

**Forests and range resources around the Mediterranean:**  
**State, functions and knowledge**

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**Cairo, 2010**

## Acronyms and abbreviations

AIMF	Association Internationale Forêts Méditerranéennes
CBD	Convention on Biological Diversity
CIHEAM	Centre International de Hautes Etudes Agronomiques Méditerranéennes
CIRCE	Climate Change and Impact Research: Mediterranean Environment
CMA	Unità di Ricerca per la Climatologia e la Meteorologia Applicate all'Agricoltura
CPF	Collaborative Partnership on Forests
CRA	Consiglio per la Ricerca e la Sperimentazione in Agricoltura
EFFIS	European Forest Fire Information System
EFC	European Forestry Commission
EFIMED	Mediterranean Regional Office of the European Forest Institute
FAO	Food and Agriculture Organizations of the United Nations
FOREST EUROPE	Ministerial Conference on the Protection of Forests in Europe
FRA	Global Forest Resources Assessment
INGV	Istituto Nazionale di Geofisica e Vulcanologia
INRA	Insitut National de la Recherche Agronomique
IPA	Important Plant Areas
IPCC	Inter-governmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
JRC	Joint Research Centre
MFRA	Mediterranean Forest Research Agenda
MMFN	Mediterranean Model Forest Network
NFMA	National Forest Monitoring and Assessment
NWFP	Non-Wood Forest Product
OFME	Observatoire de la Forêt Méditerranéenne
PES	Payment for Environmental Services
SoEF	State of Europe's Forests
SOMF	State of Mediterranean Forests
UfM	Union for the Mediterranean
UNCCD	United Nations Convention to Combat Desertification
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
URFM	Ecologie des Forêts Méditerranéennes
WWF	World Wildlife Fund

## BACKGROUND

The bioclimatic zone of the Mediterranean extends to the entire coastal strip of the basin. It covers parts of the following coastal countries: Portugal, Spain, United Kingdom(Gibraltar), France, Monaco, Italy, Malta, Slovenia, Croatia, Bosnia-Herzegovina, Montenegro, Macedonia, Albania, Greece, Bulgaria, Turkey, Cyprus, Syria, Lebanon, Israel, Palestine, Jordan, Egypt, Libya, Tunisia, Algeria, Morocco. The map of figure 1 shows the extent of the area. The Mediterranean has watersheds of different extent. It includes the Nile watershed in the south, substantial parts of the Alps and the Rhodopes Mountain in the north.

**Figure 1. Map of Mediterranean countries**



Source: State of the environment and development in the Mediterranean - 2009, Plan Bleu

The Mediterranean forest and range<sup>1</sup> ecosystems (see Box 1) are generally characterized by a remarkable set of features and an exceptionally large variation of environmental conditions that make them naturally and aesthetically attractive. Moreover, the Mediterranean forests contain an array of plant and animal species diversity with relatively high genetic variability. This region is one of the world's biodiversity hotspots. Its mosaic of forest landscapes contributes greatly to the outstanding biological richness and multiple values which attract the many tourists that visit the Mediterranean every year. These Mediterranean forest landscapes also contribute to poverty alleviation, the socio economic development of rural areas, food security of local people and the preservation of the multiple environmental services considered today by the international community as of global importance (biodiversity, landscape quality, preservation of water resources and fight against land degradation). Despite their apparent fragility, Mediterranean

<sup>1</sup> The term of range and rangelands are used to reflect the importance (socially and economically) of this vegetation type and ecosystem in many countries particularly in the south and East of the Mediterranean. Rangelands can be with or without woody formations

forest landscapes have been shaped by human activities and have demonstrated for several centuries their strong resilience to changes of anthropogenic origins. However, today they are facing a threat of unprecedented magnitude which they will have to adapt to in the coming

**Box 1: Terms and Definitions**

**Forest:** Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use.

**FAO FRA -Working Paper 83/E, 2004**

**Other wooded land:** Land not classified as Forest, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds *in situ*; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.

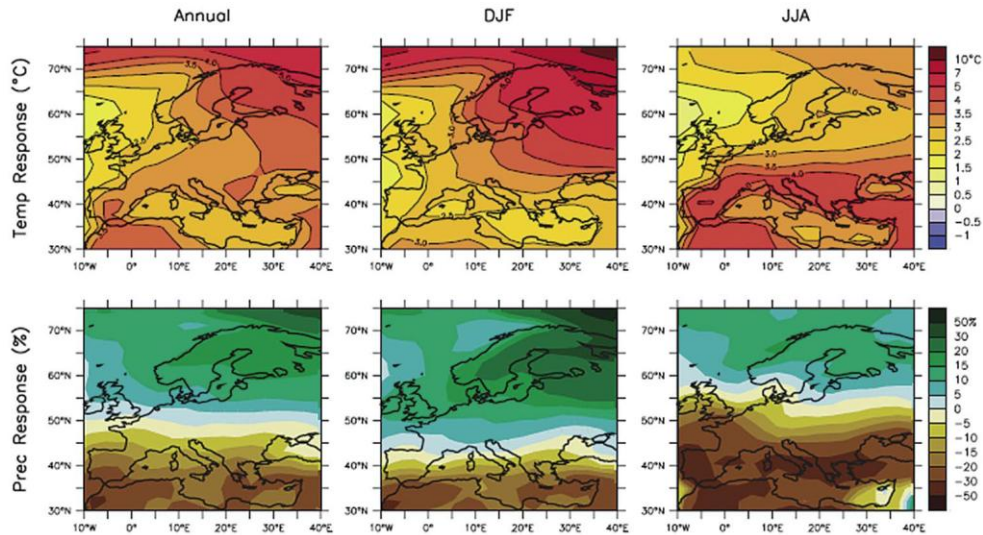
**FAO FRA -Working Paper 83/E, 2004**

**Rangelands:** Land not classified as Forest or other wooded land, spanning more than 0.5 hectares, with natural grassy vegetation used for browsing by livestock. It does not include land that is predominantly under natural or manmade natural woody vegetation, crops or urban land use.

**Definition for the purpose of this paper**

decades. Climate change is expected to have significant, if not severe, impacts on Mediterranean ecosystems (See figure 2) while at the same time the population of the Mediterranean region will increase significantly by 2050. IUCN estimates that worldwide the current species extinction rate is between 1,000 and 10,000 times higher than it would naturally be. According to the same source, the main drivers of this loss are converting natural areas to farming and urban development, introducing invasive alien species, polluting or over-exploiting resources including water and soils and harvesting wild plants and animals at unsustainable levels. This raises crucial questions. What can be done to ensure that Mediterranean forest landscapes adapt to new social, economic, environmental and climate conditions so that they can continue to provide goods and services on which people depend? How can regional cooperation in this area located at the crossroads of Africa, Europe and Asia help countries respond effectively to the new challenges posed by climate change? How can the Mediterranean region, which is particularly hard hit by global climate change, become in some ways, a laboratory to develop, test and disseminate best practices to promote adaptation of forest ecosystems to climatic changes and other pressures during the twenty-first century?

