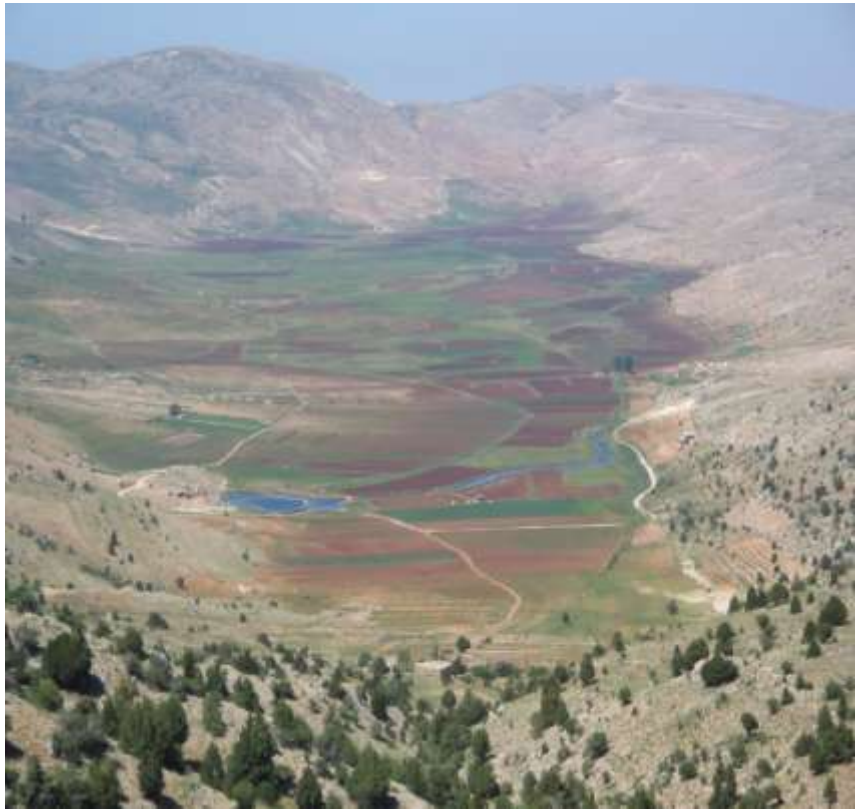
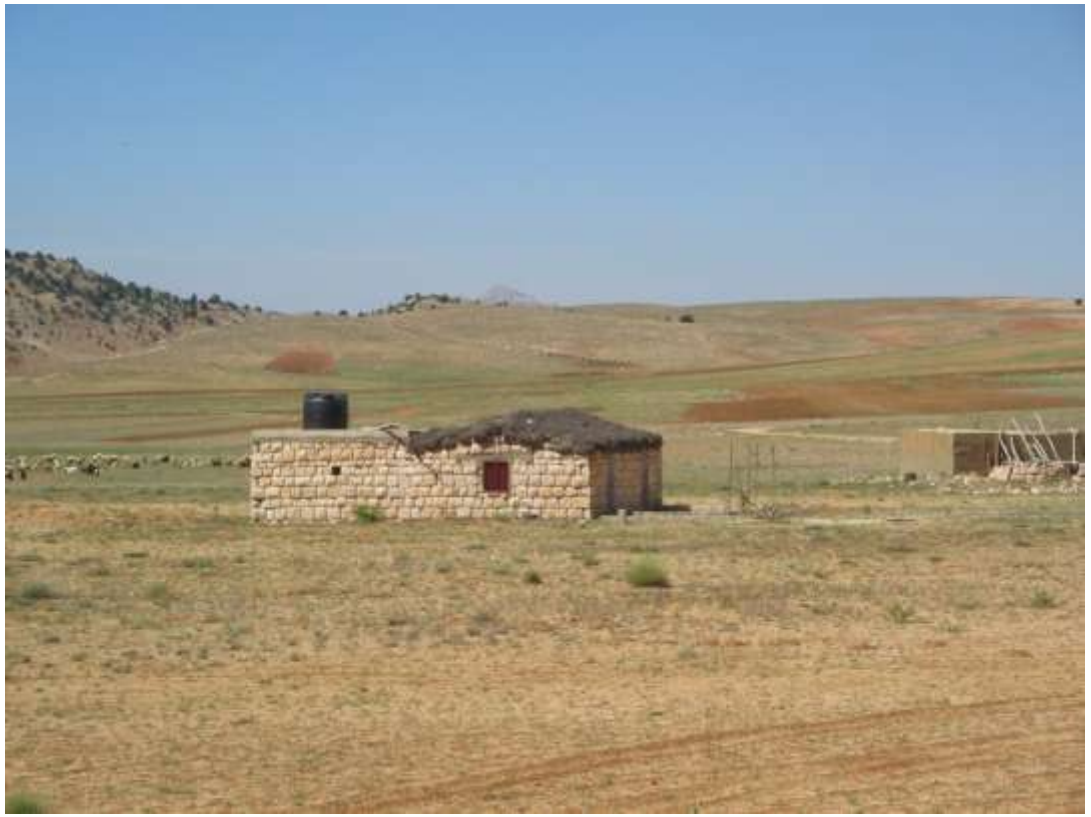
Development of a Project Proposal for a National Reforestation Programme in Lebanon

