



Woman making corks in the national cork factory, Tabarka, Tunisia

## Contribution of Forests to a Green Economy in the Middle East and North Africa

Evidence, drivers and policy orientations





# CONTRIBUTION OF FORESTS TO A GREEN ECONOMY IN THE MIDDLE EAST AND NORTH AFRICA



*Worker in a tree nursery preparing plastic pots to receive seeds, Tunisia*





## TABLE OF CONTENTS

Foreword	4
Authors	5
Acknowledgements	6
Acronyms and abbreviations	7
Executive summary	8
1. How much are MENA's forests worth?	10
2. Capturing forest values	16
2.1. Green accounting	17
2.2. Payments for Environmental Services	18
2.3. Protected areas	20
2.4. Non Wood Forest Products: value chains and ethical bio-trade	23
2.5. Carbon finance	25
2.6. Financing opportunities for forest-based adaptation	26
3. Policy recommendations	27
References	28

## FOREWORD

### Mr. Ismaïl Belen, President of Silva Mediterranea



Mediterranean forests are vital for the sustainable development of the Middle East North Africa region, contributing to job creation and sustainable livelihoods for people. In today's challenges of building resilient and inclusive economies, we need forests as a crucial element for adapting our landscapes to global changes and tackling socio-economic vulnerabilities. Foresters' paradigm is already shifting towards providing services to the society, promoting intersectoral approaches and participatory forest governance, crucial elements for success.

This publication draws attention on the manifold goods and services provided by our MENA forest ecosystems and presents key drivers to fully capture the great value of our forests.

Forests for all, all for forests: let us make it together!

A handwritten signature in blue ink, appearing to read 'Ismail Belen'.

Ismaïl Belen

### Mr. Alexander Reinhard Kastl, Head of the GIZ Regional Project Silva Mediterranea-CPMF



The great variety of forest goods and services play an important role for the socio-economic development in Mediterranean countries. Still largely underestimated up to the present day, these forest goods and services however secure existential job and income opportunities for the population. They help numerous public sectors to mitigate the negative impacts of climate change in an ecological friendly way and to maintain the productivity and service delivery capacity of these sectors.

Especially in the context of *Green Economy*, forests have considerable market and development potentials. Therefore I strongly hope that this publication will contribute to highlight these potentials and to

encourage decision makers to implement the policy recommendations proposed in chapter 3.

A handwritten signature in blue ink, appearing to read 'Alexander Kastl'.

Alexander Reinhard Kastl



## AUTHORS



**Lelia Croitoru** is an environmental economist and independent consultant. She has worked extensively on environmental valuation related to forests, water, agricultural land and air quality. She edited 'The Cost of Environmental Degradation: Case Studies from Middle East and North Africa' (World Bank 2010), a pioneering book that assesses the economic costs of environmental degradation in selected countries of the Middle East and North Africa. She also co-edited 'Valuing Mediterranean forests: Towards Total Economic Value' (CABI Publishing 2005), a book that estimates the value of all forest goods and services in eighteen Mediterranean countries. Most of her recent work focuses on World Bank projects related to climate change adaptation in Algeria, Yemen and Bangladesh. She holds a PhD in Forest Economics from the University of Padova and Trento (Italy), and a Masters in Agricultural Economics from the University of Bucharest (Romania).



**Ludwig Liagre** is an expert in green economy, operating as project officer and policy advisor for the German Development Cooperation (GIZ). He currently works for the GIZ regional project "Adapting Forest Policy Framework Conditions to Climate Change in the Middle East North Africa region", where he supports the forest administrations of the Collaborative Partnership on Mediterranean Forests to better promote the socio-economic importance of their forest goods and services in the context of climate change. Beforehand, he operated in the bilateral GIZ project "Nature Protection and Combating Desertification" in Morocco. He also worked as a consultant on the development of environmental monitoring systems in the car industry and as a researcher on the economic analysis of environmental and social impacts of hydropower plants. He holds Masters in Environmental Economics and Rural Development from AgroParisTech (France) and a Master of Business Administration from Le Collège des Ingénieurs (France-Germany).

## ACKNOWLEDGMENTS

This paper benefitted from the vast knowledge provided by several experts in each country studied. The authors would like to thank for the useful contribution to Messrs/Mmes: Fayçal Benchekroun (Director of Planning, Information System and Cooperation, High Commissariat for Water, Forestry and Combating Desertification, Morocco), Ameer Mokhtar (Director of the Legal Department, General Directorate of Forestry, Tunisia), Hamed Daly-Hassen (Researcher, National Agricultural Research Institute of Tunisia), Michel Bassil (Forestry Engineer, Forest Department, Lebanon), Elsa Sattout (Assistant Professor, Faculty of Natural and Applied Sciences, Notre Dame University, Lebanon), Kenan Ok (Professor, Faculty of Forestry, University of Istanbul, Turkey), Mustafa Fehmi Turker (Professor, Karadeniz Technical University, Turkey), Tugba Deniz (Research Assistant, Faculty of Forestry, University of Istanbul, Turkey), Pablo Campos (Research Professor, Institute for Public Goods and Policies of the Consejo Superior de Investigaciones Científicas, Spain) and Alejandro Caparros (Associate Research Professor, Institute for Public Goods and Policies of the Consejo Superior de Investigaciones Científicas, Spain).

Special thanks go to the peer-reviewers Hamed Daly-Hassen (Researcher, National Agricultural Research Institute of Tunisia), Stefano Pagiola (Senior Environmental Economist, World Bank, Washington D.C.) and Ismail Belen (President of Silva Mediterranea) for their valuable comments, inputs and suggestions.



*Ecotourism in Yalova, Turkey*

## ACRONYMS AND ABBREVIATIONS

ABS	Access and Benefit Sharing (under the Nagoya Protocol)
AFD	French Development Agency
CBD	Convention on Biological Diversity
CIFOR	Center for International Forestry Research
CDM	Clean Development Mechanism
CO <sub>2</sub>	Carbon dioxide
COP	Conference of Parties
CPMF	Collaborative Partnership on Mediterranean Forests
Dh	Moroccan dirham
EbA	Ecosystem-based Adaptation
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FCPF	Forest Carbon Partnership Facility
FFEM	French Global Environment Facility
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIZ	German Development Cooperation
ha	Hectare(s)
HCEFLCD	Haut Commissariat aux Eaux et Forêts et à la Lutte Contre la Désertification
ICI	International Climate Initiative
ILO	International Labor Organization
IPBES	International Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
LULUCF	Land Use, Land Use Change and Forestry
MENA	Middle East North Africa
MRV	Monitoring, Reporting and Verification
Mt	Million tons
NPIF	Nagoya Protocol Implementation Fund
NWFPs	Non Wood Forest Products
PA <sub>s</sub>	Protected Areas
PES	Payments for Environmental Services
RECAMAN	Renta y Capital de los Montes de Andalucía (Spain)
REDD	Reductions of Emissions from Deforestation and Forest Degradation
SEEA	System of Environmental and Economic Accounting
SFMF	Strategic Framework on Mediterranean Forests
SMEs	Small and Medium Enterprises
SNA <sub>s</sub>	System of National Accounts
TEEB	The Economics of Ecosystems and Biodiversity
TEV	Total Economic Value
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nations Environment Programme
UN-ESCWA	United Nations Economic and Social Commission for Western Asia
UNFCCC	United Nations Framework Convention on Climate Change
UN-REDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
USAID	United States Agency for International Development
US\$	United States dollars
WAVES	Wealth Accounting and Valuation of Ecosystem Services
WFPs	Wood Forest Products
WWF	World Wildlife Fund

## EXECUTIVE SUMMARY

How much are MENA's forests worth? This question used to go largely unanswered. It is not that forests were seen as unimportant. It is just that as many benefits that forests provide are intangible and unpriced on the market, their magnitude is not known. Watershed protection, biodiversity conservation and adaptation to climate change are just few examples of such benefits, whose importance can easily exceed that of timber and tangible non-wood forest products (NWFPs).

Understanding the role of forests in building a green economy<sup>1</sup> – generating employment, ecosystem services, low carbon opportunities – has been much discussed in recent years<sup>2</sup>. While there is broad agreement that forests are important, their precise role in the MENA region has not been reviewed comprehensively. This paper aims to fill this gap by presenting evidence on forests' contribution to a green economy and suggesting concrete recommendations to decision-makers in the MENA region.

The paper focuses primarily on countries participating in the Collaborative Partnership on Mediterranean Forests (CPMF), namely Algeria, Lebanon, Morocco, Syria, Tunisia, and Turkey. The CPMF is composed of eighteen stakeholders from different institutions (research institutes, NGOs, international cooperation agencies, etc.) operating throughout the Mediterranean region. The aim of the CPMF is to bring effective responses to the multiple pressures faced by forests in these countries.

### The CPMF partnership



<sup>1</sup> A green economy is one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities (UNEP 2010).

<sup>2</sup> Several international conferences addressed the topic, among which in Bonn, Germany (Contributions of Forests to a Green Economy, 4-7 October 2011), in Antalya, Turkey (Joint session of ECE Timber Committee and European Forestry Committee, 10-14 October 2011) and in Rio de Janeiro, Brazil (Rio+20, United Nations Conference on Sustainable Development, 20-22 June 2012).



Based on a thorough review of valuations in the region, **Section 1** shows that, on average, NWFPs such as grazing, cork, fruits, and plants, are the most important forest benefit and can contribute 40 percent of household income. Watershed protection is very significant, particularly in Syria (US\$100/ha/year) and the Maghreb countries (US\$31/ha/year) in general. Specific ecosystems can reach particularly high values: net annual benefits from cork oak are estimated at US\$214/ha in Tunisia and can reach up to US\$440/ha in Morocco's Maamora forest<sup>3</sup>. Despite these high values, the social damage caused by deforestation and forest degradation can be as high as 0.7 percent of the countries' gross domestic product.

How can forest benefits be captured in ways that promote a green economy? **Section 2** presents good practice examples of market-based mechanisms applied in the region and elsewhere. Many CPMF countries have already taken steps to create value chains for NWFPs, establishing protected areas, and promoting green accounting for some natural resources. However, only a few limited efforts have been made to introduce innovative mechanisms such as payments for environmental services (PES) and carbon finance.

Based on the above, **Section 3** provides a set of concrete recommendations to policy makers in the areas of valuation and market-based mechanisms. While a lot more can be done in the forestry sector, these should be considered priority actions towards a green economy primarily from a market-based perspective.

Last but not least, this document is not a final step; it is just a snapshot of the existing situation aiming at highlighting the need for action and provoking additional work in key areas to support a green economy in the MENA region.