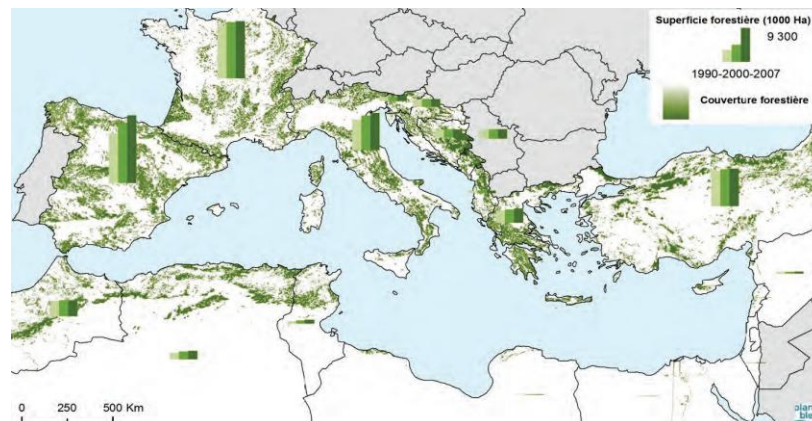
**Figure 2:** Simulated temperature and precipitation changes over Europe for the A1B scenario



Source: IPCC 4th assessment report 2007: Simulated temperature and precipitation changes over Europe for the A1B scenario. Top row: annual mean; winter (DJF); summer (JJA); temperature change between 1980 to 1999 and 2080 to 2099 averaged over 21 models. Bottom row: same as top, but for fractional change in precipitation.

In the countries to the north of the Mediterranean, natural land ecosystems are seeing the more or less vigorous return of forests (See figure 3), due to the abandonment of marginal agriculture lands and to reforestation campaigns. To the South, particularly in the Maghreb, the ecosystems are still exposed to increasing anthropogenic pressure of clearing and cultivation of marginal lands, overexploitation of firewood and overgrazing. The south Mediterranean forest and range ecosystems fall mostly in the semi-arid with often poor soils and scarce water. Due to the reigning environmental and climatic conditions, these ecosystems are particularly fragile and vulnerable and one of the most endangered in the world. Many native plants and animal species have become extinct or endangered.

**Figure 3: Forest cover around the Mediterranean**

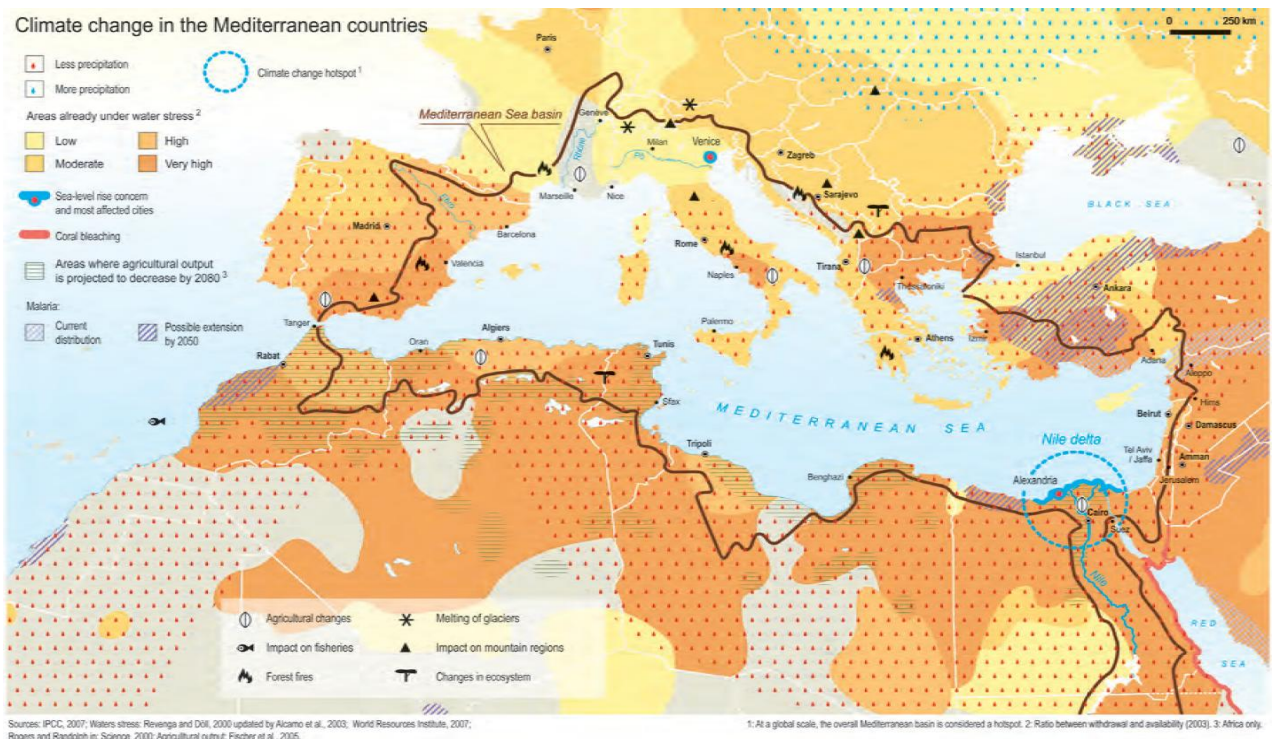


Source: State of the environment and development in the Mediterranean – 2009, Plan Bleu

based on data of Forest Resources Assessment of FAO (FRA 1990 – 2000 - 2005)

The predictions on climate change shown in Figure 4 below announce that the region will likely enter into an era of severe water stress due to predicted decrease of annual precipitations, especially to the south but also in some parts to the north of the Mediterranean. The natural ecosystems will likely suffer most. These predictions of climate change, if will be verified true, and the increasing demand of the ecosystems goods and services depict a bleak future for forests and rangelands.

**Figure 4: Climate change in the Mediterranean countries**



Source: State of the environment and development in the Mediterranean – 2009, Plan Bleu

Although all countries in the region have routinely collected national data from surveys on country demographics and agricultural statistics, very little effort has been made in looking at the data from an integrated perspective that combines forestry and rangelands information with other relevant statistics to get a full picture of the land use systems and their trends. An integrated system of data serves as an effective tool for planning both at the national and regional level. Food security analysis may require a diverse system of measurement and cannot be adequately analyzed only through the crop forecast survey, post harvest survey and the living conditions survey. An integrated instrument that looks at all aspects such as land use systems, forest and rangelands resources, and other biophysical characteristics of the environment could help understand the environmental and livelihoods issues such as poverty alleviation and food security concerns in the countries of the region and their trends.

This paper includes a section on the state of knowledge about forests and range resources in the Mediterranean countries and a section on the reasons behind the scarcity of information about these resources. It also includes the main conclusions and recommendations with, in particular,

the proposal for a new regional process to fill information gaps: the State Of Mediterranean Forests.

## I. STATE OF KNOWLEDGE ABOUT FORESTS AND RANGE RESOURCES IN THE MEDITERRANEAN COUNTRIES

The Mediterranean region comprises 26 countries covering an area of 8.779 million km<sup>2</sup>. While this is equal to 6.7 percent of the world's land area, the region's forest cover amounts to 85 million ha, about 9.5 percent of the countries' total area and two percent of the world's forest area. When the other wooded land area is added, the total area of the natural woody vegetation in the Mediterranean raises to 115 million ha which is about 13 percent of the countries' total area.

15 countries with about 28 percent of the region land area account for about 89% of the region forest and other wooded land area. (See Table 1).

In the South of the Mediterranean Basin, the region is generally under semi arid to desert conditions, and rural economies are widely hindered by degraded environments. It is characterized by low forest cover – 10 percent or less of the land area is covered by forests. The forest vegetation is generally composed of open woodlands with scattered trees and *xerophytic* shrubs. However, temperate and moist forests are found in the highlands of Algeria.