Background

- Intense human interventions leading to the eradication of all primary forests, and to the loss and degradation of most mountain conifer forests
- Largest deforestation rates in the Beqaa and Hermel and inner slopes of the Mount-Lebanon and Anti-Lebanon Range
- Overgrazing and overharvesting of forest in the Beqaa region
- Highly urbanised and cultivated coastal zones
- Increase in forest cover on the western slopes and valleys of Mount Lebanon
- Very high forest degradation and fragmentation due to the accelerated trend of urbanization and fires



- The implications of the combined phenomena of climate change and human-caused forest degradation pose serious threats.
- The Lebanese government is aware of the urgent need to develop a long-term reforestation programme, which can mitigate threats and increase forest resilience to meet future environmental and socio-economic challenges.



Current Situation

According to data from the 2010 Global FRA:

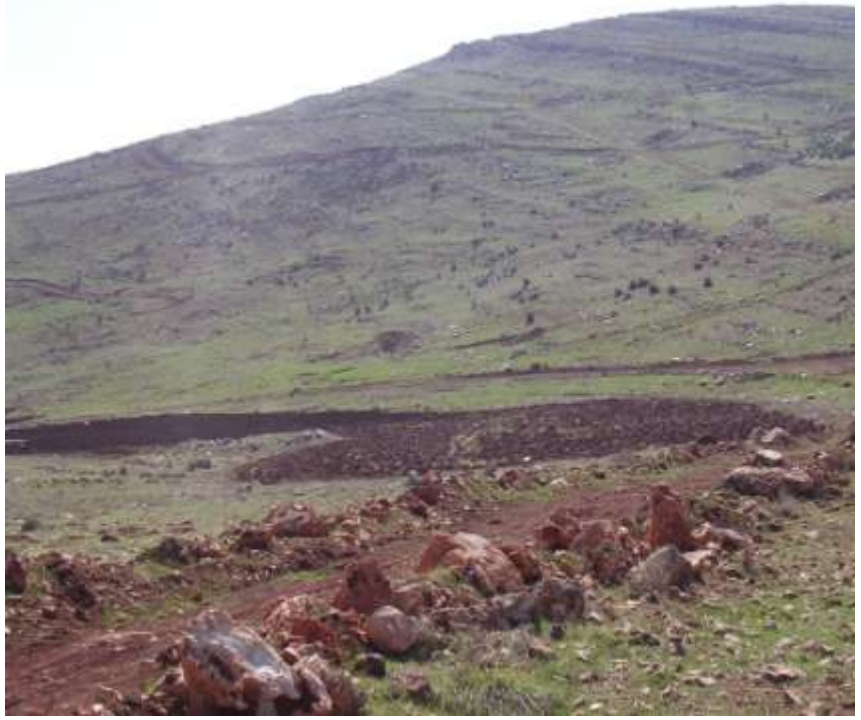
- Forests cover 13.2%
- “Other Wooded Lands” (OWL) cover 10.2%
- 23.4% of the Lebanese land area covered by forests, woodlands and scrub.
- Other lands with trees, including fruit trees, olive yards, highly degraded forest lands that do not fall under “Forests” or “OWL” cover 11% of the total land area.
- These figures make Lebanon one of the most forested countries in the Middle East.

- Forest: Land with tree crown cover (or equivalent stocking level) of more than 10 percent and area of more than 0.5 ha. The trees should be able to reach a minimum height of 5 m at maturity *in situ*.
- OWL: Land either with a tree crown cover (or equivalent stocking level) of 5-10 percent of trees able to reach a height of 5 m at maturity in situ; or a crown cover (or equivalent stocking level) of more than 10 percent of trees not able to reach a height of 5 m at maturity in situ (e.g. dwarf or stunted trees) and shrub or bush cover.

- A burnt forest or OWL is still considered as such, as long as the regeneration (either natural or assisted) capacity and the land use are maintained (i.e. as long as there is no change in the land-use, from forest or OWL to agriculture or urban)

Past and On-Going Efforts

- Different forestation programmes have slightly contributed to increase the forest cover in the country.
- Reforestation/afforestation actions have often failed due to different factors, such as the lack of participation of local people, inadequate site and/or species selection, bad quality of produced plants, problems in transporting plants to the field, inadequate practices in land preparation and planting techniques, and lack of maintenance of reforested sites.