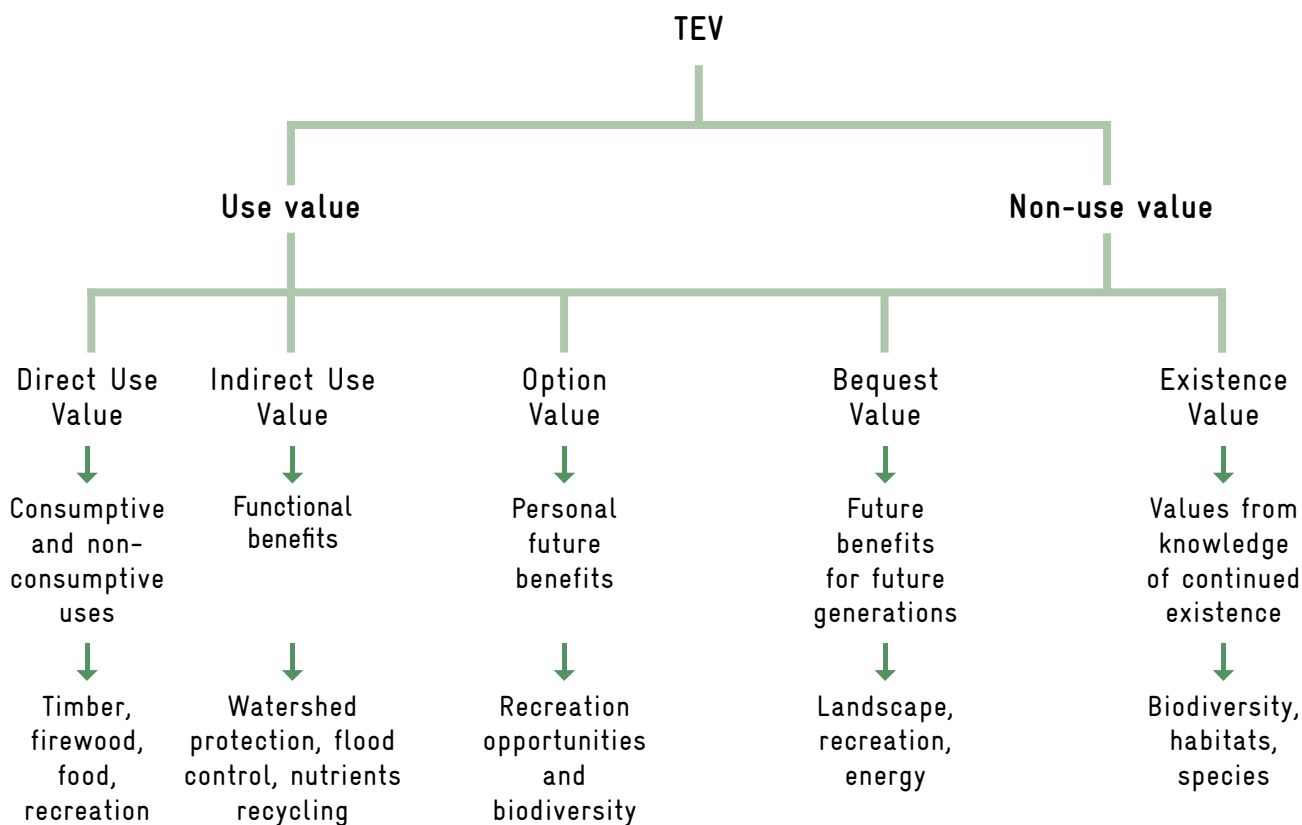
*Women processing cones to get seeds, Morocco*

<sup>3</sup> These values refer to the year 2010.

## 1. HOW MUCH ARE MENA'S FORESTS WORTH?

Forests in MENA<sup>4</sup> are much more important than official statistics suggest. With less than 1 percent of the world's forests and only 4 percent of the countries' area, forests in MENA are scarce (FAO 2011). By official statistics, they also appear to contribute little to national economies, generating less than 1 percent of the countries' GDP (FAO 2011). However, these figures are deeply misleading: they only capture a few tangible products (essentially timber), and omit the ecosystem services that forests provide, such as water purification, biodiversity, and recreation. Figure 1 presents the Total Economic Value (TEV) of forests and its main components. A regional valuation study (Croitoru and Merlo 2005) and further updates (Daly-Hassen et al. 2012a; Pak et al. 2010) estimated that timber accounts for only one third of the TEV of forests in the Mediterranean countries. Likewise, estimates that MENA's forests contribute less than 1 percent of countries' labor force (FAO 2011) capture only formal employment and exclude informal workers and the poor who depend on forests for subsistence. Globally, more than 90 percent of total forest employment is estimated to be informal (UNEP 2008)<sup>5</sup>; although specific estimates for MENA countries are not available, it is likely that there, too, formal forest employment is only a fraction of the total.

Figure 1. Total Economic Value of forests



Source: modified from Pearce and Moran (1994)

<sup>4</sup> In this paper, MENA consists of Algeria, Arab Republic of Egypt, Islamic Republic of Iran, Iraq, Jordan, Lebanon, Libya, Morocco, Syrian Arab Republic, Tunisia, Turkey, West Bank and Gaza and Yemen.

<sup>5</sup> Estimated based on a formal employment of 12.9-20 million workers and a total employment of roughly 957 million - 1.74 billion workers. In addition, employment in the informal sector in North Africa was estimated at 43 percent of the non-agricultural employment during 1990-1999.



**How much are the CPMF forests worth?** In the CPMF countries, conservative estimates indicate that forests generate US\$77/ha annually and can be much more valuable in specific locations. The estimated TEV of forests varies from US\$63/ha per year in Turkey to US\$296/ha in Lebanon (Table 1). Because the estimates partially capture several non-market benefits, they underestimate the real forest value in these countries<sup>6</sup>. In addition, as national averages, they do not reflect the true value of certain forest types. For example, benefits from cork oak in Tunisia are estimated at US\$214/ha of cork oak (Daly-Hassen et al. 2012a), compared to an estimated national average for all forests of US\$112/ha. They can reach up to US\$440/ha in Morocco's Maamora forests<sup>7</sup> (HCEFLCD 2012), compared to an estimated national average of US\$94/ha.

Table 1. Value of forest benefits in CPMF countries (US\$, 2010 prices)

Country	WFPs <sup>a</sup>	Grazing and NWFPs <sup>b</sup>	Recreation, hunting	Watershed protection <sup>c</sup>	Carbon <sup>d</sup>	Biodiversity	TEV
Algeria	-7	47	n.c	32	-3	n.c	69
Morocco	29	44	-6	29	-3	n.c	94
Tunisia	6	73	1	26	3	9	112
Lebanon	-10	187	125	n.c	-15	8	296
Syria	4	10	n.c	101	8	n.c	123
Turkey	32	21	1	-8	11	7	63
<b>Weighted average<sup>e</sup></b>	<b>25</b>	<b>31</b>	<b>n.c</b>	<b>8</b>	<b>6</b>	<b>7</b>	<b>77</b>

Sources: Daly-Hassen et al. (2012a) for Tunisia. Croitoru and Merlo (2005) for the other countries, updated to 2010 prices.

Notes: <sup>a</sup> The aggregated value of WFP removals, net growth of standing timber and WFP losses to forest fires.

<sup>b</sup> The aggregated value of NWFP use benefits and losses to forest fires.

<sup>c</sup> the aggregated value of watershed protection benefits and the value of erosion, floods and landslides due to poor forest management.

<sup>d</sup> The aggregated value of carbon sequestered in forest growth and carbon losses from deforestation and forest fires; the monetary estimates are based on carbon prices on international markets in the year of reference, updated to 2010.

<sup>e</sup> Estimated by weighting the value of each individual benefit by the forest area in each country.

The negative values in the table mean that the estimated social costs due to poor forest management are higher than the estimated forest benefits.

n.c. = Not calculated due to insufficient information. The valuations provided in the table are not necessarily comparable across countries due to differences in valuation methods and data availability for individual benefits.

**Non-wood forest products (NWFPs) are the most important forest benefit in the CPMF countries and contribute significantly to the income of forest-dependent people.** NWFPs, such as fodder for grazing, pine kernels, pine honey, mushrooms, and other minor products generate an average benefit of US\$31/ha and account for more than 40 percent of forests' TEV in the CPMF countries (Croitoru 2007). These benefits are important safety nets for many poor rural households, particularly in times of shortfalls, and also contribute to rural income throughout the year. Though statistics on NWFPs' contribution to livelihoods are scarce, several case studies indicate that their value is high (Box 1). In Morocco, for example, argan forests contribute to 7 percent of regional GDP (Bencheikroun 2012) and ensure

<sup>6</sup> In addition to timber, these estimates capture the value of non-wood forest products (NWFPs), such as fodder for grazing, cork, mushrooms, and other minor products that are sold on the market and, in some cases, collected for subsistence. They also include the value of carbon sequestration. However, only in some countries are the estimates able to capture the value of other ecosystem services, such as watershed protection and biodiversity, and then only partially.

<sup>7</sup> Estimates of other forests are much lower, such as US\$17/ha of Bouhachem forest under a scenario of improved management (based on Mavsar and Farreras 2010).

subsistence of 14 percent of the rural population<sup>8</sup>. This high contribution is not surprising. A meta-analysis of 54 case studies in Asia, Africa, and Latin America indicates that forest environmental income<sup>9</sup> accounts for about US\$680 per household per year, or 22 percent of total household income, and could reach up to 30–40 percent in areas with good forest access (Vedeld et al. 2004).

### Box 1. Forests contribution to rural welfare: evidence from case studies

**Cork oak in Tunisia.** The area of Iteimia is located in north-western Tunisia and covers 634 ha. The main land uses are cork oak (70 percent) and crops (20 percent). The area is densely populated, with 80 inhabitants per km<sup>2</sup>. Forests are owned by the state, and the Tunisian Forest Administration obtains commercial benefits from cork, firewood, mushrooms, myrtle, and wild boar hunting. Local households have specific use rights, such as livestock grazing and cropping non-forested plots. Iteimia has a weak employee labor market and family members carry out most jobs<sup>10</sup>, as self-employed workforce. In 2002, the annual income was about US\$1,250 per person in Iteimia. Forests contributed US\$540 per person, primarily due to livestock grazing, which generates about US\$350 per person. In the context of low labor opportunities, livestock grazing in Iteimia is a subsistence activity that generates on average 65 percent of total forest income, or 28 percent of annual household income.