### 1. Area and Area change

Commonly, forest inventory – nowadays broadened to become national forest monitoring and assessment (NFMA) - refers to measurements of several important parameters of forests and trees and to the analysis of abundance, distribution, state, change and trends of these parameters. Presently, as the social and environmental functions of forests, trees and rangelands are increasingly recognized, the scope of information in a national forest inventory has widened to include:

- Biophysical properties of forest and trees: stand origin and structure, tree canopy cover, tree species composition, stem and regeneration count, stump count per species, tree height and diameter at breast height, crown and overall tree health and causative agents, etc.;
- Resources management: protection status, land tenure, forest ownership, management agreement, human induced disturbances, resources exploitation (timber, fuel wood, and other NWFP), forest fire, grazing, etc.;
- Site information: soil type, surface condition, topsoil depth and texture/structure, drainage, erosion and topography (slope, orientation and relief etc...);
- Products harvested: category, species harvested, supply and demand, frequency of harvesting, trend, users, uses, etc.;
- Services: habitat for species diversity, soil and water conservation, erosion and landslide control, drought and inundation control, climate regulation, insect pests and disease control, windbreak, shade, religious/spiritual, cultural heritage, employment and income generation, recreation, tourism, education, research;
- Livelihood data from households: income, education, livelihood activities, household gender balance of harvesters, access to products and services, access to inputs, etc.

To be complete, and considering the importance of rangelands to the countries in the south and east of the basin and the use of forests as source of fodder for animals, NFMA systems must cover also the rangelands resources including biophysical, management, products and services. and livelihood.

**Table 1: Area of forest, other wooded land, rangeland and source (x1000 ha)**

Country	Land Area	Forest Area	Other Wooded Land	Forest + OWL	Forest + OWL- % of Land Area	Range(*)	Source				
							NFI (include field assessment)	Mapping (+ R.S & Aerial photo)	Registers and Statistics	Compilation of sub-national assessments	Expert estimate
Albania	2,875	776	255	1,032	36	345			2007		
Algeria	238,174	1,492	2,685	4,177	2	173,867	2003				
Bulgaria	11,100	3,927	0	3,927	35	1,332			2009		
Cyprus	925	173	214	387	42	0		2005			
Croatia	5,654	1,920	554	2,474	44	1,696		2006			
Egypt	100,145	70	20	90	0	0					2009
France	55,150	15,954	1,618	17,572	32	13,788	2006				
Greece	13,196	3,903	2,636	6,539	50	3,959					1992
Israel	2,207	154	33	187	9	441			2008		
Italy	30,134	9,149	1,767	10,916	36	4,520	2005				
Jordan	8,878	98	51	149	2	5,771					2007
Lebanon	1,040	137	106	243	23	52	2004				
Libya	175,954	217	330	547	0	149,561					2005
Macedonia	2,571	998	143	1,141	44	514			2000		
Malta	32	0	0	0	0	0					1996
Monaco	0	0	0	0	0	0					
Montenegro	1,381	543	175	718	52	249					2005
Morocco	44,655	5,131	631	5,762	13	26,793	2005				
Palestine	0	0	0	0	0	0					
Portugal	9,212	3,456	155	3,611	39	2,303	2005				
Serbia	8836	2713	410	3123	35.3	1590.5					
Slovenia	2,027	1,253	21	1,274	63	405		2007			
Spain	50,537	18,173	9,574	27,748	55	12,634	2002				
Syria	18,518	491	35	526	3	12,037					2008
Tunisia	16,361	1,006	300	1,306	8	6,544	2003				
Turkey	78,356	11,334	10,368	21,702	28	15,671	2004				
Total	877,918	83,068	32,081	115,151	13.1	434,072.5					

Source FRA 2010; (\*): Estimations from FAOSTAT

Forest inventories whether localized or with national magnitude are still designed according to conventional approaches focusing on few parameters like total volume, timber, tree species composition and density, forest types, and their area, etc. The natural woody vegetation in other wooded land, trees outside forests, rangelands are not accounted for in most inventories in the region. The non wood forest products (NWFP) and services are rarely covered in these inventories. Customary or formal management, land ownership, resources tenure, users and uses (use right, trade, domestic) of the resources, gender, frequency of intake, etc are not often covered properly in the national forest inventories and in the assessment and analysis. Policy impacts and interactions with other land uses are not taken into account in field data collection.

The national statistics (See Table 2) show that to the North of the Mediterranean, the forest expansion is in steady increase, while in the countries to the south and east of the Mediterranean basin, despite the limited forest covers, the forest area is seemingly stable with very low positive



change. If the national reports are accurate, the Mediterranean countries are generally doing better compared to the world average of -0.18% negative change in the world forest cover.

**Table 2: Forest area change**

Regions	Forest area annual change(1 000 ha)		Annual change rate (%)	
	1990-2000	2000-2005	1990-2000	2000-2005
North Mediterranean	542	556	0.32	0.33
South Mediterranean	159	120	0.09	0.07
World	-3802	-4251	-0.22	-0.18

Source: FRA 2005

According to the available records, national information about forests and other wooded lands was produced through field surveys for an estimated 81 percent of the forest area of the region. For 19 percent of the forest and other wooded land area, the information was produced based on expert estimates (12.9%) or based on remote sensing analysis (6%).

## 2. Social, economic and environmental contexts of forests and range

Nowadays, the expansion of urbanization, industrialization and globalization of trade and tourism have profoundly modified the uses of forests. These uses are causing large disparities between north and south of the basin. To the north, there is progression of natural dynamics of vegetation following abandon of agriculture and pasture practices, but at the same time increasing forest fires, impacts of insects, diseases and other pests and expanding urbanization. To the south, the continuous pressure on the resources from an increasingly dense and poor rural population is spreading the ecosystem degradation which could lead to desertification. In addition to these socio-economic conditions, forests and rangelands are enduring the threats of global climate change and challenges of global economic difficulties.

### a. Use of forests and ranges for forage supply

The whole South is generally characterized by extensive pastoralism, widespread overgrazing and chronic forage deficits. Forests and other wooded lands are, there, widely used as forage reservoir for livestock. From 1967 to 2007, the livestock population grew by more than 200%. The traditional livestock systems contribute to the livelihoods of 70% of the rural poor (Bengoumi, 2010). As the rural population (See Table 3) is growing steadily, particularly to the south of the Mediterranean, and the life style of people has been continuously improving, the demand for livestock products has significantly risen. Traditional cattle raising in many parts of the Mediterranean region is in constant growth and causing a mounting pressure on the rangelands resources including within forests and other wooded lands. The multiple use of forests including for browsing by extensive cattle raising system in a hazardous environment characterized by low and irregular rainfall, high temperature, prolonged droughts, more frequent forest fires and insects and pests diseases outbreaks, is putting natural ecosystems under real threat of irreversible degradation and desertification. The question one may ask is how the resources are changing and evolving under the present social and environmental contexts? The information available does not provide any satisfactory answer to this question and the technical capacity of many countries is still not at the level that can design integrated national forest and

range monitoring and assessment system that covers all the biophysical and socio-economic dimensions of forests and rangelands.