- Concerned stakeholders have made significant progress, and improved professional know-how and technical instruments related to forestation measures.
- Some example include:
  - GIS mapping and planning tools
  - Reforastation/afforestation programs by MoE and MoA
  - Improvement of nursery conditions for native species production by MoA, AFDC, AUB-AREC;
  - Development of research techniques to assess genetic provenances of native species and seed germination by Saint Joseph University;
  - Production, planting, processing and marketing of forest species with agro-biodiversity values by LARI;
  - Restoration of biodiversity in protected areas, such as the work done by ACS in the Shouf Cedar Reserve.

The National Reforestation Program

- Main Objective: Regaining healthy forest conditions and enhancing sustainable forest management so that forest functions, biodiversity, resilience and productivity are maintained and contribute to the social, cultural, spiritual and economic wealth of the society.

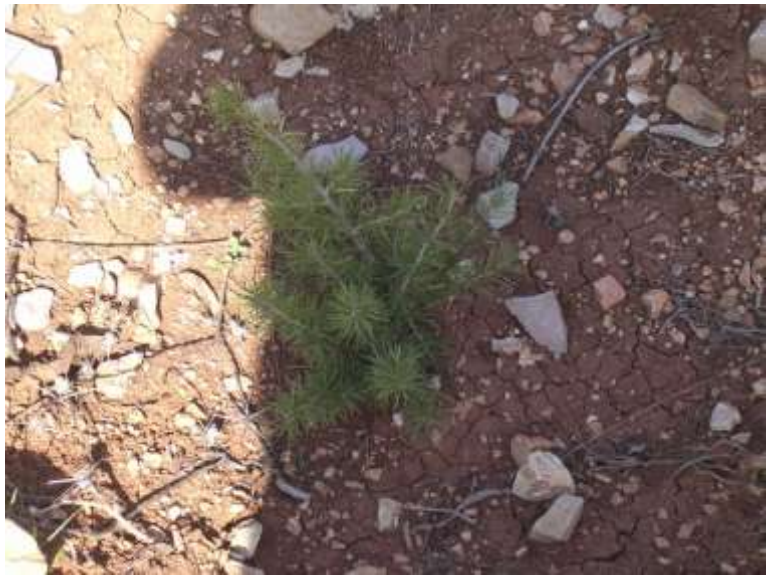
WHY DO WE NEED REFORESTATION/AFFORESTATION?

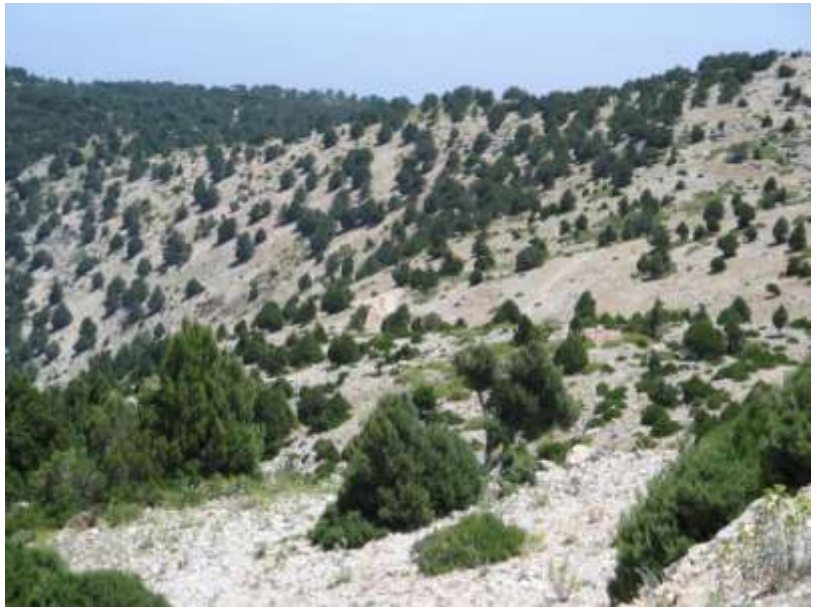
✔ Conserve Biological Diversity
integral part of the wealth of the country
✔ Combat Desertification
over-exploitation of natural resources
✔ Reduce Environmental Risks
forest fires; floods; soil loss and erosion
✔ Build Resilience to Climate Change
extreme weather events & large scale disturbances
✔ Support Rural Development
traditional systems, livelihoods and food security
✔Protect and Improve Resources
Soil and water systems