**Argan forests in Morocco.** The argan oil is among the most expensive edible types of oil. The ecological uniqueness of the argan forest led it to be designated as a United Nations Educational, Scientific and Cultural Organization (UNESCO) Biosphere Reserve in 1998. As a result, the price of argan soared between 1999–2007 in high-value markets, which sparked a bonanza of argan activity. The proportion of households selling argan oil more than doubled. However, the proportion selling fruit increased more than sixfold, because the booming fruit market has turned argan fruit into an important source of income. This boom induced several changes in households with access to argan fruit: they increased their consumption relative to other households; accumulated more assets in the form of goats; girls from these households were significantly more likely to move from primary to secondary schools. In fact, in communes with 65 percent argan forest cover, the proportion of eligible girls enrolled increased by 10 percent between 2000–2005.

**Pine honey in Turkey.** Honey is generally produced from flowers. However, pine honey is made from honeydew secreted on trees (*Pinus brutia* and *Pinus halepensis*) by an insect (*Marchalina hellenica*). Once bees consume this honeydew, they make pine honey. It is organic, has a special taste and is very appreciated by consumers. In Turkey, the main source of pine honey is the province of Mugla, but it can be found also elsewhere. Nearly 50,000 ha of state forests are dominated by red pine designated for pine honey production, with special and multifunctional forest management plans. It is the main source of income for nearly ten thousand families and is also exported to other countries.

Sources: Campos et al. 2008 for Tunisia; Lybbert et al. 2011 for Morocco; Ismail Belen for Turkey

<sup>8</sup> They ensure subsistence for 2 million people (FAO 2010a), out of a total rural population of 13.8 million (<http://www.indexmundi.com/facts/morocco/rural-population>).

<sup>9</sup> Environmental income is defined as rent (or value added) captured through consumption, barter, or sale of natural capital within the first link in a market chain, starting from the point at which the natural capital is extracted or appropriated. The most important sources of environmental income from forests are wild food, fuelwood, and fodder for grazing (Vedeld et al. 2004).

<sup>10</sup> Other than cork stripping and tree thinning.



**Watershed protection is one of the most important benefits in Maghreb countries (US\$31/ha/yr) and in Syria (US\$100/ha/yr).** It is commonly known that the MENA region suffers from water stress<sup>11</sup>, severe climate conditions, and soils susceptible to erosion, high runoff and landslides. In such a fragile environment, the role of forests in protecting water supplies, regulating water flows, and conserving soil is particularly important<sup>12</sup>. Where they are available, estimates of the value of these functions tend to be high, both in absolute and relative terms. Watershed protection is the single most valuable benefit in Syria, for example, accounting for more than 50 percent of the TEV of forests. In the Maghreb countries, it is second in value only to grazing, varying within US\$26–32/ha per year<sup>13</sup>. Estimates for watershed protection provided by forests would most likely have been high in the other countries as well, if data had been available. Box 2 provides estimates of watershed benefit provided by forests and other erosion control activities in Turkey.

## Box 2. Estimating the willingness to pay for watershed benefits in Turkey

Turkey is a country with a high risk of erosion. For this reason, many projects have sought to prevent erosion and to control floods, among them the Çakıt Watershed Rehabilitation Project, supported by the World Bank, and implemented in Adana and Niğde provinces, in southern Turkey beginning in 1982. The project aimed to protect settlements and agricultural areas from floods, prevent dam sedimentation, and protect roads and railroads from landslides.

The project conducted a study to estimate people's WTP for preventing floods and soil erosion, increasing the life of dams, and increasing access to spring water in the watershed. The valuation was based on the Choice Experiments Method. The study found an annual WTP per household of US\$0.6 to postpone floods occurrence by 1 year; US\$2.4 to prevent 1 percent of soil erosion, –US\$0.1 to increase dam life by 1 year and US\$1.2 to increase access to spring water by 1 percent (2012 prices). While people have positive preferences for flood prevention, soil erosion control and access to spring water, their preferences for increasing the life of the dam were negative. Using these estimates, the table below presents the results of the study for two other scenarios.

	WTP (US\$/household/year)	
	Scenario 1 <sup>a</sup>	Scenario 2 <sup>b</sup>
Postpone flood occurrence	33	63
Control soil erosion	48	96
Increase dam life	–20	–45
Increase access to spring water	60	108
<b>Total WTP for each scenario</b>	<b>121</b>	<b>222</b>

*Notes: (a) refers to postponing flood occurrence for the successive 55 years; reducing soil erosion by 20 percent; increasing dam life by 250 years; increasing access to spring water by 50 percent. (b) refers to postponing flood occurrence for the successive 105 years; reducing erosion by 40 percent; increasing dam life by 450 years; increasing access to spring water by 90 percent.*

*Source: Deniz 2012*

<sup>11</sup> Water stress is defined as an average water availability of less than 1,700 m<sup>3</sup> per capita per year (www.unwater.org)

<sup>12</sup> However, estimating this benefit is particularly difficult, primarily because of unclear cause-and-effect relationships between forests and water and the complexity of water-related functions. While forests do tend to improve water quality, their impact on dry season water flows varies depending on local conditions and their impact on total annual flow is generally negative, because of high evapo-transpiration from trees (Aylward et al., 1998; Bruijnzeel, 2000; Calder, 2000; Tognetti et al., 2004). Forests also help to reduce downstream flood risk, but this effect is on a more limited scale than is commonly assumed. Indeed, it is increasingly argued that the presence of forests does not help to reduce the most damaging floods, which occur once-in-a-lifetime; rather, at a large scale, dams, drainage channels and the extent of water use are more significant (Kaimowitz 2004). Though research on forest-hydrology links in the Mediterranean has been limited to a few site-specific studies, its conclusions are broadly similar (Bellot et al. 2001; Lavabre et al. 2000).

<sup>13</sup> These estimates are not comparable, as they refer to different water-related aspects in different countries. They reflect the avoided cost of reservoir sedimentation and of potential loss of irrigated agricultural production in Tunisia; the average value of different levels of erosion protection by forest species in Morocco (ranging from US\$21/ha of area covered by Saharian acacias to US\$40/ha of area covered by other forest types); and the cost of protecting water supplies in Algeria.

**Forests can play an important role in adaptation to climate change.** The linkage between forests and adaptation is twofold (Locatelli and Pramova 2010, Hergarten 2013). First, the role of forests in social adaptation is significant, by providing local services that reduce the vulnerability of local communities to climate change ('forests for adaptation'). Secondly, climate change is likely to cause important changes in forests, thus forests themselves need adaptation ('adaptation of forests'). Giannakopoulos et al. (2009) predicted that the Mediterranean region would experience a drop in rainfall of 10–20 percent and an increase in temperature around 2°–4°C by 2031–2060 using the HADCM3 model<sup>14</sup>. For the cork oak ecosystem in northwest Tunisia, it was predicted a decrease of rainfall by 10–11 percent and an increase of temperature by 1.4°–1.8°C in 2050 using the same model (Daly-Hassen et al. 2012b). The role of CPMF forests in climate change mitigation is currently limited compared to other benefits. Available valuations across CPMF countries show that carbon sequestration is highest in Turkey, the country with highest forest growth.

**In this context, approaches to Ecosystem-based Adaptation (EbA) could be valuable cost-effective tools to facilitate both societies' and forests' adaptation to climate change.** EbA is a set of adaptation policies or measures that consider the role of ecosystem services in reducing the vulnerability of society to climate change in a multi-sectoral and multi-scale approach (Vignola et al. 2009). Figure 2 illustrates the relationship between forest ecosystem services and the different components of vulnerability to climate change. For example, coastal mangroves in Bangladesh can protect lives and house damages from extreme events (cyclones) in the order of about US\$1,200/ha of forest<sup>15</sup> (World Bank 2012a).

**Other forest benefits are particularly underestimated and need further analysis.** Recreation is likely to be a significant forest benefit in CPMF countries. However, available estimates are limited to certain areas, such as forest parks and reserves. Hunting benefits have been estimated only for a few countries and vary considerably from US\$1–99/ha, due to differences in site characteristics and valuation methods. As efforts to estimate non-use values of biodiversity are very scarce and site-specific, the estimated value of biodiversity remains almost negligible, at about 2 percent of the countries' forest TEV, or US\$7/ha on average. Because these estimates are particularly weak, no strong conclusions can be drawn.



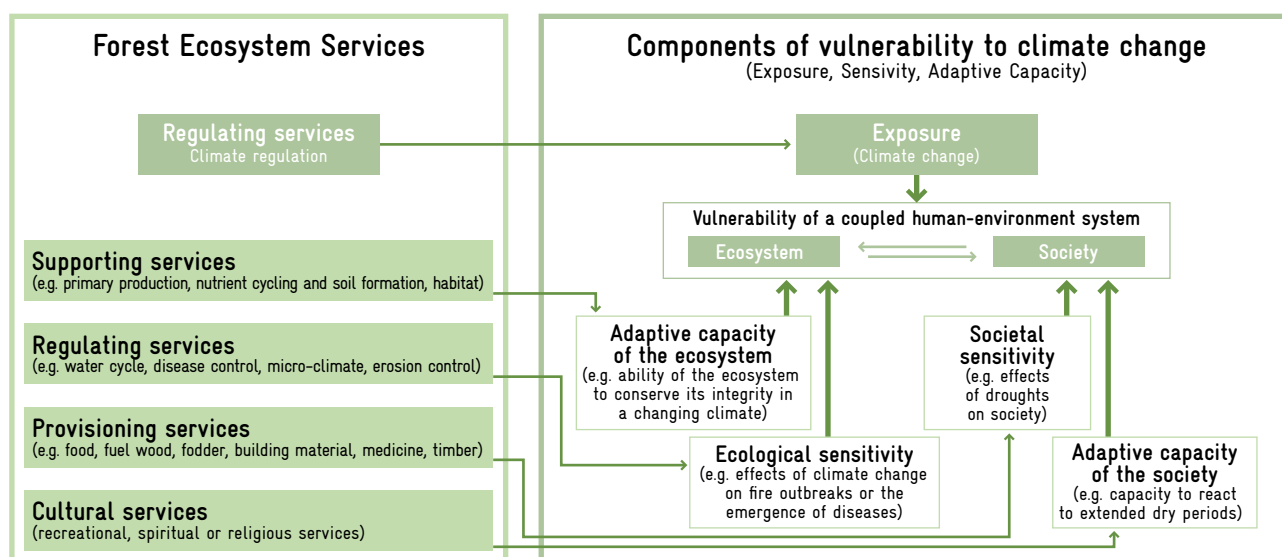
*Non-Wood Forest Products, oils and jams, Tannourine Natural Reserve, Lebanon*

<sup>14</sup> Similar results are obtained by Kunstmann et al. (2007) for the mountains of the upper Jordan catchment, with 25 percent decreases in mean annual precipitation and temperature increases of up to 4.5°C, for the period 2070 – 2099.