**Table 3: Total population, rural population and livestock statistics**

Country	Total Population* (x1000)	Rural Population* (%)	Livestock (Ruminants)**					
			Total (x1000)	Percent				
				Cattle	Sheep	Goats	Camels	Pigs
Albania	3,169	52.0	3,503	18.7	50.2	26.9	0	4.2
Algeria	35,423	33.5	25,740	6.4	77.7	14.8	1.1	
Bulgaria	7,497	28.3	4,021	16.9	42.1	17.9	0	23.2
Cyprus	880	29.8	1,084	5.3	24.8	30.4	0	39.5
Croatia	4,410	42.2	2,593	18.2	30.7	4.6	0.0	46.5
Egypt	84,474	57.2	15,162	37.9	33.1	27.9	1.0	
France	62,637	22.2	44,801	43.3	20.5	2.7	0	33.5
Greece	11,183	38.6	16,000	3.8	56.3	33.8	0	6.3
Israel	7,285	8.3	n.a	n.a	n.a	n.a	n.a	n.a
Italy	60,098	31.6	24,559	26.3	32.4	3.8	0	37.5
Jordan	6,472	21.5	3,700	2.0	68.2	29.7	0.1	
Lebanon	4,255	12.8	370	24.3	64.6	11.0	0.1	
Libya	6,546	22.1	5,942	2.2	75.7	21.3	0.8	
Macedonia	2,043	32.1	1,649	15.1	75.5	0.0	0.0	9.4
Malta	410	5.4	111	16.1	13.4	4.9	0.0	65.6
Monaco	33	0.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	626	40.4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Morocco	32,381	43.3	25,155	11.2	67.9	20.3	0.6	
Palestine	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Portugal	10,732	39.3	9,838	14.7	55.9	5.6	0	23.9
Serbia	9,856	47.6	n.a	n.a	n.a	n.a	n.a	n.a
Slovenia	2,025	52.0	1,101	41.0	8.5	2.0	0	48.5
Spain	45,317	22.6	57,002	11.3	39.9	5.1	0	43.7
Syria	22,505	45.1	24,070	4.9	84.3	10.7	0.1	
Tunisia	10,374	32.7	70,000	1.0	10.9	2.2	0.3	
Turkey	75,705	30.4	n.a	n.a	n.a	n.a	n.a	n.a

(\*) Source: FRA 2005

(\*\*)Source: M. Bengoumi, Overview of forage production and feed shortage in the /Near East Region

In the South of the Mediterranean basin, natural resources continue to decline both in quality and quantity. The forests in particular are vulnerable to factors such as the ever-increasing demands for wood-based energy (firewood and charcoal); over-grazing; insects, diseases and other pests and forest fires. In some countries, rural poverty is still high. Analysis of the socio-economic and environmental contexts of forests showed in other parts of the world (e.g. ILUA Zambia, 2009) a high correlation between poverty and deforestation/resource depletion. Scarce and dwindling natural resource base are a major contributor to poverty in areas where this resource is an important element of peoples' livelihoods. Poverty may encourage activities that threaten the natural resource base.

#### b. Timbers and other wood products:

Forest wood products such as timber, fuelwood, charcoal, construction material and wood carving have always been important to the region. Timber is not the main product of most Mediterranean forests. It is scarcer in the southern and eastern countries with relatively small forest area and timber productivity and quality are low. However, timber production is more

abundant in the northern countries where the climate conditions favor faster growth of timber. Use of woody biomass for energy purposes in more forested countries in the south of the basin has a long history. Wood has been and continues to be in some countries the principal source of energy for cooking food and for keeping warm for both urban as well as rural. In these countries an estimated 86 percent of all the wood consumed annually is used as fuel. Despite the scarcity of the resources, the wood consumption for energy amounts to 55 million m<sup>3</sup> in North Africa (0.5 m<sup>3</sup>/capita) and 13 million m<sup>3</sup> in Near East (0.15 m<sup>3</sup>/capita). See Table 4. The world range of consumption per capita is 0.15 to 1.14 m<sup>3</sup>. (Ref: Unasylva N° 118). As populations have grown, this dependence has led inexorably to pressures on the wood resource which, all too often, have resulted both in the destruction of the forest, “maquis” and “garrigue” and in the worsening of the situation of the hundreds of millions of people whose lives are conditioned by the products of the forest.

**Table 4: Fuelwood consumption in North Africa and the Near East**

Region	Consumption of wood fuel <sup>1</sup>		Energy from wood fuel	
	Total (Million m <sup>3</sup> )	per caput (m <sup>3</sup> )	Coal equivalent <sup>2</sup> (Million tons)	Percent of total energy <sup>3</sup>
Near East	13	0.15	4	6
North Africa	55	0.50	18	41

Source: Ref: Unasylva N° 118

The knowledge about the changes that took, or are taking place, in the forest and other wooded lands is scanty and does not provide accurate idea about the actual state, the changes that took place in the past, or the present trends. The lack of reliable information is usually hindered by the lack of institutional capacity which itself is a result of insufficient priority being assigned to the forest and rangelands sector.

#### c. Non wood products

Nowadays, forests are not seen from merely an economic perspective. They fulfill wide range of social, economic and environmental functions. This is particularly true for the Mediterranean forest which plays equally important socio-economic and environmental roles in the life of people. National policies, development plans, programmes and projects cannot be conducive to sustainable resources management and better contribution to livelihood if these socio-economic and environmental dimensions are not well taken into account when generating information. Planning from policy to project levels cannot be soundly designed if not based on reliable and updated information and knowledge on all resources including the non-wood forest products (NWFP) such as: plant food for human consumption, plant medicines, soap and cosmetics, dyeing and tanning, herbs and spices, exudates, utensils, handicrafts, ornamentals, seeds, fibre, fertilizer, honey and beeswax, bush meat, other edible animal products, hides and skins, etc.

This wide range of resources has been neglected in national forest inventories in the past. The reasons for this can be put under three main headings: (i) lack of awareness of decision makers, but also of the managers about the role of these resources in the livelihood of the poor segment of the population but also in the national economy; (ii) The low institutional and financial capacities and (iii) inadequate policies.

#### d. Services

The variety of services provided by the Mediterranean forest and other wooded lands have never been recognized as they are today. Decision makers, managers, the scientific community and the society at large recognize, value and use the multiple services of forests, trees and wooded lands. The services include the protective, productive and socio-economic functions.

Despite the low forest cover and the thin range vegetation, forest and range ecosystems constitute important pools for carbon sequestration in above ground vegetation biomass, litter, routing system and soil. Degradation of the forest and range ecosystems reduce largely the capacity of these ecosystems to sequester and retain carbon.

The Mediterranean forests and wooded lands constitute a habitat for rich species composition. The terrestrial ecosystems have high levels of plant diversity and endemism (Conservation International). Mammals and birds fauna composition contribute to the richness of the biological diversity of the region. The 22,500 endemic vascular plant species of the flora of the Mediterranean Basin are more than four times the number found in all the rest of Europe.

**Table 5. Diversity and Endemism in the Mediterranean region**

Taxonomic Group	Species	Endemic Species	Percent Endemism
Plants	22,500	11,700	52.0
Mammals	226	25	11.1
Birds	489	25	5.1
Reptiles	230	77	33.5
Amphibians	79	27	34.2
Freshwater Fishes	216	63	29.2

Source: Conservation International

**Figure 5: Biodiversity Hotspots in Mediterranean Region**



Source: Conservation International

The national reports to FAO global FRA (FRA 2005) underscore the rich diversity of the native tree species. In North Africa, the number of native tree species per country varies from 20 in Tunisia to 60 in Egypt. In the north of the Mediterranean, the number varies between 36 in Cyprus to 128 in Bulgaria. In the eastern side of the basin, the tree species composition is variable from 25 in Jordan to 116 in Turkey. Syria did not report on tree species composition for lack of information.

The information on plant or even tree species composition, threatened or endangered species remain with great uncertainties as most of it has been derived from case studies and extrapolations to reflect national situations or from expert estimates.

Forests, trees and other wooded lands in this region play also very important role in soil and water conservation; control of erosion, landslide, inundation and drought; regulation of climate; control of insect and pests diseases; creation of employment opportunities... The sector in the region employs about 1 million people (FRA 2005).