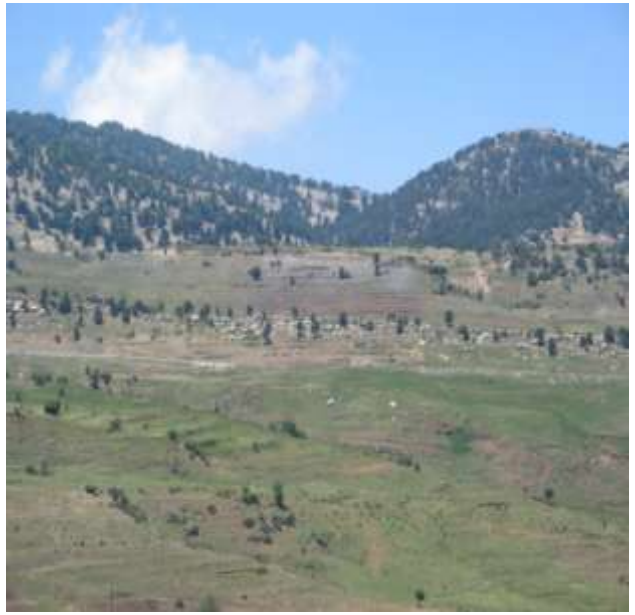
Lines of Intervention

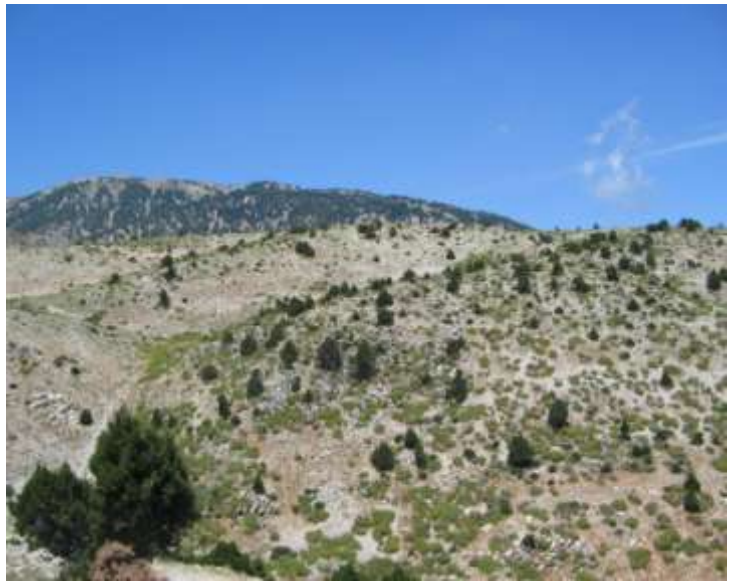
- The following lines of interventions could be implemented in the different regions, depending on the land-cover/land-use

- Active restoration (Planting, seeding...)
- Passive restoration (sustainable management and protection of forests, scrub and grasslands to favour natural regeneration and to allow the evolution of degraded woodlands)









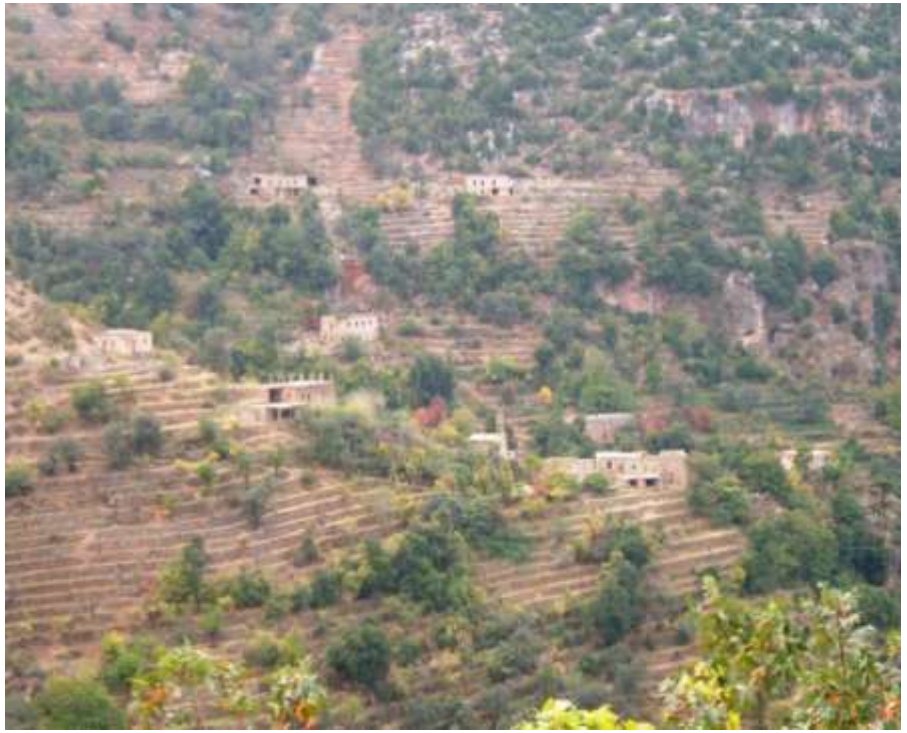
A – Restoration of connectivity, to mitigate the threat of fragmentation and isolation

