For the most part, the eight practices address a landscape and not individual sites. When the focus is on specific sites, attention goes beyond their boundaries in an attempt to create connectivity between sites or buffer areas around them. More often the landscape is described as a mosaic, a combination of different land uses and land cover, and agro-sylvo-pastoral uses are widespread.

FLR is not only about forests, but forests are explicitly addressed by all practices. Forests are the main land use in a diverse mosaic-like landscape; sometimes they are the only habitat type. Forests have been brought back where they had disappeared, improved where they had been degraded, protected when access and use needed to be limited, thinned where they contained too much fuel load and fragmented through firebreaks when fires had to be prevented.

[7] UNEP-WCMC, FFI and ELP (2020). Funding Ecosystem Restoration in Europe: A summary of funding trends and recommendations to inform practitioners, policymakers and funders. 24pp. https://www.restorationfunders.com/

Engage stakeholders and support participatory governance

No practice has a formal shared vision, that is to say a statement that unites all stakeholders and describes the desirable scenario expected at the end of the restoration effort. However, all have clear objectives, and one practice – the Insubria ecological corridor – even developed a motto, an interesting way to condense the complexity of the project's approach.

All have implemented some form of participation and stakeholder involvement, none was top-down or implemented by one party only. The notion that restoration needs to work for the local people is well ingrained. Local communities, users and residents are always engaged, albeit to varying degrees. Often they organize themselves into associations of users and producers (both Morocco practices, Mosaico), legal entities that become responsible for the sustainable use of resources.

In several cases new parties have joined the initiatives along the way, an indication that the benefits of the initiatives have become clear with time and that the process is flexible enough to allow for the inclusion of new partners.

Gender-sensitiveness is not often an explicit concern of the practices. Women tend to be involved in concrete restoration activities such as in tree nurseries, in planting and in awareness programmes. In some cases, restoration outcomes have shown improvements in the lives of women (both Morocco practices, Murat). When money is made available to communities for spending on their own priorities – such as in the Moroccan practices – the needs and requirements of women in the communities are addressed. No mention of vulnerable groups was noted.

The most common activity involving young students (and their teachers) is education and awareness raising regarding the resources and cultural heritage of their area. For the youngest members of the community in Morocco, special school buses were organized with the money made available from the compensation mechanism. Young entrepreneurs are targeted by several programmes intending to (re)launch sustainable livelihoods, especially in rural and formerly abandoned areas.

Restore multiple functions for multiple benefits

In some cases restoration efforts focus on the ecological component without explicitly addressing socio-economic systems (Pinsapo, Juniperus coastal dunes, Insubria). Interestingly, during this survey when prompted by additional questions, in a couple of these cases respondents acknowledged indirect social and economic benefits that had neither been immediately apparent nor investigated. In the majority of practices, though, restoration objectives encompassed both ecological and socio-economic components (Aterno, both Morocco practices, Murat, Mosaico).

Of the three practices that explicitly address only ecological restoration (Pinsapo, Juniperus coastal dunes and Insubria) two have the conservation of a species or habitat as their main objective, and one the restoration of an ecological corridor. The objectives of all the other practices, however, converge towards two main concepts: resilient landscapes and sustainable rural development.

The multiple benefits pursued (and achieved) by the majority of the practices include the following:

- robust landscapes that do not yield to climate and support lively communities of people anchored to their land
- fire prevention
- sustainable livelihoods based on forest products, agriculture, livestock, tourism and culture
- young entrepreneurs
- healthy communities
- rich biodiversity.

Value chains, much encouraged by FAO, are generated in most of the practices included here.

Maintain and enhance natural ecosystems within the landscape

All eight practices address habitat types or ecosystems or landscapes. There is no restoration practice that only focuses on one single species. When the practice objective was to protect an endangered species, restoration activities covered cohorts of other species that share the same habitat as the flagship species and that contribute to shaping the ecosystem.

Tailor to the local context using a variety of approaches

Together, the eight practices show a vast range of implementation options and approaches, spanning from active field restoration to natural regeneration, from permanent or temporary protection to regulated use, from co-management to social sylviculture, from productive firebreaks to new value chains, from compensation mechanisms to multi-party agreements, from policies to education. Each practice applies a set of these.

If managed appropriately, grazing becomes an ally in the restoration of Mediterranean mosaic landscapes and in fire fighting. Livestock grazing is a key component of Mediterranean culture and economy and shapes the landscape. While grazing has been repeatedly listed as one of the causes of degradation, it has often also been incorporated into the practices to make the landscapes resilient to climate change and wildfire (Pinsapo, Mosaico).

Manage adaptively for long term resilience

All practices have addressed awareness raising. All but three have websites, some of which are really innovative. Mosaico, for example, explains the intricacies of a complex programme and the preliminary results through short, effective videos. Several awareness-raising activities have targeted children – the practice on Juniperus coastal dunes has produced a fairy tale book. Project documentaries have won awards – the one on Insubria ecological corridor, for example.

Most practices have produced project reports or publications that provide a great deal of data; the Pinsapo programme has produced a fascinating monography. Practices linked to research centres or research grants have also developed scientific papers and engaged the scientific community in academic exchanges.

The eight practices have built the capacity of a wide range of key stakeholders: resource users, producers, new entrepreneurs, technical advisors, public officials, policy makers. Project extension officers have both delivered and received training. Training has increased soft skills (planning, participatory techniques) and technical capacity in field activities, depending on the needs of the restoration initiatives.

