Valuing Mediterranean Forests

Towards Total Economic Value

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Edited by

Maurizio Merlo

and

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Foreword

There is an old expression – not to be able to see the forest for the trees – meaning that one focuses attention on the details (the trees) and misses the bigger picture (the forest). This has very much been the case when one considers past efforts in economic valuation of forest resources. Most economists have dealt with a limited number of the goods and services produced by a forest ecosystem and have made careful estimates for one or two uses. Few have attempted to value a forest in its entirety and thereby provide valuable information that is needed by resource managers and decision makers to better understand the values of forests and take the steps needed for their conservation.

In this volume the editors, the late Maurizio Merlo and Lelia Croitoru, both of the Centre for Accounting and Management in Agriculture and Forestry of Padua University, Italy, have presented an admirable example of taking a much more holistic approach to valuation of forest resources. With their collaborators, they have applied their valuation template to some 18 countries bordering the Mediterranean Sea. Adopting the Total Economic Value (TEV) approach, the various country studies have attempted to include both direct and indirect use values, as well as various non-use values. Whereas direct use values (e.g. including both consumptive uses such as forestry and collection of non-timber forest products, as well as non-consumptive uses such as recreation and hunting) are easier to value, indirect-use values (such as watershed protection or provision of potable water) are usually harder to value in monetary terms. Non-use values, especially values that often relate to cultural or historical uses associated with healthy forests, are the most difficult to value in monetary terms.

The results are somewhat surprising. Although the relative importance of use versus non-use values varies considerably from country to country, watershed-related values such as reducing the risk of erosion, floods and landslides are important benefits in most countries, and can produce 50% or more of the TEV. Forest products per se (e.g. timber) are usually a fairly small part of the TEV. Other country-by-country variations are not surprising: recreational benefits are very important in western European countries and various extractive uses such as firewood collection or grazing are more important in the southern and eastern Mediterranean countries.

When valued as a whole the economic numbers are large: the average TEV from the 18 countries studied is about €133/ha per year – highest in the northern Mediterranean (about €176/ha) and lower in the eastern (€48/ha) and southern Mediterranean (about €67/ha) countries. *Per capita* values also range from about €70 *per capita* per year in the northern countries to less than €11 *per capita* per year in southern and eastern countries. These figures reflect both the difference in values per ha as well as the major differences in forest area per person in different parts of the region.

Merlo and Croitoru's volume raises as well as answers many valuation questions. It illustrates the importance of applying the TEV approach as well as the data requirements to do so, and the necessity of sometimes 'borrowing' economic value estimates from one location and applying them to another site – a process known as 'benefit transfer'. The book presents the common approaches used for obtaining estimates comparable within and across countries and the methodological difficulties encountered. While highlighting what has been accomplished in the area of forest resource valuation, this volume also identifies those topics that need additional work – often in the areas of indirect use and non-use values.

Once decision makers realize the true economic value of the wide range of goods and services provided by healthy forest ecosystems, they will both demand better analysis of these economic values and be willing to spend more for conservation and management of these important natural (and cultural) resources. This volume is an important step in helping researchers, decision makers, managers, and the public to see BOTH the forests and the trees.

John A. Dixon
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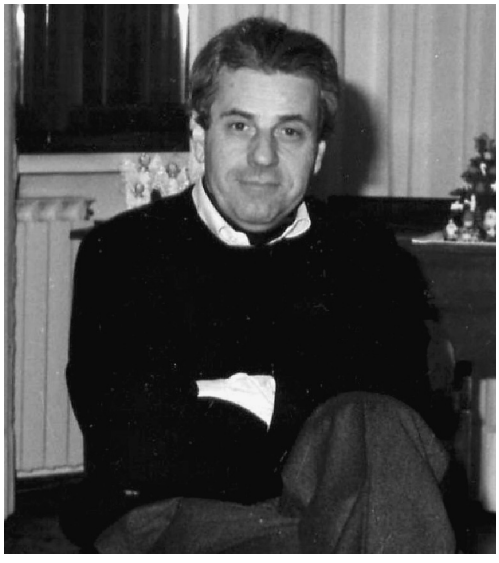
Dedication and Acknowledgements

This book is dedicated to the memory of Maurizio Merlo, a wonderful professor and friend



Maurizio Merlo was born and brought up in the outstanding hilly landscape of Vittorio Veneto. He achieved his honours degree in agriculture at the University of Padova in 1970, obtained a PhD degree at London University in 1978 and became full professor of Forest Economics and Policy at the University of Padova in 1985.