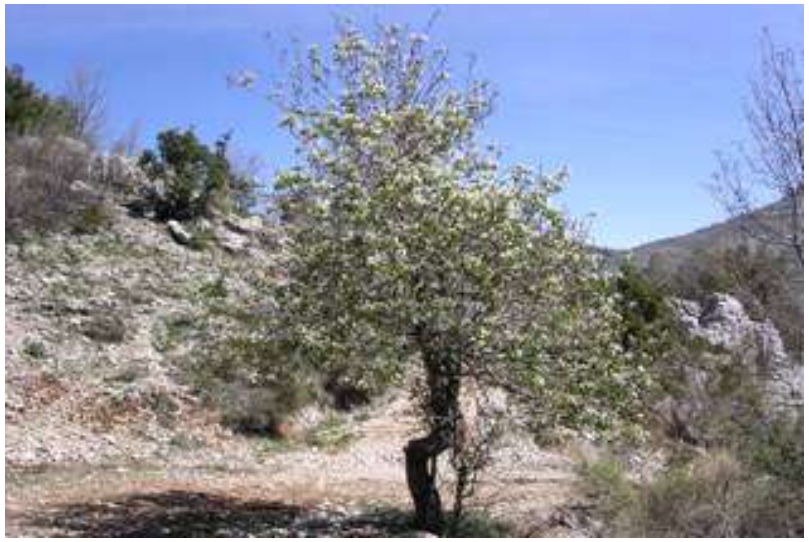
- Linking isolated forest stands with native shrubs and trees (namely endemic oak species) with a *nursery* effect
- Reforestation with saplings of riparian trees along river networks to improve runoff regulation and water quality, and facilitate species migration upwards and over the landscape in response to climate changes.
- Windbreaks in major agricultural zones
- Trees along the roads and abandoned railways
- Green belts around cities and villages

B – Diversification of forest species composition, combining different types of species to increase economic opportunities for local people and to enhance biodiversity and resilience against major disturbances and climate change.

C – Restoration of a mosaic landscape structure for soil stabilization and for biodiversity within forest landscapes.

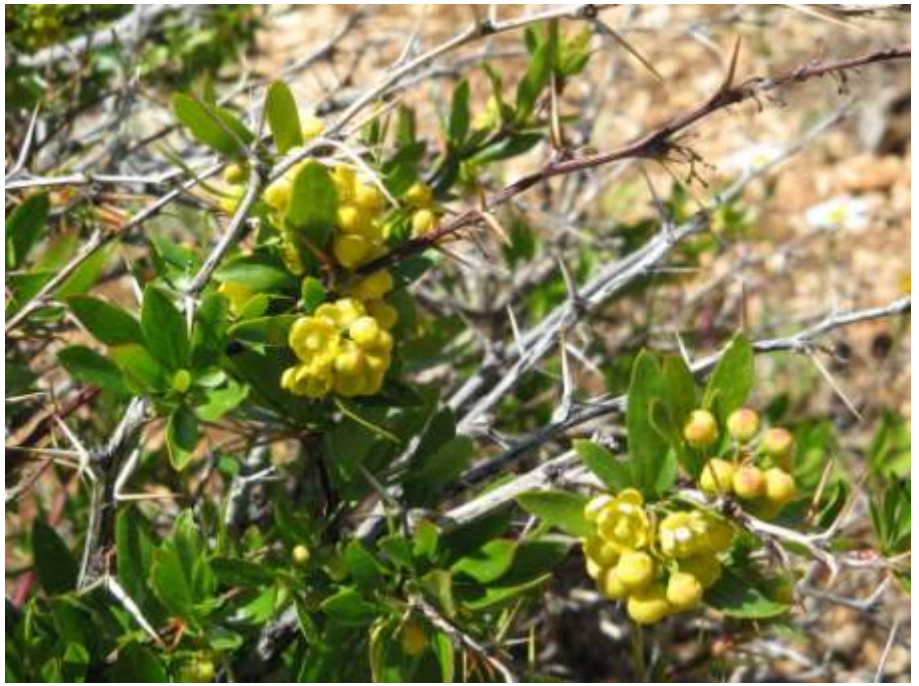
- Restoration of terraces
- Planting and cultivation of wild fruit trees and aromatic/medicinal plants, is important