Almost all practices have tackled the governance system; some have made recommendations to improve legislation and procedures (both Morocco practices) and several have gone as far as to change them or to develop new planning documents that maintain and reinforce the results of restoration (Pinsapo, Insubria, Mosaico). In one case (Aterno) emphasis has been placed on preparing governance for the future implementation of FLR – the statute and agreement of a multi-stakeholder association, the strategic plan and the fundraising plan. Results at the policy and wider governance level are very significant: the landscape is changed if there is political will and effort.

All practices have foreseen monitoring and evaluation of their results, in a wide range of ways. Most practices include formal M&E, either as a continuous activity or in the short- and mid-term after the end of the project; however, a few practices have not yet started their M&E and are at too early a stage to show any results, or can share only outdated results. As a consequence the individual practices do not provide consistent information on all FLR principles, and describe the fulfilment of the same FLR principle in vastly different ways. No practice complies with the indicators suggested by the GPFLR, for example, which of course is no surprise given that they all began without the explicit intention to implement FLR.

Main conclusions

Collectively, the eight practices fulfil all FLR principles. Individually, most of them fulfil most of the principles.

In questionnaires and interviews the majority of respondents rated the success of their restoration activities 2 or 3 out of 3. This is often not based on quantified data, but they thought carefully before giving their answers, which bear witness to the success of their initiatives.

We have seen that the socio-economic benefits of ecosystem restoration are generally known or can easily be inferred, even when this component is not explicitly addressed. Thus, deliberately incorporating thinking about socio-economic benefits in planning FLR from the outset could substantially improve socio-economic conditions.

The drivers of ecosystem degradation and the need for restoration do not seem to be development-sensitive. There is a widespread perception that FLR is mainly for developing countries. With six out of our eight practices in countries that would normally not be defined as developing (Spain, Italy, Greece and Turkey), this survey shows that FLR is for all types of countries, and that all types of countries are already implementing it, regardless of their level of development.

The approach proposed by the International Model Forest Network (IMFN) and its Mediterranean chapter (MMFN) is very promising, seen here in the the Aterno Valley Model Forest and the Ifrane Model Forest. Stakeholders are brought together to take part in a dialogue around the opportunities of their landscapes. “Landscapes, Partnerships, Sustainability” and “Sustainable landscape governance” are the key words on their websites[8]. The Network supports its members in initiating model forests by sharing guidelines, templates, experiences and intranet support. Model Forests feel they belong to a wider family.

Survey summary: indications for the state of and potential for FLR in the Mediterranean

Our call for contributions to this survey of FLR in the Mediterranean resulted in the response of the eight practices that we have described here. It is our understanding that they are only a fraction of what is out there, and that many more practices exist in the Mediterranean that could have been included.

Restoration initiatives in the Mediterranean can often be considered FLR. Generally, though, they are not acknowledged as such and not capitalized upon. In recognizing the role of FLR in addressing much needed restoration and strengthening of ecological and social systems, and in an effort to encourage FLR worldwide, it is a pity to have this untapped knowledge. It may seem that the Mediterranean is not doing much in this realm, often because formal large-scale efforts towards FLR touch the Mediterranean only marginally. This survey, then, contributes to raising the Mediterranean profile of FLR. By broadening our understanding of FLR and focusing on Mediterranean FLR efforts, the Mediterranean can be considered a key area for forest landscape restoration.

With this survey we are proud to contribute to fulfilling the strategy of the UN Decade on Ecosystem Restoration 2021-2030, in particular, contributing to the UN-DER actions and pathways “Global movement” and “Technical capacity”. We hope and expect to raise awareness, showcase economic returns from restoration, inspire restoration initiatives, synthesise lessons learned, and contribute to monitoring. The wide range of approaches to implementation and monitoring of the eight practices confirms that a consistent monitoring approach across practices is needed to take adequate stock of FLR efforts in the Mediterranean. This survey thus reinforces the motivation which led to the designation of 2021-2030 as the UN Decade on Ecosystem Restoration, because FLR is still largely unknown and often intimidating, and information on interesting practices that contribute to FLR implementation needs to be circulated and better known.

Networks of practitioners such as Medforval and M6 can indeed work alongside the UN Decade on Ecosystem Restoration, the Global Partnership on Forest and Landscape Restoration, Silva Mediterranea and the Mediterranean Model Forest Network to collect and disseminate FLR practices and to provide a platform for exchanges. We will continue to do so. Most importantly, FLR is within reach.

Forest and Landscape Restoration initiatives can be undertaken anywhere there is ecosystem degradation, a perception that restoration is needed and a readiness to start a participatory process.

[8] International Model Forest Network (IMFN) https://imfn.net/ and Mediterranean Model Forest Network (MMFN) https://www.medmodelforest.net/en/

UNITED NATIONS DECADE ON
ECOSYSTEM
RESTORATION
2021-2030

There has never been a more urgent need to restore damaged ecosystems than now.
Ecosystems support all life on Earth. The healthier our ecosystems are, the healthier the planet - and its people. The UN Decade on Ecosystem Restoration aims to prevent, halt and reverse the degradation of ecosystems on every continent and in every ocean. It can help to end poverty, combat climate change and prevent a mass extinction. It will only succeed if everyone plays a part.

The UN Decade on Ecosystem Restoration is a rallying call for the protection and revival of ecosystems all around the world, for the benefit of people and nature. It aims to halt the degradation of ecosystems, and restore them to achieve global goals. Only with healthy ecosystems can we enhance people's livelihoods, counteract climate change, and stop the collapse of biodiversity.

www.decadeonrestoration.org

MAVA
FONDATION POUR LA NATURE

MEDFORVAL

OIKOS

SHOUF BIOSPHERE RESERVE
محمية الشوف المحيط الحيوي