However, the opportunity costs of conversion of forests to agricultural lands, urban areas or other developments are high. The current national forest management strategies where they exist in the

region are generally based on direct values of products including NWFP and to certain extent timber and do not capture indirect values of environmental forest services. Values of these services for any payment structure need assessment under environment services payment policy that defines the responsibilities and benefits of the providers and users of forest environmental services. Over the last few years, there has been incipient work on valuing different aspects of Mediterranean forests. EFIMED conducted an inventory with the objective of estimating the Total Economic Value of Mediterranean forests. The inventory compiled data on direct and indirect use values as well as different non-use values, for 18 countries in the Mediterranean basin. The EFIMED database covers the state of the forest, quantity and value of wood and non-wood forest goods and services.

The quality and validity of the information on the various goods and services provided by the forests, trees, and wooded lands remain dependent on the methods and frequency of data collection. Long term monitoring and assessment of forests, tree, woodlands and rangelands is the main source of information that supports the decision making processes on environment matters including designing and implementing environment services payment mechanisms.

e. Other indicators about forests and range

Managers as well as policy makers need information on many other aspects of forestry in relation to management, uses and users of the resources such as:

- Management planning (traditional and customary, management plans, etc.);
- Ownership and use right, access to resources and harvesting;
- Uses (local consumption, sale, etc.);
- Users (individuals, local communities, companies, etc...);
- gender (men, women and children);
- Forest protection: insect and pest diseases, forest fires, etc;
- Biomass, carbon sequestration and GHG emissions;
- Etc...

## II. WHY COUNTRIES HAVE INSUFFICIENT KNOWLEDGE ABOUT THESE RESOURCES

a) Overall policy

The forestry and rangelands sector are governed by national government policies. In some countries, forest land ownership is private, in others, it is State owned. Ownership governs to large extent the management systems of the resources and access to them. Forest and rangelands policy depend generally also on the priorities set by governments in their overall development policy. Not many countries in the south have comprehensive and systematic policy that treats equitably all the potentialities of the country. The economics usually direct decisions. Less attention is often paid to the renewable natural resources like forests and trees, because they are often believed to have low impact on the lives of people. Forests, other wooded lands and trees are often ignored in national development policies due to lack of knowledge of their real contribution to the livelihood of large proportion of the local communities. There are, however, efforts in some countries to benefit from every available resource on their land. As awareness at

the decision makers level about the social and economic contribution of forests and trees in the lives of people is improving, there is a tendency in the region that national policies are becoming more inclusive of all resources.

At the same time, in some European countries bordering the Mediterranean, environment and natural resources conservation are considered an important issue in the national policy. European countries have one of the highest environment standards in the world. Today the main priorities are adaptation to, and mitigation of climate change, preserving biodiversity, reducing health problems from pollution and using natural resources more responsibly in order to ensure their sustainable management. While aimed at protecting the environment, these goals can contribute to economic growth by fostering innovation and enterprise

#### b) Forest and range policy

Countries are increasingly recognizing the importance of forest policy and legislation and the role they play in the conservation and management of forests, trees outside forests, other wooded lands and rangelands. While many countries in the region have developed forest policies in the past, it is understood that a number of countries lacked: (i) familiarity to design and implement sound processes of forest policy formulation; (ii) awareness of the regional and global forestry issues; (iii) comprehension and valuation of the multiple functions of forest resources; and (iv) long term vision for the forestry sector. This is because some countries lacked the adequate institutional setting and capacity to develop such policies in cooperation with other national institutions and sectors dealing with forest-related activities and trees outside forests, including urban forests and trees, protected areas and other ecosystems.

Forest policy in the region varies widely, but it is generally weak, partly because of the low national forest cover. If the lack of sound policies stems from the limited resources, it is unfortunately like putting another "nail in the coffin", since the climatic conditions are not favorable for natural expansion of the forest cover. The increasing human population in the region and their demands of products and services from forests, trees, wooded lands and rangelands requires unprecedented efforts to reverse further resources degradation, manage them on a sustainable basis and develop them through education, research, reforestation and afforestation so that they can continue to meet national demand on forest goods and services.

There are considerable differences in the evolution of forests and forestry among different countries in the region, depending on the individual histories and development trajectories (FAO, 2006). Whenever forest policy exists, the priorities change according to Government orientations in the national policy. Knowledge and information about the state and change of the resources and their trends are not adequately valued in forest policy neither taken into account sufficiently in national forest programmes. Decision making and policy formulation are not therefore supported by reliable information sources at both national and regional levels.

Implementation of forestry policy in some countries is often dependent on budgetary limitations reflecting the national priorities. The low priority to the forest sector is matched with less resources allocation from public funds and hence less operational capacity in the forestry services. The financial restrictions for the forestry sector are not necessarily specific to poorer countries. Even in wealthier countries, because of the low priority level assigned to their forest sector, the financial resources allocations remain below the real need. In some countries, in order to overcome the decreasing operational capacity, the national forest policy is shifting towards

involvement of the stakeholders (Private, local communities, NGOs, etc) in resources management under the forest concession system. Recently Tunisia initiated the development of concession system to involve the private sector, NGOS and the local communities in the resources management. This adds considerable responsibility on the forestry services to develop norms and standards for co-management of the forestry resources. Financial resources, human capacity, adapted institutions and sound knowledge remain a prerequisites for the success of co-management of the resources.

Statistics on land use in different national institutions are generally conflicting. This is generally due to the fact that the land use information framework (terms, definitions and classification systems) are not harmonized amongst national institutions nor at the regional level.

Despite the availability of knowledge and technology, the information management systems in some countries are still remote and do not allow easy retrieval or updating of the information.

#### c) Technical gaps

At the global level FRA 2000, 2005 and 2010 describe in detail the weaknesses and strengths of the world forest information. The article titled “Gaps in national-level information on forests and trees in developing countries” published in *Unasylva*, vol 53, 2202/3 (Saket, 2002), describes the state of forest information in developing countries. The analysis of national reports for FRA 2000 for this article indicated many areas where the country information is insufficient in comparison to the needs at the national as well as at the regional and international levels. It revealed important gaps especially on the socio-economic roles of the forests and trees. In this study, it was concluded that countries with less forest cover tend to invest less in forest information gathering based on national field sampling or detailed remote sensing. They rather opt for expert estimates or general purpose mapping. The findings are today still valid for many countries around the Mediterranean Basin.

Today, as concerns for adaptation to, and mitigation of climate change are mounting, accurate estimates of carbon stock and carbon stock change in forests and trees outside forests at the national level are becoming increasingly important. The change of carbon stock is dependent on the rate of land use change which is driven by local and regional social and economic forces, including poverty, food insecurity, etc. Moreover, monitoring of the seven themes or elements of sustainable forest management, (governance/institutional, extent and condition of forests, forest ecosystem health, forest production, biological diversity, soil and water protection and the socio-economic conditions) are increasingly in the spotlight of policy makers and managers of forest resources at all levels

At the regional level of the Mediterranean there are a number of regional processes and organizations in charge of collecting data and compiling information relevant to Mediterranean forests, such as FAO *Silva Mediterranea* Committee, AIMF, Bioversity International, Blue Plan, CIHEAM, CIRCE of INGV, CMA of CRA, EFIMED, FOREST EUROPE, JRC (in particular EFFIS for forest fires), MMFN, OFME, UNECE, URFM of INRA, WWF, LFCC process, etc. The Union for the Mediterranean represents a further thrust and a reinforced institutional framework for regional cooperation on forest issues. Yet, each of these entities looks at the subject from different perspectives, collecting data in response to specific questions and needs or with a geographic focus which only embeds a part of the Mediterranean rim, e.g. the “State of

Europe's Forests", a report on sustainable forest management in Europe jointly prepared every four years by FOREST EUROPE, UNECE and FAO/FRA. In order to assemble comprehensive, harmonized and validated information throughout the Mediterranean edge, there is a need to design and implement a new approach which is able to bring together and build upon existing processes and actors and move on towards a thorough monitoring of forest resources and policies based on a complete set of indicators comparable at the regional scale.