<sup>15</sup> Net Present Value over 30 years, using a 10 percent discount rate.



Figure 2. Relationship between forest ecosystem services and the different components of vulnerability to climate change



Source: adapted from Locatelli & al. 2008. CIFOR.

**Despite forests' importance, deforestation and forest degradation continue.** Overuse, overgrazing, and competition from other forms of land use hamper productivity and reduce the environmental services provided by the region's remaining forests. Though net deforestation at global level seems to have slowed down since 2000, this is only a result of increasing area under plantations (FAO 2010b). Over the past two decades, Algeria lost more than 10 percent of its forest cover (Van Acoleyen and Khelladi 2011) and its deforestation rate was 0.6 percent per year during 2005–2010 (FAO 2010b). In many countries, forest degradation is likely to be a more important problem than deforestation itself (CIFOR 2009). Overall, the cost of deforestation and forest degradation can be high: 0.2 percent of the GDP in Morocco (Ellatifi 2005) up to 0.7 percent of the GDP in Iran (Croitoru and Sarraf 2010).

**Climate change is likely to exacerbate the impacts of deforestation and forest degradation.** Climate change, compounded by 'maladaptive' processes and inadequate land uses, is likely to reduce the ability of Mediterranean forests to autonomously accommodate climate change and to increase frequency and intensity of risk of pathogen outbreaks, uncontrolled fires, and other large-scale disturbances (FAO/Silva Mediterranea 2010). An analysis of climate change vulnerability in Tunisia showed that climate change could cause a loss of 1,200 – 18,500 ha of cork oak (1–20 percent of the total cork oak area), leading to an economic loss of US\$2–27 million for the period 2010–2050. This represents about 0.3–4.8 percent of the TEV of cork oak forests (Daly-Hassen et al. 2012b)<sup>16</sup>. A recent study in Tazekka National Park of Morocco projected that climate change could reduce ground water recharge by 47 percent over the next 50 years, due to a decrease in the average rainfall and higher runoff due to greater rainfall intensity (GIZ 2011).

**Forests for a green economy: what vision?** The importance of forests in the CPMF countries is undeniable. So is the social damage caused by forest degradation and climate change. How can forest contribute to a green economy? Greening the forestry sector implies managing it and investing in it as an asset that produces a wide range of benefits to society (UNEP 2011). With a better understanding of public goods and externalities generated by forests, it becomes critical for forest managers and governments to account more effectively and transparently for forest stocks and flows. In this light, the next section summarizes good practice examples of mechanisms to capture forest benefits towards green economy in the MENA region.

<sup>16</sup> The analysis was conducted using IPCC HADCM3 Scenario A2 (1.8°C increase in temperature and 11 percent decrease in rainfall by 2050) and B2 (1.4°C increase in temperature and 10 percent decrease in rainfall by 2050). The economic loss was estimated using a discount rate of 2 percent.

## 2. CAPTURING FOREST VALUES

With a greater understanding of forests' potential to contribute to a green economy, it becomes critical for governments to capture and develop the full range of forest benefits, including their contribution to livelihoods of the poor and marginalized. While available efforts focus on mechanisms to capture forest benefits in general (UNEP 2011; WWF 2009), in protected areas (IUCN 2006), or in other regions of the world (EFIMED et al. 2008), none reviews comprehensively the existing efforts in the MENA region. Table 2 provides examples of instruments to capture different forest benefits. This section focuses mostly on the use of market-based instruments through illustration of successful case studies in the region and elsewhere.

Table 2. Examples of instruments to capture forest benefits

Environmental conservation target	Mechanism	Case study
All forest ecosystem' goods and services	Green accounting	Morocco: Maamora forest, and the Argan tree ecosystem Spain*: cork oak forest in Andalusia
	Compensation mechanisms	Morocco: compensation for zoning degraded forests
	Incentives to reforestation	Morocco: subsidy to forest plantations on private lands
Water	PES	Tunisia: compensation for adopting sustainable land uses Lebanon: payments for environmental protection France*: compensation for adopting best practices in diary farming Italy*: compensation for adopting certain forest management practices
Biodiversity	Eco-tourism	Lebanon: natural reserves (e.g. Shouf Biosphere Reserve) Tunisia: forest concessions
	PES	Spain*: conserving forest biodiversity in Girona
	Access and Benefit-Sharing	Algeria, Morocco: first experiences with ABS
NWFPs	Value chain development and organic certification	Lebanon, Morocco, Tunisia: transforming aromatic and medicinal plants into essential oil and dried herbs Turkey: pine honey
	Ethical bio-trade	Morocco: case of argan ecosystem
Carbon	CDM, REDD+, LULUCF voluntary markets	Morocco: partner of UN-REDD Turkey: LULUCF project in development (in partnership with UNDP) Algeria, Tunisia, Morocco, Lebanon, Tunisia, Turkey: REDD+ Fast-start project (in partnership with AFD/FFEM)

Note: \* The examples from north Mediterranean countries show the application of mechanisms in ecosystems similar to those of MENA region

## 2.1. Green accounting

It is widely acknowledged that gross domestic product (GDP) is not a measure of sustainability. The System of National Accounts (SNAs) usually understates the economic contribution of forests to economies, by capturing the income from logging, but excluding many forest benefits (watershed protection, recreation, among others) and costs (forest degradation or depletion) (FAO 1997; Lange 2004).

To overcome this problem, the System of Environmental and Economic Accounting (SEEA) uses satellite accounts for the environment (forests, water, energy) that complement the SNA. In 2012, the Statistical Commission of the United Nations adopted the SEEA as an international statistical standard for official statistics<sup>17</sup>. Through its forest accounts<sup>18</sup>, SEEA supports the green economy by responding to policy questions, such as: What is the total economic contribution of forests and what are the benefits from sustainable forest management? What are the forest benefits and their distribution among different groups in society? Is economic growth sustainable or is it based on the depletion of forests?

In MENA, efforts to incorporate the value of ecosystem services in national accounting vary across countries. For example, Tunisia's SNA captures only a few tangible forest benefits sold by the State (e.g. timber, fuelwood, NWFPs, hunting). Morocco is currently estimating the value of non-market forest benefits in two pilot eco-regions (Maamora forest, and the argan ecosystem) and incorporating them in national accounts<sup>19</sup>. Lebanon took steps to develop pilot accounts for water by using a conceptual framework (SEEA for Water) for organizing the hydrological and economic information in a coherent and consistent manner (UN-ESCWA 2009).

The World Bank is leading the Wealth Accounting and the Valuation of Ecosystem Services (WAVES) program, a global partnership which aims to promote sustainable development by ensuring that the national accounts used to measure and plan for economic growth include the value of natural resources. As part of WAVES, Spain has prepared a system of green national accounts for forests in Andalusia (Box 3). What are the practical implications of this system?

- **evaluating trade-offs for development:** When building roads or bridges, these accounts show which parts of the forests store more carbon and are worth preserving or how much compensation is to be paid to local residents for commercial revenue lost as a result of the road.
- **public buy-in for millions spent on fire protection in the region:** The accounts map fire expenditures and help in determining whether the money is being spent on the forest with the greatest value.
- **setting entry prices for tourists:** one part of the land accounts involves using the Simulated Exchange Value tool, which determines the amount of money tourists would be willing to pay to visit a particular area of Andalusia (WAVES 2012).

---

<sup>17</sup> <http://unstats.un.org/unsd/envaccounting/Brochure.pdf>

<sup>18</sup> Within SEEA, forest accounts provide a framework for: (1) linking forest asset (balance) accounts with flow accounts for timber, non-timber forest products and forest ecosystem services in physical and monetary terms; (2) linking forest asset and flow accounts with SNA (Lange 2004).

<sup>19</sup> Communication with F. Benchekroun, Haut Commissariat aux Eaux et Forêts et à la Lutte contre la Désertification du Royaume du Maroc.



### Box 3. RECAMAN<sup>20</sup>: Application of green national accounting in Andalusia (by Pablo Campos and Alejandro Caparrós)

Andalusia covers 9 million ha in southern Spain. Mediterranean forests, one of the world's biodiversity hotspots, cover about 52 percent of the region. These are complex ecosystems that have been traditionally managed for cork, timber, firewood, nuts, hunting, and grazing. As pressures grew, policy makers realized that the region is worth much more, by providing ecosystem services – public and private recreation, landscape, carbon storage, and biodiversity – whose values are not readily observable in the markets.

The RECAMAN project prepared a system of green national accounts for Andalusia's forests, grasslands, and scrublands (montes). The project applies a methodology that: (i) integrates commercial and non-commercial values in a consistent manner; (ii) fully integrates a production and a capital account; (iii) clearly distinguishes between intermediate and final production, allowing for the estimation of sector-level values; and (iv) provides spatially explicit results for almost all of the terrestrial ecosystems of Andalusia, except for agricultural land, urban areas, and wetlands. The methodology has two components: a method to integrate commercial and environmental values, the Simulated Exchange Value method, and a system of accounts, called the Agro-forestry Accounting System.

The Simulated Exchange Value method simulates the entire market (demand, supply, and market structure) to estimate the outputs that could be obtained if all non-commercial values were internalized. It aims at simulating prices for cases where neither direct market price nor prices from similar markets exist. For example, in the case of recreation, if the area is so unique that monopolistic behavior should be assumed, the price will be set so as to maximize revenue. If perfect competition is the appropriate market structure, costs will be paramount in determining the price (as long as demand is strong enough to cover these costs). This simulated price, multiplied by the corresponding quantity provides the output exchange value to be integrated in the accounting system as an environmental output.

The Agro-forestry Accounting System framework has a production and a capital sheet. The production account incorporates all the economic flows related to the production process that occur during the accounting period. The capital sheet records stock values and their variations. There are three different versions of each sheet: (i) private, focused only on the goods and services produced or used by the private owner of the land; (ii) public, recording benefits and costs affecting other agents; and (iii) social, which simply adds up the two previous versions. The goods and services valued in the project include: timber, cork, mushrooms, forage, environmental self-consumption, game, carbon, recreation, landscape, and biodiversity.

Source: [www.recaman.es](http://www.recaman.es)

## 2.2. Payments for Environmental Services

Payments for Environmental Services (PES) are a popular incentive mechanism to conserve indirect benefits provided by ecosystems, such as water services. In a PES mechanism, the beneficiaries of environmental services downstream in a watershed (e.g. water users) compensate the producers of such services (e.g. farmers or forest managers) for the difference in net profit resulting from adopting the practices preferred by water users rather than the most profitable alternative. PES programs are based on two parallel principles: (1) those who provide environmental services should be compensated for doing so, and (2) those who benefit from environmental services should pay (Pagiola and Platais 2007; Engel et al. 2008). These programs have been widely adopted in Latin American countries such as Costa Rica, Ecuador, and Brazil. In the Mediterranean region, applications of PES are relatively scarce. Most documented examples are found in Europe, and focus on biodiversity conservation and watershed management (Box 4).