Maurizio Merlo was both a brilliant scientist and a talented teacher. He held numerous responsibilities and initiatives at national and international levels. Among others, he was the Director of the Centre for Environmental Accounting and Management in Agriculture and Forestry in Padova and carried out research work for FAO, OECD, the World Bank, the European Union and many Italian governmental institutions. His scientific work is proved by more than 150 publications, of which more than 100 can be found in peer-reviewed journals and are abstracted by CAB International.

Maurizio Merlo was the coordinator and driving force behind this book. Drafting this book was a difficult task; but when he entered the office, he spontaneously transmitted his spirit and energy to everyone around, and everything seemed easier. He believed in the ideas of this book and wished to

see it finished and published. Unfortunately, he did not have this chance: on 24th August 2003, a strong heart attack tore him away at only 58 years of age.

In addition to his scientific merits, Maurizio Merlo's honesty, humanity and sense of humour made him an example as a refined colleague and friend. With his young spirit, he always enjoyed helping and encouraging others. The authors of this book remember him not only as a brilliant professor but, above all, as a good friend.

He left a precious heritage that will live on in those following his path.

Acknowledgements

If this book can be said to have a father, it would be Maurizio Merlo. He was the coordinator and driving force behind this work. His full commitment started five years ago, with the initial idea for such a book. He founded a network of authors from 18 Mediterranean countries and organized the work based on a common framework. Deep knowledge, refined spirit of analysis and creativeness characterized everything he was doing: collaboration with authors, discussions and drafting book chapters. His premature death was a great loss for all his friends, colleagues and the scientific community as a whole.

A book such as this owes much to the generous support, both intellectual and practical, of many people and institutions. The greatest thanks go, of course, to the contributing authors. Without their assistance, its completion would not have been possible. Their input has likewise been supported by many others, who are acknowledged in the individual chapters.

This book is the output of a project regading MEDiterranean FORest public goods and EXternalities (MEDFOREX). Its aim is the identification and valuation of MEDFOREX and other outputs provided by Mediterranean forests in all the countries bordering the Mediterranean Sea. The idea of the project was born in 2000 at a meeting of foresters and forest economists from, at that time, only a few countries: Spain, France, Italy and Portugal. This meeting was organized by the Forest Technology Centre of Catalonia (CTFC) and was the first of a series of four meetings where the ideas, framework and first results of this book were thoroughly discussed.

Since then, the MEDFOREX Centre has become the focal point for the project. The MEDFOREX Centre is an European Forest Institute (EFI) regional project centre formed by a consortium of Mediterranean forestry research and training institutions from 15 countries. The centre is coordinated, managed and represented by the CTFC, whose purpose is: (i) to undertake an inventory of Mediterranean forest externalities, services and non-wood forest products; (ii) to promote research regarding the valuation of Mediterranean forest externalities for sound policy design; (iii) to undertake and promote research on decision support tools for the multipurpose management and planning of Mediterranean forests; and (iv) to disseminate and produce value-added information by effective networking and coordination of activities among the consortium participants.

A common working framework was designed during several meetings held by the authors. Many thanks for the financial and organizational support in preparing these meetings are given to CTFC and especially to Pere Riera and Marc Palahi; to the Department of Environment and Housing of the Government of Catalonia; to the Ministry of Environment of Spain; and to the University of Padova.

This book owes much to the helpful discussions held with several colleagues throughout the world. Many thanks are given to Stefano Pagiola for his valuable support through critical insights, helpful discussions and review of several chapters. I am very grateful to Neil Powe, Guy Garrod, Paola Gatto, Giovanna Toffanin, Richard Panting, Yves Birot, Luca Cesaro for helpful discussions, reviewing chapters and for their continuous support.