The contribution of forests and trees to sustainable development, livelihoods and landscape restoration, depends on inter-sectoral approaches for the management of natural resources. This requires a policy supportive of an integrated approach to resources monitoring and assessment of the multiple benefits of all forest types. IPF/IFF, 1997 encouraged all countries to improve national forest resources assessment, forest statistics and the capacity to analyse and make proper use of forest resources information to allow for more informed decision-making on the implications of alternative proposals for forest programmes and land-use plans. It also encouraged donor countries and international organizations to support these initiatives. In 2000, 7% of the forests in developing countries were covered by field inventories in combination with remote sensing. Through the FAO programme of support to National Forest Monitoring and Assessment (NFMA), which has been active in over fifteen countries, that figure increased to 13.8% in 2010. By 2015, the figure will raise to around 31 after completion of NFMAs being launched in countries like Brazil, Peru, Vietnam, etc... In addition, the programme has succeeded in improving country awareness of the utility of accurate and timely information in formulation of new forest policies and in enhancing national forest programme processes.

#### d. Methodological approach

It is proven that relying only on remote sensing for forest resources monitoring cannot satisfy most of the information needs. Field sampling, when properly designed has the potential to produce a wide array of high-quality information.

Systematic field sampling and remote sensing are therefore the pillars of a national forest and rangeland monitoring process. These two data collection techniques apply at different scales and complement one another.

Data collection at the field sample plots reflects the ground reality (1:1 scale) and covers a wide range of biophysical and socio-economic data through measurements and interviews with resources users (e.g. local communities) and managers. Remote sensing, on the other hand, applies at much smaller scales and can be either wall-to-wall or sample-based.

Remote sensing surveys serve to gather some geospatial data on land cover/land use that cannot be collected from field sampling (e.g. geographic location and distribution of forests, fragmentation of forests, past changes in forest cover and extent, etc). Both methods are complementary and combination of the two improves the quality of the statistics.

#### e. Process of forest inventory design

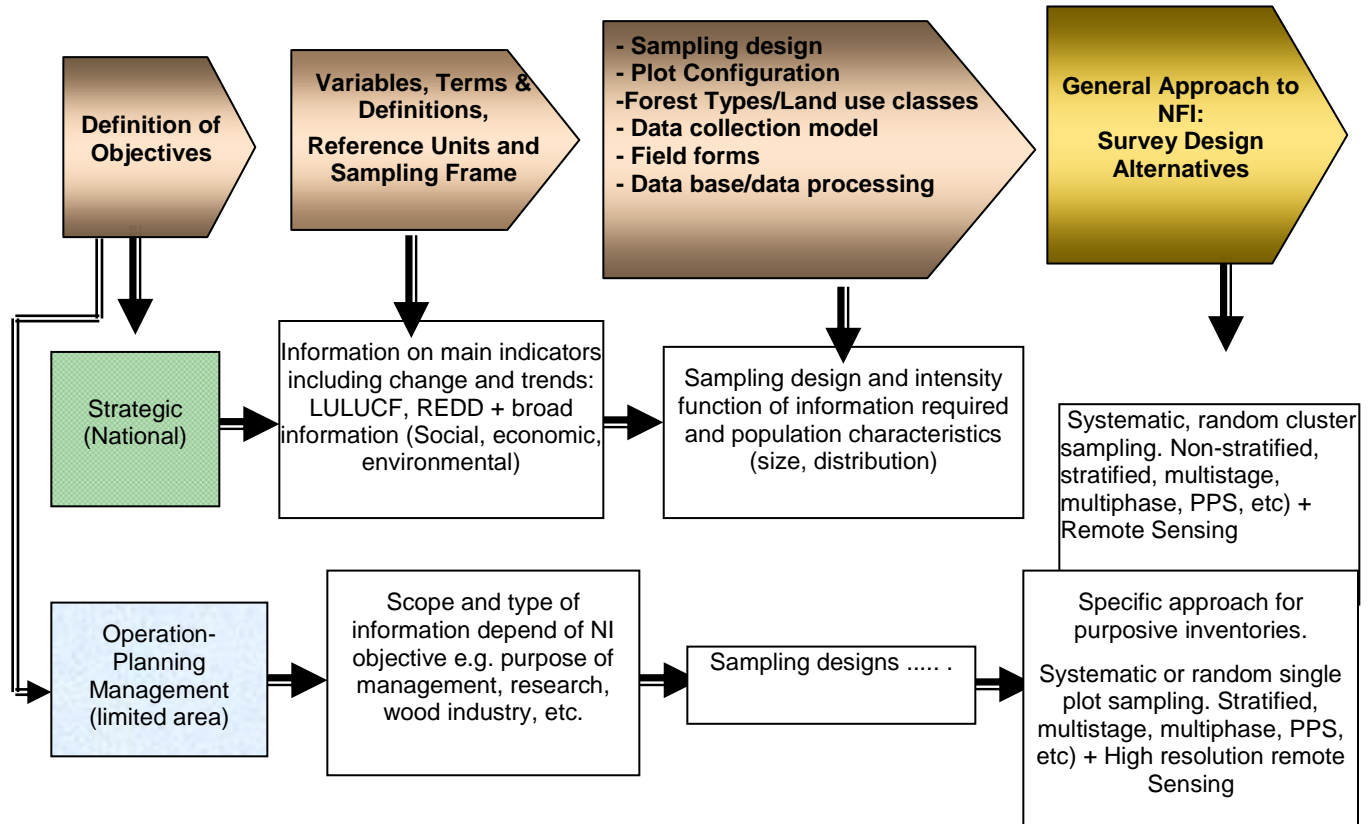
**A forest inventory can only be properly designed if the objectives are well defined and agreed upon in advance. The type and scope of information to collect in the field depend on the defined objectives. National**



policy and various other decision-making and planning processes require different information compared to management-oriented or other operation-oriented inventories. Depending on the information required, the sampling frame is conceptualized and designed as illustrated in

Figure 6.

Figure 6: Process of sampling design for (national) forest inventory



f. Need for a new regional process to fill information gaps

In order to assemble comprehensive, harmonized and validated information throughout the Mediterranean Basin, there is a need to design and implement a new approach which is able to bring together and build upon existing processes actors and move on towards a thorough monitoring of forest resources and policies based on a complete set of indicators comparable at the regional scale with a new tool: The State Of Mediterranean Forests (SOMF).

As a first step, the existing situation needs to be valorized, synthesizing information from available data and making it available to a larger audience than the single processes' specialists and users, which entails a harmonized language coherent with a more comprehensive and holistic

approach. This stock-taking exercise is supposed to highlight missing data on important indicators of environmental, social and institutional change impacting on Mediterranean forests as well as substantial differences of level of data available and of methodology used to collect them depending on individual countries' factors.

Therefore, in order to move toward a more comprehensive and thorough monitoring system of the state of Mediterranean forests, there is a need to first identify relevant missing indicators in data collection processes and, building on the existing platforms, to put the basis for a sustainable process aimed at developing information on newly identified indicators and knowledge needs.