<sup>20</sup> *Renta y Capital de los Montes de Andalucía* (RECAMAN) is a project coordinated by Pablo Campos and funded by the Junta de Andalucía. Alejandro Caparrós is responsible for the aggregated methodology and the researchers responsible for the different parts of the project are: Begoña Álvarez, Santiago Beguería, Juan Carranza, Luis Díaz-Balteiro, Mario Díaz, Casimiro Herruzo, Fernando Martínez, Gregorio Montero, Paola Ovando, José Luis Oviedo and Mario Soliño.

In MENA, applications of PES are very limited. For example, in Morocco, the Government pays compensation for zoning degraded forest ecosystems so that they regenerate<sup>21</sup> (*compensation pour mise en défens*). Under the program, cooperatives or associations of farmers respecting the zoning receive Dh250/ha (or Dh350/ha for argan) for a minimum of 300 ha (or 100 ha for argan). The funds are used for community projects and income-generating activities. The scheme has been successful in terms of forest regeneration and achievement of community projects (Aouni 2012). A study carried out in a Moroccan national park suggested opportunities for improving this scheme by adapting the amount of compensation to the real value of forgone benefits<sup>22</sup>.

In Tunisia, a study analyzed the PES potential to improve conservation of a Tunisian watershed. The government subsidized 80 percent of investments for conservation measures, such as planting acacia in gullies, while farmers were expected to provide the remaining costs through in kind contributions and to undertake maintenance. However, observed survival rates were 40 percent, because of lack of maintenance and damages due to grazing by other farmers. The case study led to a series of lessons, including: (a) paying for trees that survive instead of trees planted; (b) payments should be sufficient to make the practice attractive for farmers ; (c) making repeated payments rather than a one-time ex ante payment (Croitoru and Daly-Hassen 2010).

In Lebanon, a more indirect scheme of PES has been used. The Banque Libano-Française, in partnership with the United Nations Development Programme - Lebanon (UNDP) and MasterCard, launched in 2011 a unique card on the Lebanese market: the Earth Card. While using it to pay for purchases, a percentage of the profits generated through card payments is transferred for the funding of environmental projects in Lebanon under the supervision of the UNDP-Lebanon<sup>23</sup>. By the end of 2012, the Bank awarded about US\$40,000 to finance three projects in the field of renewable energy and energy efficiency (Banque Libano-Française-UNDP 2012)<sup>24</sup>.



Workers in sawmill, Morocco

<sup>21</sup> By decree no. 1855-01 of March 21 2002.

<sup>22</sup> Decree no. 1855-01 of March 21 2002 fixed the amount of Dh250/ha/year based on the national average yield of forage (250 UF/ha) and the price of barley in 2002 (Dh1/kg) (GIZ 2010a). This amount may be lower than the real forgone benefit because it does not capture the increase in the price of barley (which more than tripled from 2002 to 2011), foregone benefits from collection of dead wood, and other costs (eg fencing, guards). For the National Park of Tazzeka, the real value of forgone benefits from zoning is estimated at Dh1.145/ha (Croitoru 2011).

<sup>23</sup> <http://www.eblf.com/en/Cards-services-Earth-Card>

<sup>24</sup> However, it is not clear whether the payments made through Earthcard are conditional to any indicators of project success.

## Box 4. Payments for water and biodiversity in Europe

**France: Vittel (Nestlé Waters).** Mineral bottler Vittel has run a PES programme since 1993 in its 5,100 ha catchment at the foot of the Vosges Mountains to maintain the high quality of aquifer water. The programme pays 27 farmers in the 'Grande Source' watershed to adopt best practices in dairy farming. The programme, implemented by an agricultural extension agency, Agrivair, combines conditional cash payments with technical assistance, reimbursement of incremental agricultural labor cost, and even arrangements to take over lands and provide usufruct rights to the farmers. Contracts are long-term (18–30 years), payments vary according to service provision costs on a farm-by-farm basis, and both land use and water quality are closely monitored over time. Total costs during 1993–2000 were euro 980/ha per year, which is equivalent to euro 1.52/m<sup>3</sup> of water produced.

**Italy: Romagna Acque S.p.a.** Romagna Acque S.p.a. is a consortium of municipalities that manages water in the Romagna area of north-east Italy, transferring tap water from the Appenines to cities along the coast. A study demonstrated that certain forest management practices could improve water quality and reduce erosion by 10,000 m<sup>3</sup> per year, from 42,000 m<sup>3</sup>. In 2001, the company implemented a payment scheme to encourage public and private forest owners to adopt these practices. The initial payment was around euro 200/ha, decreasing to euro 100/ha after a couple of years, which corresponds to a decline from 7 to 3 percent of water bill revenues. Today, the scheme covers almost all of the catchment area (5,200 ha) and generates a revenue of euro 0.5–1 million per year for recipients.

**Spain: Girona.** Since 2008, this PES mechanism operates in the Catalan province of Girona to promote biodiversity by conserving mature forest stands (stands that have not been actively managed in the last 50–100 years). Forest owners are offered payments for a commitment to leave the stands in natural evolution for 30 years. The payment is meant to compensate for the profit loss, calculated using an approved forest management plan.

*Source: Prokofieva et al. 2012 (based on Perrot-Maitre 2006, Pettenella et al. 2011, Gorriz and Prokofieva 2011)*

## 2.3. Protected areas

Creating protected areas (PAs) has been the dominant approach of many governments to conserve forest ecosystem services. In MENA, the number of PAs has increased significantly over the last decade, while environmental conventions and agreements have promoted several PAs systems<sup>25</sup>. Nevertheless, biodiversity continues to be lost in the region. One reason is that many PAs do not receive adequate funds to ensure their effective management and little is spent on compensation to local communities who lose access to land and resources<sup>26</sup>. In most MENA countries, the funds allocated to PAs average US\$4.5/ha per year as opposed to the need of US\$70–280/ha per year for an effective management<sup>27</sup> (IUCN 2006).

However, the traditional vision of PAs as state initiatives on state-owned lands with state and international financing is fading. Many PAs in the region have gradually introduced a broad spectrum of financing mechanisms. Among these, market-related initiatives include<sup>28</sup>:

- **Use rights.** In the Mediterranean, entrance fees are charged in Jordan (in all PAs), Egypt (for marine PAs), Montenegro and Slovenia; other countries collect fees in some PAs or are testing them at pilot sites (IUCN 2006). Generally, PAs charge reduced rates for domestic visitors, and even lower for some groups (e.g. school groups). If the number of visitors is high, revenues can cover a significant portion of the PA's costs. Other use rights are commonly charged in PAs at points with educational or tourist interest (e.g. caves, museums, etc.) or for the use of facilities (e.g. parking places).

<sup>25</sup> Ramsar sites, Biosphere reserves, Natural and Mixed World Heritage sites, Specially Protected Areas of Mediterranean Importance, etc.

<sup>26</sup> Other reasons relate to the existing system and governance aspects linked to the creation and management of PAs.

<sup>27</sup> The US\$4.5/ha estimate includes both national and international contributions. The range of values US\$70–280/ha refers to PA categories I–IV (strictly protected and national parks).

<sup>28</sup> In addition PA managers may need to resort to (1) revised policies on subsidies, offsets from environmental impacts of infrastructures, and special taxes; and (2) partnerships with economic and social sectors and raising contributions from private companies (IUCN 2006).



- **Concession rights.** A management option commonly used is to arrange for private sector companies or NGOs to operate certain facilities or activities against payment of a concession fee. This practice has been used often for to the right to operate accommodations, souvenir shops, and guided tours. For example, in **Morocco**, the ability to delegate management agreement for PA is provided by law<sup>29</sup> based on specification of the management conditions, charges, etc.
- **Ecotourism.** Promotion of ecotourism is increasingly used as an incentive to conserve biodiversity and the revenues of local communities in PAs. In the MENA region, ecotourism has been successfully promoted in PAs in **Jordan** and **Lebanon**. Box 5 highlights the ecotourism strategy promoted in **Lebanon's** Shouf Biosphere Reserve. Other initiatives are being undertaken in the Maghreb, such as an IUCN project promoting ecotourism in two pilot areas of **Morocco** and **Tunisia**<sup>30</sup>.
- **PES.** In many cases worldwide, PES contributes to the protection of PAs or their buffer zones. For example, in Ecuador, payments by Quito's water company contribute to the conservation of the Cayambe Coca and Antisana ecological reserves (Echavarría 2002). However, not all PAs with high biodiversity and touristic value have PES potential. An analysis of PES potential for water in Tazekka National Park in Morocco suggests that a successful implementation should be based on an in-depth feasibility study exploring issues such as existing threat (loss of water quality or quantity), affected resource (freshwater, groundwater) and population.

Though such approaches have already been developed in several MENA countries, they remain largely one-off exceptions from the conventional dependence on domestic government budgets and foreign donors, rather than systematic approaches. Perhaps the most promising are the entrance fees and the PES for water (IUCN 2006).



*Magot monkey, Chrea National Park, Algeria*

<sup>29</sup> Law n° 22-07 related to protected areas.

<sup>30</sup> [http://www.iucn.org/about/union/secretariat/offices/iucnmed/iucn\\_med\\_programme/terrestrial\\_ecosystems\\_\\_\\_li-velihoods/protected\\_areas/](http://www.iucn.org/about/union/secretariat/offices/iucnmed/iucn_med_programme/terrestrial_ecosystems___li-velihoods/protected_areas/)

## Box 5. Ecotourism strategy in Shouf Biosphere Reserve (by Elsa Sattout)

The Shouf Biosphere Reserve was declared a UNESCO Biosphere Reserve in 2005. It covers 165 km<sup>2</sup> and includes Al-Shouf Cedar Nature Reserve, Ammiq Wetland Protected Area, and 24 villages from the eastern and western sides of the Barouk and Niha mountains. It accounts for a quarter of the remaining cedar forests in Lebanon. The reserve has become a popular destination for ecotourism activities such as hiking, snowshoeing, and bird watching. This is reflected by a drastic increase in the number of visitors, from 20,000 in 2003 to almost 70,000 in 2011. The Ministry of Environment provides annually about US\$43,000 for the reserve, which accounts for approximately 32 percent of the reserve's total expenditures.