Gian Luca Schievano and Fabrizio Bordini helped redraw many maps in the book to make them suitable for publication. Tim Hardwick and his team at CABI Publishing worked hard to ensure that this book is published in a timely fashion and reaches the widest possible audience.

Lelia Croitoru

Acronyms and Abbreviations

AAC	allowable annual cut
ACSAD	Arab Centre for Studies of Arid Zones and Drylands (Tunisia)
AEFCS	Administration des Eaux et Forêts et de la Conservation des Sols (Administration of Waters, Forests and Soil Conservation) (Morocco)
ANN	Agence Nationale de la Conservation de la Nature (National Agency for Nature Conservation) (Algeria)
AOAD	Arab Organization for Agricultural Development (Egypt)
ARIJ	Applied Research Institute Jerusalem (Palestine)
Art.	article
BNEDER	Bureau National des Études pour le Développement Rural (National Office of Studies for Rural Development) (Algeria)
CAP	Common Agricultural Policy
CBA	cost–benefit analysis
CDM	clean development mechanism
CELPA	Associação da Indústria Papeleira (Association of Paper Industry) (Portugal)
CER	carbon emission reduction
CESE	Conselho Para a Cooperação Ensino Superior-Empresa (Council for Higher Education–Business Cooperation) (Portugal)
CFS	Corpo Forestale dello Stato (State Forest Corp.) (Italy)
CFT	Chartes forestières de territoire (Land Forest Charters) (France)
CIEM	Centre for Integrated Environmental Management (Greece)
CNEL	Consiglio Nazionale dell'Economia e del Lavoro (National Council for Economy and Labour) (Italy)
CONTAGRAF	Centro di Contabilità e Gestione Agraria, Forestale e Ambientale (Centre for Accounting and Management in Agriculture and Forestry) (Italy)
COP7	Seventh Conference of Parties
COSE	Confederación de Organizaciones de Selvicultores de España (Spanish Forest Owners Federation) (Spain)
CRPF	Centre Régional de la Propriété Forestière (Regional Forest Ownership Agency) (France)
CSIC	Consejo Superior de Investigaciones Científicas (Superior Council for Scientific Research) (Spain)

CTFC	Centre Tecnològic Forestal de Catalunya (Technological Forest Centre of Catalonia) (Spain)
CVM	contingent valuation method
ÇEKUL	The Foundation for Protection and Promotion of the Environmental and Cultural Heritage (Turkey)
dbh	diameter at breast height
DCES	Direction de la Conservation des Eaux et des Sols (Direction for Conservation of Waters and Soils)
DEFCS	Direction des Eaux et Forêts et de la Conservation des Sols (Direction of Waters, Forests and Soil Conservation) (Morocco)
DFCI	Défense des Forêts Contre l'Incendie (Forest Fire Protection) (France)
DGF	Direction Générale des Forêts (Algeria, Tunisia)/Direcção Geral das Florestas (Portugal)/(General Direction of Forests)
DGFP	General Directorate for Forests and Pastures (Albania)
DGPDIA	Direction Générale de la Planification, du Développement et des Investissements Agricoles (General Direction of Planning, Development and Agricultural Investments) (Tunisia)
DM	Deutschmark
DM	dry matter
DPA	Directorate for Protected Area (Albania)
DREF	Direction Régionale des Eaux et Forêts (Regional Direction of Waters and Forests) (Morocco)
DRS	Défense et Restauration du Sols (Soil Defence and Restoration) (Algeria)
EAA	European Economic Accounts for Agriculture (Spain)
EAF	European Economic Accounts for Forestry (Spain)
EC	European Community
EDF	Électricité de France (Electricity of France) (France)
EEAA	Egyptian Environmental Affairs Agency (Egypt)
EWS	Egyptian Wildlife Service (Egypt)
EGS	environmental goods and services
EVRI	Environmental Valuation Reference Inventory
EU	European Union
EUROSTAT	Statistical Office of the European Communities
FACO	Forest Administration Chief Office (Turkey)
FAO	Food and Agriculture Organization
FAO/MOA	Food and Agriculture Organization/Ministry of Agriculture (Lebanon)
FAOSTAT	Food and Agriculture Organization Statistics
FCC	fixed capital consumption (Spain)
FO	final outputs (Spain)
FOA	Forest Owners' Association (Greece)
FORIS	Forest Information System
FSC	Forest Stewardship Council
FU	forage unit(s)
GDF	General Directorate of Forests (Turkey)
GDNPGW	General Directorate of National Parks, Game and Wildlife (Turkey)
GDP	gross domestic product
GEO.C.G	The Geotechnical Chamber of Greece
GHG	greenhouse gases
GMOs	genetically modified organisms
GSF&NE	General Secretariat of Forests and Natural Environment (Greece)
GVA	gross value added (Spain)
HCA	High Commission for Afforestation (Syria)