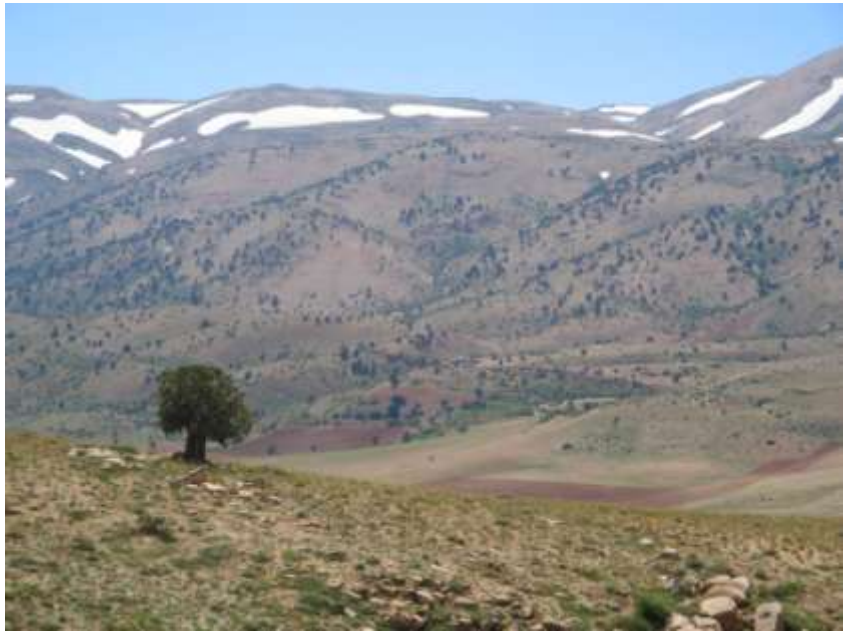




D – Restoration of degraded and marginal lands

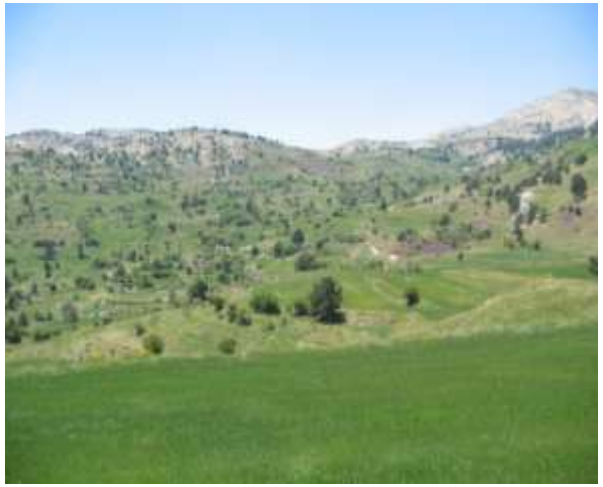
- Seeding with grass species and planting pioneer shrub and grass seedlings
- Plantation of tree seedling where soils are best preserved.
- Airplane seeding with native herbaceous species in very inaccessible areas with a high risk of erosion.
- Mulching of soil with straw or other organic materials may facilitate soil retention and natural regeneration.





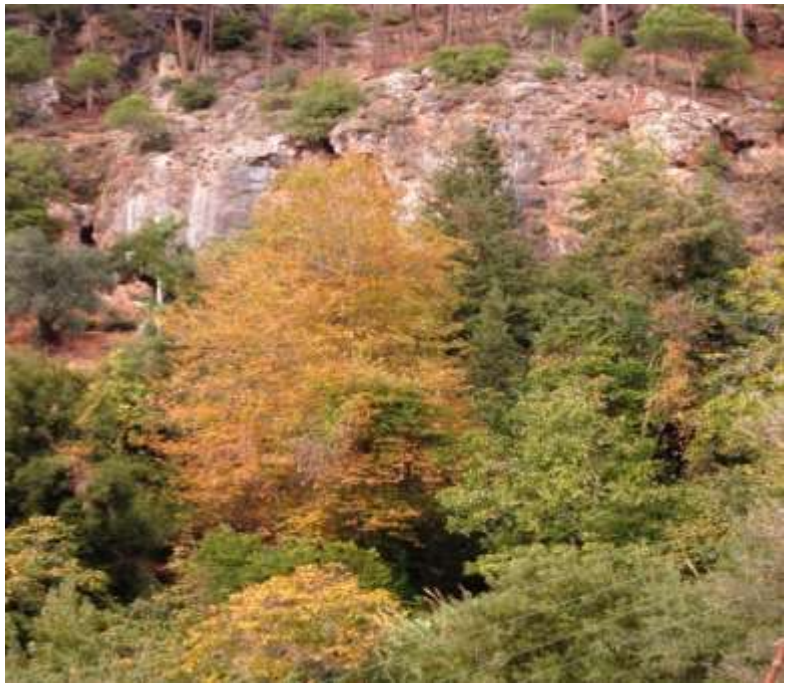
E – Management of natural forests and OWL.