In 2004, a revised business plan revealed a budget deficit due to high management cost of Al-Shouf Cedar Nature Reserve. This prompted efforts to seek donations, sponsors from among the stakeholders, and other innovative income generating activities. In 2009, GTZ drafted an ecotourism strategy and an action plan for the entire Shouf Biosphere Reserve. These focused on the role of ecotourism as being critical to reconciling biodiversity conservation and economic development, including opportunities for local communities. The plan was to improve income by increasing visitor numbers while minimizing threats to the environment. The main highlights of the strategy include:

- **Increasing funds:** developing efficient fee collection methods (permanent presence at entrances, credit card payment facilities); identifying equitable fee policy and determining which activities should be subject to fee (guided tour with a biodiversity specialist); and installing park-based tourism (building solid partnership with the private sector)
- **Minimizing threats from tourism:** developing 'green packages' to enlarge market demand for green tourism; considering closure of some access roads; introducing pay parking in villages, including clean shuttle transport.
- **Creating a tourism value chain:** involving micro-enterprises owned by residents surrounding the reserve to deliver quality service throughout all stages of their visit (from pre-visit image and information; booking and reservation; to departure and follow up)
- **Tourism packages:** promoting diversified packages of services for a few-day stay, involving local communities.

Source: GTZ 2009; Sattout and Caligari 2011

Implementation of the above mechanisms does not immediately guarantee that PAs will successfully conserve biodiversity and improve people's livelihoods. In most cases, the revenues generated by PAs (admissions, concession sales, and services) are transferred to central government accounts and are not repaid to PAs. This policy discourages PAs from developing new income sources. In the MENA region, only five countries repay the fees to parks in their network, albeit partially. It is therefore desirable to establish: (i) **financing mechanisms through tourism development**, (ii) **a policy of transferring at least a portion of revenues to the PA where they were generated**.

Local people would benefit from tourism development through jobs that would be generated (e.g. sale of handicrafts). However, this would not affect everyone, as many jobs might require particular skills, such as knowledge of foreign languages. To ensure that all people benefit from tourism development, it would be desirable that **a portion of revenues is shared with local people, or dedicated to community investments**. In Bolivia, for example, 25 percent of revenues from entrance fees to PAs are transferred to local people.

## 2.4. Non Wood Forest Products: value chains and ethical bio-trade

Forests in the MENA region provide a great diversity of NWFPs, such as cork, mushrooms, aromatic and medicinal plants, fruits and others. However, far too often, many of these products are exported in bulk to other continents, where most of the value and profits remain. For example, argan cosmetic oil may bring added value to France 12 times higher than to Morocco (per liter), where argan fruits are collected (GIZ 2010b).

### • Creating value chains

Creating or improving NWFP value chains can improve forest conservation and local income opportunities<sup>31</sup>. A wealth of guidance already exists on supporting small and medium enterprises (SMEs) and providing opportunities for poor in the forest sector. Recent developments witnessed a move from traditional approaches that favor the supply side (through financial services) to facilitating a market system development by intervening on both supply and demand (Macqueen 2008). This can be done in several ways, such as through process upgrading (increasing production efficiency), product upgrading (qualitative improvements), functional upgrading (intermediaries), and channel upgrading (product diversification). Box 6 presents two examples of value chains of aromatic and medicinal plants in Turkey and Morocco. In Lebanon, initiatives include improving the value chain of wild plants (thyme, mint, rosemary) in the Shouf reserve<sup>32</sup>. In Tunisia, ongoing efforts focus on promoting micro-enterprises based on NWFPs by using local knowledge and rational forest exploitation<sup>33</sup>.

### Box 6. Aromatic and medicinal plants: value chain and organic certification

**Oregano in Turkey.** Turkey exports annually about 5,000–7,500 tons of dried oregano for a return of US\$13–15 million. Commercial oregano species are collected mainly in the Aegean and Mediterranean regions of Turkey and represent typical Mediterranean aromatic plants. In Sütçüler township and its villages in Isparta province, an interesting practice for sustainable wild crafting of oregano has been realized. Sütçüler oregano, an endemic species that grows only in this region, revealed its high economic value; this led collectors to the establishment of village cooperatives. These cooperatives, in collaboration with the regional Forestry Office, have drawn up a set of rules for the wild crafting of this species. The rules require the collectors not to start harvesting before a predetermined date and permit harvest of the plants only based on precise guidelines. This initiative contributes to reduce malpractice in harvesting, which often is responsible for destruction of biodiversity and unnecessary loss of material. According to Turkish forest management plans, wild harvesting of oregano must be regulated by permissions from the Turkish Forest Department and can get a certified organic product label.

**Rosemary in Morocco.** Morocco's climate creates perfect conditions for the wild growth of a variety of aromatic and medicinal plants. However, before 2005, harvest techniques resulted in low product quality; and many aromatic and medicinal plants were sold as raw materials in bulk, generating little income for collectors. The Integrated Agriculture and Agribusiness Program (US\$22.6 million), implemented by USAID in partnership with HCEFLCD during 2005–2009, helped transform the value chain of the aromatic and medicinal plants. The program trained a cooperative and collectors in the Oriental region in sustainable harvesting techniques (cutting no more than 50 percent of the plant), rotating the selected harvesting sites each year, and planting additional areas. It assisted in obtaining harvesting rights on public lands, installed a modern distillation unit in Jerada, and linked the cooperatives to potential national and international buyers. It also provided training and resources to become export certified and receive organic certification. Thanks to this program, the Jerada rosemary cooperative now transforms raw materials into essential oil and dried herbs. By improving collection and processing methods, the cooperative substantially increased both the quantity (from 5 liters to 17.5 liters per ton) and quality of the essential oils produced. The program created 150–200 jobs among local communities that collect or process rosemary. The improved collection techniques have also helped to reduce deforestation in the Oriental region.

Sources: Ismail Belen for Turkey; USAID 2010 for Morocco

<sup>31</sup> However, not all existing NWFP chains are sustainable: Zimbabwean woodcarvers produce large quantities of low-quality carvings from an open-access resource, resulting in overexploitation and continuing poverty (Matose 2005; Cunningham 2005).

<sup>32</sup> World Bank/UNDP project 'Sustainable use of Edible, Medicinal and Aromatic Plants' in the Shouf Reserve.

<sup>33</sup> FAO funded a project on Supporting the promotion of forest micro enterprises specialized in NTFPs to improve the living standards of forest dwellers and sustainable management of the country's forests (US\$304,000 during 2011–2013).



### • Ethical bio-trade

In most MENA countries, the development of national regulations for an equitable access and benefit sharing (ABS) of genetic resources is still underway, following the Convention on Biological Diversity's (CBD) Nagoya Protocol. Thus, case studies on the implementation of this mechanism are not readily available. Box 7 provides an interesting example of corporate social responsibility approach conducted for argan in Morocco, based on a voluntary benefit-sharing program.

The Global Environment Facility (GEF) set up the Nagoya Protocol Implementation Fund (NPIF) as a multi-donor trust fund aiming at funding activities under the Nagoya Protocol. The fund became operational in 2011. It supports projects that encourage engagements with private sector to explore the economic potential of genetic resources and facilitate the transfer of appropriate technologies. Through these projects, countries should be generating additional information that can help to understand their capacities and needs on ABS, with focus on the provisions from existing policies, laws, and regulations affecting genetic resources (GEF 2011).

#### Box 7. Argan in Morocco: a voluntary 'benefit-sharing' program

Argan fruit collected from Morocco is the base product for several European cosmetic producers distributed internationally. Currently, in the absence of any ABS law, the institutional partnership along the supply chain of argan cosmetic oil is based on a voluntary 'benefit-sharing' program, which offers producers shared ownership and payments above market price, based on EcoCert Fair Trade certification rules.

Since 2008, a partnership has been established among Laboratoires Serobiologiques, L'Oreal, the NGO Yamana, and their partners in Morocco – the Targanine cooperatives based in Agadir. Targanine cooperatives supply argan oil and related argan products (e.g. pressed oil cake and argan leaves) to Laboratoires Serobiologiques under fair trade arrangements of product prepayment (e.g. 2 year contract for the supply of oil) agreed prices, and a premium price paid (e.g. 5 percent premium paid for oil at the end of 2010). L'Oreal receives the processed products; it then incorporates them in some cosmetic products that are sold internationally. Yamana is a trainer and facilitator working with the cooperatives in Morocco and ensuring that local stakeholder expectations are taken into consideration. Some of the most notable aspects of the supply chain include:

- purchase of products specifically from Targanine cooperatives with the purpose of providing not only employment, but also shared ownership in the cooperative and shared decision-making.
- the cost structure of argan oil was assessed to make sure that payment each year has been above market price since 2008 when EcoCert Fair Trade certification was achieved.
- introduction by Laboratoires Serobiologiques of co-products utilizing pressed cake and argan leaves for subsequent use in L'Oreal cosmetics<sup>34</sup>.
- the social fund of each Targanine cooperative noted above receives 50 percent of the pressed cake payment. It has been spent on eye glasses, literacy programs, basic hygiene products, etc.
- the partnership enabled the cooperatives to maintain their EcoCert certified organic compliance<sup>35</sup>.
- a traceability program developed by EIG Targanine and Yamana is in place to ensure that products collected or purchased are organic. There is also a traceability program to monitor social fund expenditure to ensure that purchases made from it are those agreed upon by the cooperative.

*Source: Robinson and Defrenne 2011*

<sup>34</sup> The cooperatives sell pressed cake for approximately 15 times local market prices, substantially improving the viability of these operations. Of the total paid per kilogram, approximately 50 percent goes to a social fund for each cooperative, 25 percent to Economic Interest Group Targanine for maintenance costs, machinery, investment and management, and 25 percent to the cooperative.

<sup>35</sup> The certification of 'organic' reflects traditional harvesting practice of collecting fruit from trees that occur 'wild' across the landscape of Souss Valley

## 2.5. Carbon finance

Several mechanisms are currently available for carbon finance (World Bank 2012b):

- *Clean Development Mechanism (CDM)*, established under the Kyoto Protocol, provides for financing emission reductions through afforestation and reforestation in developing countries until 2012. The Durban climate negotiations – Conference of Parties (COP) 17 of the United Nations Framework Convention on Climate Change (UNFCCC) – made provisions for a new commitment period from 2013 until 2017 or 2020, including adoption of a New Market Mechanism, improvements to the CDM, and development of market-based approaches to finance REDD+ in the coming years. However, this provision still requires political necessary decisions to be taken in the next COPs before it can become reality.
- *Reducing emissions from deforestation and forest degradation (REDD +)*, compensates for the reduction in emissions by avoided deforestation and degradation through sustainable management. Avoided deforestation can generate multiple benefits in terms of biodiversity conservation, water flow regulation and soil conservation. Although a commitment to create a REDD mechanism was made at the Mexico COP, many details remain to be decided. In the meantime, international initiatives such as the United Nations collaborative programme on REDD (UN-REDD) and the Forest Carbon Partnership Facility (FCPF) and some individual countries, such as Norway, already finance the REDD+ preparatory phases in selected countries, as well as some emissions reductions.
- *Voluntary markets*. Two REDD projects achieved verification in 2011, one of which in Kenya. Overall, REDD contracts covering 7.7 million tons of carbon dioxide (Mt CO<sub>2</sub>) were signed, representing a 60 percent reduction in volume compared to 2010 – but nonetheless REDD remained a popular project type on the voluntary market.