Certain priorities have already been identified within the Mediterranean Forest Research Agenda 2010-2020, which EFIMED drew out of the Strategic Research Agenda of the Forest-Based Sector Technology Platform. As regards the impact of climate and land-use change on the functioning of Mediterranean forest ecosystems and the resulting need to assess and monitor the main physical and biological processes including biodiversity; two monitoring approaches are presented in the MFRA:

- Long-term ecosystem monitoring and experiments on the effects of global change in natural and planted forest ecosystem processes. The following should be established: forest-atmosphere flux stations; instrumented watersheds; water and nutrient cycling; different types (from extensive to intensive) of comparable monitoring sites that effectively cover the forest typologies as well as the geographical and climatic diversity of the region.
- Monitoring, understanding and modelling interactions between forests and microorganisms and insects: symbionts, pathogens, pests as related to climate change.

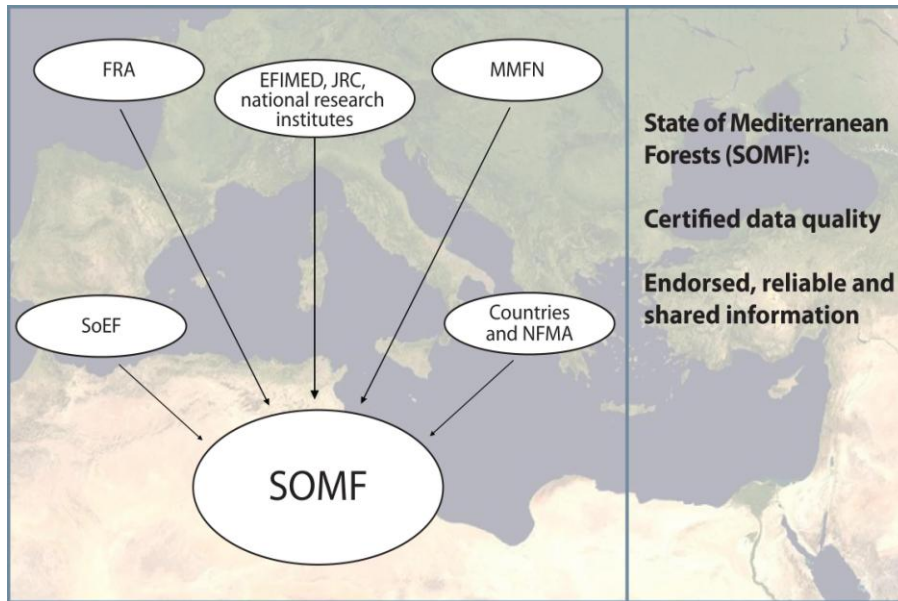
For SOMF purpose, a preliminary literature review shows that the following priority information needs call for deeper knowledge and understanding of trends, root causes, possible impacts on society and appropriate countermeasures:

- Assessment of forest fire risks;
- Water scarcity;
- Forest degradation;
- Shifting of forest areas;
- Soil degradation and desertification;
- Agrometeorological forecasting;
- Trade of timber and non-wood forest products;
- Monitoring of forest genome adaptation.

Within the institutional framework provided by, inter alia, *Silva Mediterranea* and the Union for the Mediterranean, new data and information needs encounter positive grounds for being properly addressed and fulfilled. The overall idea and proposition for a newly established "State of Mediterranean Forests" has been already endorsed by the Enlarged Executive Committee of *Silva Mediterranea* during the meeting held in Antalya, Turkey, on 14-15 April 2010 and will feed into the Strategic Plan of the Integrated Programme of Work on timber and forestry of the UNECE Timber Committee and FAO European Forestry Commission. As shown in Figure 7, the monitoring platform will be built upon and complement existing processes such as FAO's FRA

and NFMA programme, SoEF, etc..., and, similarly to them, will produce a regular report every four/five years (First one is expected before the end of 2011). Through interacting with national inventory exercises will contribute to strengthening the countries' monitoring capacity in the context of the NFMA (See Figure 7).

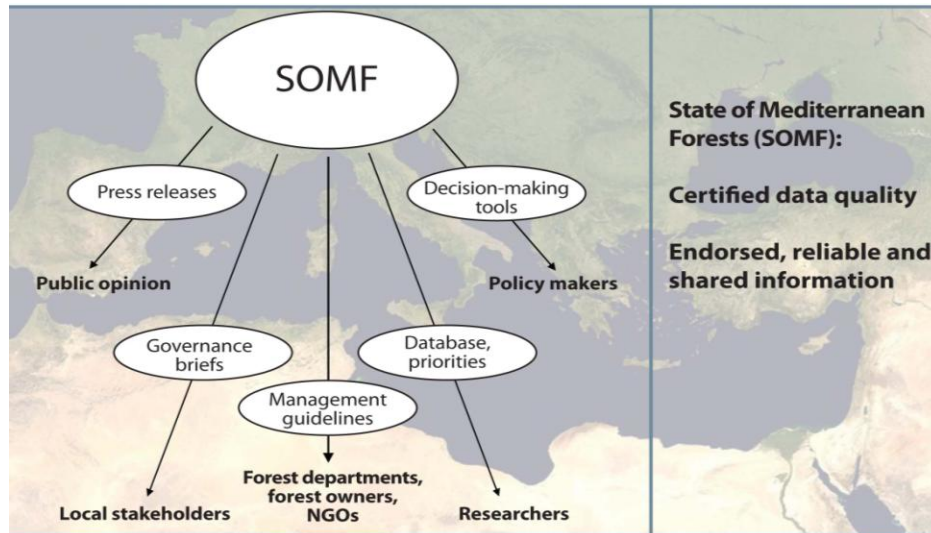
Figure 7 Examples of sources of data for SOMF



Primary objectives of the State of Mediterranean Forests are to enhance communication and strengthen partnership on forest issues at the regional level, targeting several categories of actors and stakeholders and providing them with relevant information and a consolidated and shared vision of what is at stake.

By fostering clear and transparent dissemination of information, SOMF will offer an ideal platform for discussion and decision-making based on reliable data, common objectives and trustworthiness. As illustrated in Figure 8, the wealth of information produced and presented in the regular report will make it possible to develop specific communication tools tailored to diversified users and stakeholders. The expected outcomes are wide and substantial. As far as policy is concerned, through up-to-date decision-making tools policy makers will receive assistance in designing and putting in place more responsive and adaptive legislations; a comparative analysis of existing forest legislations will help respond to critical questions such as “are current legislations flexible enough to adapt to global change, e.g. climate change, and to facilitate new financial mechanisms, e.g. PES?”.

Figure 8 : SOMF as a strategic communication tool for several stakeholders



Researchers will be facilitated in identifying knowledge gaps and research priorities; forest managers (from both state departments and private sector) will be supported in the adoption of better management practices able to embrace emerging approaches, such as payments for environmental services, and shifting market trends, for instance pursuing NWFP trade opportunities.

In the framework of regional cooperation and the Union for the Mediterranean, SOMF will make a contribution to identify priority actions and assess the impacts of cooperation programmes. It will serve as a tool for donors to address disbursement of funds in the proper direction.

SOMF will represent an important resource for local stakeholders, making them aware of the value of forests for society, of the importance of environmental services provided by forests and the management needed to ensure such services. It will provide a basis for the integration of forests into the territorial development. In connection with local governance, there is high potential for SOMF to be an active partner of the Mediterranean Model Forest Network. The main purpose of the MMFN is to define, articulate and manage a regional program of work related to the sustainable management of forest-based landscapes and natural resources that reflects the priorities, strengths and opportunities that are unique to the region. It also facilitates regional communications and knowledge exchange, capacity building and funding opportunities. Model Forests are based on a flexible approach that combines the social, cultural and economic needs of local communities with the long-term sustainability of forest landscapes. Nine countries are actively pursuing Model Forest development in the Mediterranean basin with Urbión Model Forest (Castilla y León, Spain) as the lead coordinating agency. The MMFN would be an ideal partner in providing information on the management of landscapes and territorial units where

different economic sectors cohabit as well as a source of site-specific data in relation to issues that cannot be monitored at the national level as, for instance, the state of forest genetic resources. The MMFN can help better understand how local governance evolves, how forest management is carried out by forest services at the local level and what the practices of stakeholders and forest users are. It is important to get an insight into how mayors, forest owners, farmers, cattle breeders, consumers of fuel wood, tourist boards and overall people benefiting from protective functions of forests discuss and agree on different uses of forests.