- Sustainable management practices
- Thinning practices in dense forest stands
- Reduction of dry biomass
- Sustainable grazing management
- Seeding of grassland native species and temporal fencing of overgrazed areas
- Post-fire management



Bio-climate Zones and Forest Types

- Reforestation/afforestation activities should be based on the different species in the bio-climate zones



Bio-climate	Substrate	Forest Habitat Type	Dominant species	Companion tree/shrub	Herbal species
Thermo-Med. (< 500 m)	Limestone	Carob-Lentisk Scrub	Ceratonia siliqua; Pistacia lentiscus; Myrtus communis; Olea europaea	Rhus tripartite; Calycotome villosa; Poterium spinosum; Viburnum tinus; Rhamnus alaternus; Retama raetam; Rhus tripartita	Hyparrenia hirta Aristida coerulescens Stipa capensis
		Pine woodlands	Pinus britia		
			Pinus halepensis		
		Evergreen oak woodlands	Quercus calliprinos; Ceratonia siliqua; Myrtus communis; Pistacia lentiscus	Calycotome villosa; Poterium spinosum; Hypericum thymifolium; Cistus creticus; Viburnum tinus; Rhamnus alaternus; Retama raetam; Rhus tripartita	Hyparrenia hirta; Andropogon distachyus
		Mixed oak-pine woodlands	Pinus brutia; Q. callirpinos; Myrtus communis; Pistacia lentiscus		
	Marl and marly-limestone	Pine forests	Pinus brutia	Gonocytisus pterocladus; Cytisopsis dorycniifolia; Satureja thymbra; Coridothymus capitatus; Myrtus communis; Pistacia lentiscus; Ceratonia siliqua;	Hyparrenia hirta; Trachyna distachya; Stipa bromoides
			Pinus halepensis		
		Mixed conifer forests	Pinus brutia; Cupressus sempervirens		
		Cypress forests	Cupressus sempervirens		
	Sandstone	Pine forests	Pinus pinea; (P. brutia)	Erica manipuliflora; Cistus creticus; Cistus salvifolius	Hyparrenia hirta; Stipa bromoides

Bio-climate	Substrate	Forest Habitat Type	Dominant species	Companion tree/shrub	Herbal species
Eu-Med. (500-1000 m)	Limestone	Evergreen oak forests	Quercus calliprinos	Pistacia palestina; Arbutus andrachne; Phillyrea media; Crataegus azarolus; Acer syriacum; Laurus nobilis; Viburnum tinus Degradation: Calycotome villosa; Rhamnus punctata; Hypericum thymifolium; Cistus creticus; Salvia fruticosa; Poterium spinosum	Lotus judaicus; Cyclamen persicum; Rubia tenuifolia; Grasslands: Hyparrenia hirta; Andropogon distachyum
		Mixed oak-pine forests	Quercus calliprinos; Pinus brutia; (P. pinea)		
		Deciduous oak forests	Quercus infectoria; Q. calliprinos	Styrax officinalis; Cercis siliquastrum. Degradation: Spartium junceum; Origanum syriacum	Brachypodium pinnatum
	Marl & marly-limestone	Mixed conifer forests	Pinus brutia; Cupressus sempervirens	Genista acanthoclada Degradation: Calycotome villosa; Poterium spinosum; Satureja thymbra; Thymbra spicata	Hyparrhenia hirta
		Pine forests	Pinus brutia		
		Cypress forests	Cupressus sempervirens		
	Sandstone	Pine forests	Pinus pinea; (Quercus infectoria; P. brutia)	Juniperus oxycedrus; Lavandual stoechas. Degraded: Cistus salvifolius	Briza maxima; Phleum montanum; Anthoxantum odoratum Grassland: Tuberaria guttata; Aira elegans; Trifolium medusaeum