### What are the opportunities for MENA forests to attract funding for carbon?

It has generally been assumed that opportunities to reduce emissions through land management are limited (compared to other sectors) in the region because of its dry climate<sup>36</sup>. Nonetheless, there are prospects for some important forestation projects of local significance (EIB 2007).

Several initiatives aim to pave the way towards carbon finance mechanisms adapted to MENA ecosystems, e.g.:

- AFD/FFEM is developing a project to test REDD+ initiatives on pilot sites in **Algeria, Lebanon, Morocco, Tunisia, and Turkey**.
- UNDP is also developing LULUCF approaches in several pilot areas in **Turkey**.
- Within the International Climate Initiative (ICI), a project financed by the German Ministry of Environment and targeting 20 countries – among which **Algeria, Morocco, and Tunisia** – aims at developing the geospatial and GIS capacities of forest administrations in order to implement an appropriate system of monitoring, reporting and verification (MRV). One important obstacle to entering REDD markets for MENA countries is that the substantial fixed costs of an MRV system may not be justified in light of the limited amounts of emissions reduction that might be sold.

In general, all countries of the MENA region are eligible to apply to the UN-REDD program (Morocco is already partner of UN-REDD), allowing them to dispose of the necessary information on REDD+ opportunities in order to support efficient decision-making in this regard. Financing opportunities might also emerge from this initiative.

---

<sup>36</sup> For example, it is estimated that the economic mitigation potential of agricultural and land management practices in North Africa is about 25 MtCO<sub>2</sub>e per year by 2030, or 9 percent of the total potential in Africa (Smith et al. 2008, cited in MEDPRO 2012).

However, the potential for mitigating climate change in MENA countries spans several energy resources (natural gas, hydro, and renewable energy sources – wind, geothermal, and solar) and sectors (power, industry, transport, services, and land management), particularly wind and solar energy. Several such projects have been implemented across the region, such as in **Egypt, Morocco, Algeria and Tunisia** (MEDPRO 2012). To the extent that introducing renewable energy would reduce reliance on forests for fuelwood, these initiatives could decrease deforestation and forest degradation.

## 2.6. Financing opportunities for forest-based adaptation

To improve forests' contribution to a green economy, it is necessary to make efforts to improve governance and inter-sectoral cooperation. As discussed in section 1, forests can play an important role in increasing economic, social, and ecological resilience in the context of climate change. Forests can reduce temperatures locally by several degrees, and by facilitating infiltration can help reduce the impact of more variable and intense rainfall. In Nicaragua, for example, the World Bank is financing a project that will use PES to encourage the expansion of forest land uses (albeit primarily agro forestry or silvo pastoral practices, rather than pure forest) to reduce the vulnerability of rural water supplies to the impact of climate change (World Bank 2012c). Other watershed projects aimed at incorporating natural forests and endemic riparian woodlands as part of micro catchment vegetation management with local communities, including the Lakhdar watershed in **Morocco**, the northern **Yemen** wadis, and **Turkey's** Eastern Anatolia Basin (World Bank 2009). In this regard, fundings for Adaptation to Climate Change (e.g. from the Adaptation Fund) may bring opportunities for the development of forestry projects.



*Touristic activity in cedar trees, Michlifen, Morocco*



### 3. POLICY RECOMMENDATIONS

The magnitude of forest benefits and the application of market-based mechanisms to enhance these values have important policy implications. Using these examples and building on the outcomes of the TEEB conference, Tunis, 2011 (Daly-Hassen and Liagre 2011), and on the draft Strategic Framework on Mediterranean Forests (SFMF draft 2012), the decision makers in MENA region are invited to:

- 1- Support the *economic valuation* of forest benefits
  - improve data collection and valuation of non-market forest benefits (e.g. watershed protection, biodiversity, etc.) at local and regional levels<sup>37</sup>
  - improve valuation of the impacts of climate change on forests
  - disseminate the results of existing valuation studies through on-line, user-friendly databases
- 2- Integrate the value of forest benefits in *decision making*
  - incorporate the value of fodder, water services and biodiversity in national accounting
  - invest in green infrastructure to increase resilience to climate change, reduce risk of disasters, etc.
  - increase budget allocations to the forestry sector
- 3- *NWFPs*: support the development of value chains and ethical bio-trade
  - support decentralized financing streams (micro-finance, local investment banking) for SMEs
  - develop legislations to guarantee the equitable sharing of the benefits from endemic genetic resources
  - promote the use of certification schemes (fair-trade, etc)
- 4- *Protected Areas*: conserve forest benefits and attract revenues
  - promote use and concession rights
  - develop ecotourism strategies
  - establish mechanisms to finance Protected Areas from the revenues they generate and share a portion with local people
- 5- Adopt innovative financing mechanisms such as *Payments for Ecosystem Services (PES)* schemes and REDD+
  - investigate the potential for their application at the local level
  - learn and apply good practices from other regions
  - start designing initiatives at pilot sites
- 6- Develop the use of *National Forest Funds* as key institutional and financial instruments for implementing PES schemes and supporting sustainable forest management through collection of new taxes, public and private financial resources, and international financing opportunities
- 7- Offer “green solutions” to the *private sector* to offset emissions of greenhouse gases, compensate biodiversity losses, etc.
- 8- Promote *forest-based adaptation* solutions to adapt economic sectors and people to climate change
- 9- Explore and seize the financing opportunities of the three *Rio conventions* (UNCBD, UNCCD, UNFCCC), including the REDD+ mechanism, the Adaptation Fund, the Green Climate Fund, the ABS mechanism, the opportunities presented by the Global Mechanism of the UNCCD, and the synergies between Rio conventions (financed by GEF)

Although these policy recommendations are potentially applicable to all MENA region, they need to be tailored to the specific contexts at country and local levels.

---

<sup>37</sup> This could include joining existing international initiatives on the economic valuation of ecosystems goods and services, such as TEEB (The Economics of Ecosystems and Biodiversity), the IPBES (International Platform on Biodiversity and Ecosystem Services) and WAVES.

## REFERENCES

- Aouni, K. 2012. *La Compensation des Mises en Défens pour la Reconstitution des Écosystèmes Forestiers au Maroc*. Presentation in Beirut, February 2012. Haut Commissariat aux Eaux et Forêts et à la Lutte contre la Désertification.
- Aylward, B., Echeverria, J., Fernandez Gonzalez, A., Porras, I., Allen, K. and R. Mejias. 1998. *Economic Incentives for Watershed Protection: A Case Study of Lake Arenal, Costa Rica*, p. 130. In: Final Report to the Government of the Netherlands under the program of Collaborative Research in the Economics of Environment and Development (CREED). London: IIED, TSC and the International Center for Economic Policy, National University at Heredia (CINPE).
- Banque Libano-Francaise - UNDP. 2012. "Acting Green" at the Core of Banque Libano-Francaise Strategy while Financing its Earth Card Competition Winning Projects. Press Release. December 10, 2012.
- Bellot, J., Bonet, A., Sanchez, J.R. and E. Chirino. 2001. *Likely effects of land use changes on the runoff and aquifer recharge in a semiarid landscape using a hidrological model, Landscape and Urban planning*, 778, pp.1-13.
- Benchekroun, F. 2012. *Les enjeux de la cooperation régionale pour les forêts méditerranéennes dans un contexte de changement climatique*. Présentation au side-event Rio +20. Haut Commissariat aux Eaux et Forêts et à la Lutte contre la Désertification du Royaume du Maroc.
- Bruijnzeel, L. A. 2000. *Tropical forests and environmental services: not seeing the soils for the trees? Agriculture, Ecosystems and Environment*.
- Calder, I. 2000. *Land use impacts on water resources*. In: Land-Water Linkages in Rural Watersheds. Electronic Workshop, 18 September-27 October 2000, FAO, Background Paper N° 1.
- Campos, P., H. Daly-Hassen, J. Oveido, P. Ovando and A. Chebil. 2008. *Accounting for single and aggregated forest incomes: Application to public cork oak forests in Jerez (Spain) and Iteimia (Tunisia)*. *Ecological Economics*. Vol. 65, Issue 1, p.76-86.
- CIFOR (Center for International Forestry Research). 2009. *Realising REDD. National Strategy and Policy Options*. CIFOR. Bogor. p. 355.
- Croitoru, L. 2007. *How much are Mediterranean forests worth?* *Forest Policy and Economics*. Vol. 9, p. 536-545.
- Croitoru, L. 2011. *Analyse du potentiel des paiements pour les services environnementaux dans le Parc National de Tazzeqa*, GIZ.
- Croitoru, L. and H. Daly-Hassen. 2010. *Using Payments for Environmental Services to Improve Conservation in a Tunisian Watershed*. Mountain Forum Bulletin, January 2010.
- Croitoru, L. and M. Sarraf. (Eds.) 2010. *The Cost of Environmental Degradation: Case Studies from Middle East and North Africa Region*. World Bank. Directions in Development. Washington D.C.
- Croitoru, L. and M. Merlo. 2005. *Mediterranean forest values*. In: Merlo, M. and L. Croitoru (Eds.) *Valuing Mediterranean forests: towards total economic value*. CABI Publishing. Wallingford.
- Cunningham, A., Campbell, B. and B. Belcher. 2005. *Carving out a future: forests, livelihoods and international woodcarving trade*. Earthscan Publications Ltd, London, UK.
- Daly-Hassen, H. and L. Liagre 2011. *Recommendations and orientations to MENA decision-makers*, out of the TEEB conference in Tunis, 28 and 29 June 2011.
- Daly-Hassen, H., Croitoru L., Tounsi K., Aloui A. and S. Jebari. 2012a. *Evaluation économique des biens et services des forêts tunisiennes*, préparée pour le Ministère de l'Agriculture et de l'Environnement et la FAO.
- Daly-Hassen H., Pottast M.C., G. Gader. 2012b. *Toward an economic assessment of ecosystem services under climate change: The case of the cork oak ecosystem, Tunisia*. Prepared for GIZ and presented in The Economics of Ecosystems and Biodiversity (TEEB) Conference 2012. Mainstreaming the Economics of Nature: Challenges for Science and Implementation March 19-22, 2012, UFZ, Leipzig, Leipzig, Germany.
- Deniz, T. 2012. *Valuation Analysis in Erosion Control Activities*. Phd. thesis prepared in Istanbul University 218 pages. Unpublished (in Turkish).
- EFIMED/BOKU/Alterra/CEPF. 2008. *Study on the Development and Marketing of Non-Market Forest Products and Services*. DG AGRI, Prepared for the European Commission.
- Ellatifi, M. 2005. Morocco. In: Merlo, M. and L. Croitoru (Eds.) *Valuing Mediterranean forests: towards total economic value*. CABI Publishing. Wallingford.
- Engel, S., Pagiola, S. and S. Wunder. 2008. *Designing payments for environmental services in theory and practice: An Overview of the Issues*. *Ecological Economics* 65 (4):663-674.