The calendar for the development of SOMF foresees a preliminary analysis based on FRA 2010 national reports to be presented in October 2010 in Rome, on the occasion of the Twentieth Session of the FAO Committee on Forestry.

### III. CONCLUSIONS AND RECOMMENDATIONS

#### a. Conclusions

The Mediterranean region has particularly rich biodiversity. With 25,000 plant species, the region contains 10% of plant species in the world in less than 2% of the surface of the Earth. These plant species are adapted to a difficult environment, with frequent natural and human disturbances and significant stress caused by instable climatic conditions. However, the geographic isolation, caused by fragmentation or disappearance of certain habitats, is putting an unprecedented threat to the survival of many species.

Rangelands degradation and desertification represent a major challenge to sustainable development. Overpopulation of livestock beyond the carrying capacity of the resources and the lack of regulations to and management of both rangelands and forests has largely contributed to rangelands degradation. Forests and rangelands are also facing the challenge of conversion to other types of land uses including tourism and urban development, etc.

While the human population in the northern side of the Mediterranean is stable, it is growing fast in the southern and eastern sub-regions. It has already reached 278 million people of which more than 41% (114 million) live in the rural areas relying essentially on natural resources for their livelihood. Forests, trees, other wooded land and rangelands are the backbone of the livelihood of those rural people, who meet most of their needs by the wood and non-wood forest products and services.

As the rural population grows, the demand for forest and rangelands goods and services increases. At the same time, the resources, as repeatedly reported, have reached an alarming level of degradation due to overexploitation, overgrazing and as consequence of climate change. The combined effects of man and nature will likely lead to advanced state of desertification in many parts of the Mediterranean Basin particularly in its southern and eastern borders.

Considerable efforts are required in the region to address collectively the deteriorating state of the terrestrial ecosystems composed essentially of forests, other wooded lands and rangelands. Coherent regional policies conducive to sustainable development is timely. Countries are called upon to act together to address the many problems associated with resources degradation, adaptation to climate change and usupply of the local populations needs.

Where there are many challenges in the region to sustainable forest and other wooded lands management and serious social and environmental problems affecting the resources, policies are generally weak and hardly contribute to the sustainable management of the resources. The reasons are many, but a significant one among them is the lack of timely and reliable data and information used as basis for decisions to define policy options. The term information here is inclusive of all the economic, social and environmental dimensions forests, trees, other wooded lands and rangelands. It includes data on the biophysical properties as well as on the social and economic contexts of the resources. Nowadays, national forest inventories are about forests and people. The FAO programme of support to National Forest Monitoring and Assessment (NFMA) provides the most advanced approach to date to long term forestry resources monitoring and assessment. NFMA can be planned as an integrated land use assessment (ILUA) which covers forests, trees, livestock, crops and other natural resources if there is interest in the countries and there are resources for it. ILUA helps harmonise sectoral policies in the country. The foundation of properly formulated, factual, well targeted and realistic policy is availability of the needed information, reliable and complete. Generation and management of knowledge are high skill demanding. Most of the countries in the region need capacity strengthening to embrace the new concepts of NFMA or ILUA. In the southern and eastern sides of the Mediterranean basin, considerable efforts for capacity building and institutional adaptation are required. The national institutions are generally weakly staffed and poorly organized to develop and sustain a NFMA programme at the long run. Over debted households

The need for a new regional process to compile information on forests and other wooded lands has been recognized by *Silva Mediterranea* members who decided during their last session in Antalya (14-16 April 2010) to regularly prepare the State of Mediterranean Forest (SOMF). The first report is expected by the end of 2011.

The global forest partnership (including some Mediterranean Basin countries) that was established in Oslo recently by Heads of State and Government, ministers and other representatives from some fifty countries aims at reducing greenhouse gas emissions from deforestation. Around \$4.5 billion has been pledged for the period 2010-2012 to support measures to reduce deforestation and forest degradation in developing countries. This partnership provides a potential avenue for funding, but also elevates the climate change function of the forests and rangelands in the Mediterranean region. This calls for active role of the Mediterranean countries in the international negotiations on climate change. Effective involvement of the Mediterranean countries in negotiations on climate change can only be achieved if done in coordinated way through a political set up like Ministerial Conference under the auspices of regional political bodies.

## **b. Recommendations**

1. As a first step, it is recommended to valorize the existing situation, analyse information from available data and make it available to a larger audience than the single processes' specialists and users. This entails a harmonized language coherent with a more comprehensive and holistic approach. This stock-taking exercise will allow highlighting information gaps on important indicators on environment and on the social and economic

- contexts that can inform on policy impacts on the Mediterranean forests and other wooded lands (including rangelands).
2. In order to meet all national users' needs of information, it is recommended that countries move towards more comprehensive and thorough monitoring system of their forests, other wooded lands, trees and rangelands embracing the biophysical, social and economic properties of the resources, their management, uses and users including the drivers of change and degradation.
  3. It is recommended that a collective action around the Mediterranean be taken to raise the profile of forestry and rangelands to highest national level. This will allow addressing in coordinated way regional policy issues related to resources degradation, desertification, landscape restoration following ecosystem approach, mitigation of, and adaptation to climate change, resources management, and sustainable supply of goods and services, etc. *One way to achieve this could be to institute a Ministerial Conference similar to the one existing for European countries (the Ministerial Conference on the Protection of Forests in Europe) to serve for policy guidance,* coordination, harmonization and decisions regarding conservation and sustainable management of forest and wooded land ecosystems and rangelands around the Mediterranean Basin as well as attracting donors (including the global forest partnership) for mitigation of/and adaptation to climate change
  4. Global forestry issues are continuously changing - climate change, inter-sectoral approaches for resources management, co-management) of resources with active involvement of the private sector, NGOs and local communities, etc... - there is necessity to raise awareness among countries on the need to strengthen and adapt their national forestry and rangelands institutions and policies with the aim to establishing sound management systems and developing reliable baseline information on the resources.
  5. Sustainability of collective actions in forestry and rangelands depend on the financing mechanisms at the national and regional levels. Stronger financial support is needed to the forestry and rangelands sector from the national public funds and where needed through regional collaborations and partnerships. In order to set up long term resources monitoring and assessment process and information management systems, it is recommended to develop a mechanism through which technical and, where needed financial, assistance can be provided to countries in the region.
  6. In order to assemble comprehensive, harmonized and validated information throughout the Mediterranean edge and countries, there is a need to design and implement a new approach which is able to bring together and build upon existing processes and actors and move on towards a thorough monitoring of forest, other wooded lands, trees and rangelands resources and policies based on a complete and verifiable set of indicators comparable at the regional scale. To achieve this objective the first State Of Mediterranean Forests report will be produced by the end of 2011.
  7. In complementarity with this regional process of elaboration of the first State of Mediterranean Forests report ensure that countries understand and embrace new concepts of NFMA or ILUA to reinforce their national capacity to produce reliable information to meet all users needs at national, regional and global levels.

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