Bio-climate	Substrate	Forest Habitat Type	Dominant species	Companion tree/shrub	Herbal species
Supra-Med. (1000-1500 m)	Limestone	Evergreen oak forests	Quercus calliprinos	Degraded: Calycotome villosa; Origanum syriacum; Teucrium divaricatum	Brachypodium pinnatum; Melica angustifolia
		Mixed oak and juniper forests	Q. calliprinos; Arceuthos drupacea		
		Deciduous oak forests	Q. infectoria; Q. calliprinos	Lonicera nummulariifolia Degraded: Spartium junceum; Origanum syriacum; Calycotome villosa; Poterium spinosum	Brachypodium pinnatum; Melica angustifolia; Poa bulbosa
			Q. cerris		Lathyrus niger; L. digitatus
		Hop-hornbeam mixed forests	Ostrya carpinifolia; Fraxinus ornus; Q. infectoria; Q. pinnatifida	Sambucus ebulus; Spartium junceum; Acer tauricolum; Coronilla emeroides; Genista libanotica	Melica uniflora; Brachypodium pinnatum; B. sylvaticum; Paeonia kesrouanensis
	Sandstone	Stone pine forests	Pinus pinea; Q. infectoria	Cytisus syriacus; Adenocarpus complicatus; Halimium umbellatum; Cytisus drepanolobus; Genista lydia	Tuberaria guttata; Aira elegans; Briza maxima
		Deciduous oak forests	Q. infectoria	Juniperus oxycedrus; Cytisus syriacus; Adenocarpus complicatus; Cytisus drepanolobus; Genista lydia	Origanum ehrenbergii
			Q. cerris	Cytisus syriacus; Adenocarpus complicatus	Origanum ehrenbergii; Luzula forsteri

Bio-climate	Substrate	Forest Habitat Type	Dominant species	Companion tree/shrub	Herbal species
Mountain-Med (1600-1900 m)		Mixed conifer forests	Abies Cilicia; Cedrus libani	Sorbus flabellifolia; Berberis libanotica; Cotoneaster nummularia; Acer tauricolum; Malus triloba; Sambucus ebulus; Coronilla emeroides; Colutea cilicica; Sorbus torminalis, Genista libanotica; Rosa dumetorum; Rosa glutinosa	Dactylis glomerata; Agropyrum panormitanum; Poa diversifolia; Sesleria anatolica; Lathyrus libani; Doronicum caucasicum; Trifolium physodes; Trifolium stellatum; Lathyrus digitatus; Vicia tenuifolia; Medicago lupulina; Medicago minima; Medicago radiata
			Abies cilicica		
			Cedrus libani		
		Mixed conifer/oak forests	Cedrus libani; Q. cedrorum; Q. pinnatifida		
			Cedrus libani; Q. brantii		
		Oak forests	Q. brantii look		
			Q. cedrorum		
		Juniper woodlands	Juniperus excelsa; J. foetidissima		
Oro-Med (>1900 m)		Juniper woodlands	Juniperus excelsa	Rhamnus libanotica; Berberis libanotica; Prunus prostrata; Pirus syriaca; Cotoneaster nummularia Degradation: Astragalus spp; Acantholimon libanoticum	Onobrychis cornuta; Agropyron libanoticum

Bio-climate	Substrate	Forest Habitat Type	Dominant species	Companion tree/shrub	Herbal species
Steppe non-forest		Hammada scrub		Hammada eigii; Artemisia herba-alba; Salsola villosa; Atriplex leucoclada; Atriplex lasiantha; Salvia palestina	Carex stenophylla; Vicia plaestina; Vicia cinerea; Medicago blanchea; Trifolium tomentosum; Lathyrus pseudocicera; Onobrychis hemicycla
Steppe-Med (900-1500 m)		Evergreen oak forests	Q. calliprinos	Pyracantha coccinea; Acer hermoneum; Amygdalus korschinskii; Jasminum fruticans Degradation: Poterium spinosum; Calycotome villosa	Stachys nivea; S. cretica
Steppe-Supra-Med (1500-1800 m)		Mixed oak forests	Q. calliprinos; Q. infectoria; Juniperus excelsa	Pyracantha coccinea; Acer hermoneum; Amygdalus korschinskii; A. orientalis; Jasminum fruticans; Pirus syriaca; Berberis libanotica	Ziziphora capitata; Thelegonum cynocrambe; Ononis pusilla; Trigonella monantha

Bio-climate	Substrate	Forest Habitat Type	Dominant species	Companion tree/shrub	Herbal species
Steppe. Mountain-Med (1800-2400 m)		Juniper forests	Juniperus excelsa	Berberis libanotica; Astralagus spp	Onobrychis cornuta; Agropyron libanoticum
Steppe-Oro-Med (>2400 m)		Juniper woodlands		Rhamnus libanotica; Berberis libanotica; Prunus prostrata; Pirus syriaca; Cotoneaster nummularia Degradation: Astragalus spp; Acantholimon libanoticum	Onobrychis cornuta; Agropyron libanoticum
Riparian forests		Lowland Plane tree forests	Platanus orientalis; Salix alba; Laurus nobilis; Tamarix spp	Vitex agnus-castus; Nerium oleander	Hypericum hircinum; Pteris vitata
		Plane tree and alder forests	Platanus orientalis; Alnus orientalis; Salix libani		
	Sandstone	Alder forests	Alnus orientalis; Salix libani	Rhododendron ponticum	Osmiunda regalis; Equisetum telmateia; Blechnum spicant

Thank You