- European International Bank (EIB). 2007. *Study on Clean Development Mechanism (CDM) Project Identification in FEMIP countries*. EIB.
- Food and Agriculture Organization (FAO). 1997. *Accounting for the benefits of forest resources: concepts and experience*. Prepared by J. Vincent and J. Hartwick. 1997.
- FAO. 2010a. *Forests and Climate Change in the Near East Region*. Forests and Climate Change Working Paper 9.
- FAO. 2010b. *Global Forest Resources Assessment. Main report*. FAO.
- FAO. 2011. *State of World's Forests*. FAO.
- FAO/Silva Mediterranea. 2010. *State of Mediterranean Forests*. Concept Paper.
- Global Environment Facility (GEF). 2011. *Nagoya Protocol Implementation Fund*. Brochure. <http://www.thegef.org/>
- Giannakopoulos C., Le Sager P., Bindi, M. Moriondo M., Kostopoulou E. and C. Goodess. 2009. *Climatic changes and associated impacts resulting from a 2° C global warming*. Global and Planetary Change. Vol. 68 (3), pp. 209-224.
- Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ). 2009. *Shouf Biosphere Reserve. Ecotourism strategy*. Prepared for the project Restoration of income generation affected by the war to support conservation of Shouf Biosphere Reserve. GTZ.
- GIZ. 2010a. *Elaboration d'un schéma d'utilisation durable des parcours de la zone du parc national de Tazekka*. Préparé par M. Mounsif. GTZ.
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). 2010b. *Etude de la chaîne de valeur des produits de l'arganier*. Cas de la filière cosmétique. GIZ.
- GIZ. 2011. *Réduction des risques climatiques pour un développement durable. Conservation et valorisation des services des écosystèmes naturels. Cas du Parc National de Tazekka : analyse et guide pratique*. GIZ.
- Gorriz, E. and I. Prokofieva. 2011. *Analysis of three economic incentives for the provision of forest goods and services in Catalonia (Spain)*, Spanish Journal of Rural Development, Vol. II, Special number 1, pp. 75-86.
- Haut Commissariat aux Eaux et Forêts et à la Lutte Contre la Désertification (HCEFLCD). 2012. *La Comptabilité des Ressources Forestières, un instrument pour la gestion durable des forêts*. HCEFLCD.
- Hergarten, M. 2013. *Forests and Climate Change Adaptation : a twofold approach*. ECO consult-GIZ.
- International Union for Conservation of Nature (IUCN). 2006. *Sources de financement durables pour les aires protégées en Méditerranée*. Résumé. IUCN/FundacionBiodiversidadetautres.
- Kaimowitz, D. 2004 *The great flood myth*, New Scientist, 19 June.
- Kunstmann, H., Suppan P., Heckl A., and A. Rimmer. 2007. *Regional climate change in the Middle East and impact on hydrology in the Upper Jordan catchment*. In IAHS publication, Quantification and Reduction of Predictive Uncertainty for Sustainable Water Resources Management. Wallingford, UK, HR Wallingford, pp. 141-49.
- Lange, G.-M. 2004. *Manual for environmental and economic accounts for forestry: a tool for cross-sectoral policy analysis*. FAO. Forestry Department. Rome. Italy. p. 116.
- Lavabre, J., Andréassian, V. and O. Laroussine. 2000. *Eaux et forêts. La forêt un outil de gestion des eaux*, ECOFOR, CEMAGREF Editions.
- Locatelli, B & al. 2008. *Face à un avenir incertain : comment les forêts et les populations peuvent s'adapter au changement climatique*. Regards sur la forêt N°5 CIFOR, Bogor, Indonésie.
- Locatelli, B. and E. Pramova. 2010. *Forests and adaptation to climate change: what is at stake?* World Resources Report. <http://www.worldresourcesreport.org>
- Lybbert, T. J., Aboudrare A., Chaloud D., Magnan N. and M. Nash. 2011. *Booming markets for Moroccan argan oil appear to benefit some rural households while threatening the endemic argan forest*. Proceedings of the National Academy of Sciences (PNAS). Vol. 108, No. 34, p. 13963-13968.
- Macqueen, D. 2008. *Supporting small forest enterprises – a cross-sectoral review of best practice*. IIED Small and Medium Forestry Enterprise Series No. 23. IIED, London UK.
- Matose, F. 2005. *Access mapping and chains: the woodcraft curio market around Victoria Falls, Zimbabwe*. University of the Western Cape, Cape Town, South Africa.
- Mavsar, R. and V. Farreras. 2010. *Gestion durable du capital naturel de la forêt de Bouhachem (Chefchaouen, Maroc): Garantie des Bénéfices Sociaux, Economiques et Environnementaux*. Rapport final evaluation économique. CTFC.



- MEDPRO. 2012. *Carbon Market Opportunities in Southern Mediterranean Countries*. MEDPRO Technical Report No. 8.
- Pagiola, S. and G. Platias. 2007. *Payments for environmental services: from theory to practice*. Washington. D.C. World Bank.
- Pak, M., M. F. Türker and A. Oztürk. 2010. *Total economic value of forest resources in Turkey*. African Journal of Agricultural Research Vol. 5(15), pp. 1908–1916, 4 August, 2010.
- Pearce, D. and D. Moran. 1994. *The Economic Value of Biodiversity*. Earthscan, London.
- Perrot-Maître, D. 2006. *The Vittel payments for ecosystem services: a 'perfect' PES case?* Project paper. No. 3. IIED, London.
- Pettenella, D., Vidale E., Gatto P. and P. Secco. 2011. *Paying for Water-related Environmental Services: a survey on Italian PES mechanisms*, IUFRO, International Symposium Multiple Forest Outputs: Silviculture, Accounting and Managerial Economics. Viterbo (Italy), May 19–21.
- Prokofieva, I., Wunder S. and E. Vidale. 2012. *Payments for Environmental Services: A Way Forward for the Mediterranean Forests?* EFI Policy Brief 7.
- Robinson, D. and E. Defrenne. 2011. *Argan: a case study on ABS?* Union for Ethical biotrade. www.ethicalbiotrade.org
- Sattout, E. and P.D.S. Caligari. 2011. *Forest Biodiversity Assessment in Relic Ecosystem: Monitoring and Management Practice Implications*. Diversity 3, 531–546.
- SFMF. 2012. *Strategic Framework on Mediterranean Forest: (Draft)*. 2012
- Ten Brink P., Mazza L., Badura T., Kettunen M. and Withana S. 2012. *Nature and its Role in the Transition to a Green Economy*. TEEB
- Tognetti, S., Mendoza, G., Aylward, B., Southgate, D. and L. Garcia. 2004. *A Knowledge and Assessment Guide to Support the Development of Payment Arrangements for Watershed Ecosystem Services (PWES)*. Washington: World Bank.
- United Nations Environment Programme (UNEP). 2008. *Green Jobs: Towards decent work in a sustainable low-carbon world*. UNEP.
- UNEP. 2011. *Towards a Green Economy. Pathways to Sustainable Development and Poverty Eradication*. www.unep.org/greeneconomy
- United Nations – Economic and Social Commission for Western Asia (UN-ESCWA). 2009. *Framework for Environmental Economic Accounting in the ESCWA Region*. New York.
- United States Agency for International Development (USAID). 2010. *For a more valuable and integrated agriculture in Morocco. Morocco Integrated Agriculture & Agribusiness Program*. Final Report. USAID. p. 57.
- Van Acoleyen, M. and M. Khelladi. 2011. *Analysis for European Neighbourhood Policy (ENP) Countries and the Russian Federation of social and economic benefits of enhanced environmental protection – Algeria Country Report*, funded by the European Commission. Brussels.
- Vedeld, P., Angelsen, A., Sjaastad, E. and G. Kobugabe Berg. 2004. *Counting on the Environment. Forest Incomes and the Rural Poor*. The World Bank Environment Department. June 2004.
- Vignola, R., Locatelli B., Martinez C. and P. Imbach. 2009. *Ecosystem-based adaptation to climate change: What role for policy-makers, society and scientists?* Mitigation and Adaptation Strategies for Global Change, 14, 691–696.
- Wealth Accounting and Valuation of Ecosystem Services (WAVES). 2012. *Moving beyond GDP: How to factor natural capital into economic decision-making*. WAVES. <http://www.wavespartnership.org/waves/>
- World Bank. 2009. *Convenient Solutions to an Inconvenient Truth: Ecosystem-Based Approaches to Climate Change*. Environment Department. World Bank. Washington D.C.
- World Bank. 2012a. *Bangladesh. Climate Resilient Participatory Afforestation and Reforestation Project. Project Appraisal Document*. Washington: World Bank.
- World Bank. 2012b. *State and Trends of the Carbon Market*. World Bank. Washington DC.
- World Bank. 2012c. *Nicaragua. Adaptation of Water Supplies to Climate Change Project. Project Appraisal Document*. Report No: 67746-NI. Washington: World Bank.
- World Wildlife Fund (WWF). 2009. *Guide to Conservation Finance*. Sustainable Financing for the Planet. WWF.



*Worker in forest, Seyhan watershed, Turkey*





**Authors**

Lelia Croitoru and Ludwig Liagre

**Photos**

Ms Pilar Valbuena (p1, 2, 3, 6, 9, 19, 26)

Ms Constanze Schaaff (p 14)

Ms Carolin Weinkopf (p 32)

**Imprint**

This publication has been elaborated by the GIZ Regional Project "Adapting Forest Policy Conditions to Climate Change in the MENA-region" in the context of its cooperation with the network SILVA MEDITERRANEA and the Collaborative Partnership on Mediterranean Forests (CPMF).

March 2013