HFS	The Hellenic Forestry Society (Greece)
HP	hedonic price method
IC	Intermediate consumption (Spain)
IFEN	Institut Français de l'Environnement (French Institute for Environment) (France)
IFN	Inventaire National Forestier (National Forest Inventory) (France)
ILA	Israel Lands Administration (Israel)
IMF	International Monetary Fund
INAG	Instituto Nacional da Água (National Institute for Water) (Portugal)
INE	Instituto Nacional de Estadística (Spain)
INRF	Institut National de Recherche Forestière (National Institute for Forest Research) (Algeria)
INRGREF	National Institute of Research on Rural Engineering, Water and Forestry (Tunisia)
INS	Institut National de la Statistique (National Institute of Statistics) (Tunisia)
INSEE	L'Institut National de la Statistique et des Études Économiques (National Institute of Statistics and Economic Studies) (France)
INSTAT	Institute of Statistics (Albania)
IPCC	Intergovernmental Panel on Climate Change
IPF/IFF	Intergovernmental Panel on Forests/Intergovernmental Forum on Forests
ISAFA-MAF	Istituto Sperimentale per l'Assestamento Forestale e per l'Apicoltura/ Ministero dell'Agricoltura e delle Foreste (Experimental Institute for Forest Planning, Management and Apiculture/Ministry of Agriculture and Forests) (Italy)
ISTAT	Istituto Nazionale di Statistica (National Institute of Statistics) (Italy)
IUCN	formerly known as International Union for Conservation of Nature, at present IUCN is known as The World Conservation Union
JNF	Jewish National Fund (Israel)
LCER	long-term carbon emission reductions
LEF ENGREF/INRA	Laboratoire d'Économie Forestière Ecole Nationale du Génie Rural des Eaux et des Forêts/Institut National de Recherche Agronomique (Laboratory of Forest Economics National School of Rural Engineering, of Waters and Forests/National Institute of Agricultural Research) (France)
MAD	Morrocan dirham
MAF	Ministry of Agriculture and Food (Albania)
MALR	Ministry of Agriculture and Land Reclamation (Egypt)
MAMVA	Ministère de l'Agriculture et de la Mise en Valeur Agricole (Ministry of Agriculture and Agricultural Enhancement) (Morocco)
MAP	Mediterranean Action Plan
MAP	Ministère de l'Agriculture et de la Pêche (Ministry of Agriculture and Fishing) (France)
MAPA	Ministerio de Agricultura, Pesca y Alimentación (Ministry of Agriculture, Fishing and Food) (Spain)
MARA	Ministère de l' Agriculture et de la Réforme Agraire (Ministry of Agriculture and Agrarian Reform) (Morocco)
MATE	Ministère de l'Aménagement du Territoire et de l'Environnement (Ministry of Land Planning and Environment) (Algeria)
MATUHE	Ministère de l'Aménagement du Territoire, de l'Urbanisme, de l'Habitat et de l'Environnement (Ministry of Land Planning, Urbanism, Habitat and Environment) (Morocco)
MCPMF	Ministerial Conferences for the Protection of Mediterranean Forests
MCSD	Mediterranean Commission on Sustainable Development

MCWF	Ministry in Charge of Waters and Forests (Morocco)
MDF	Medium Density Fibreboard
MEAT	Ministère de l'Environnement et de l'Aménagement du Territoire (Ministry of Environment and Land Planning) (Tunisia)
MEDFOREX	Mediterranean forest public goods and externalities
MEPPP	Ministry for Environmental Protection and Physical Planning (Croatia)
METAP	Mediterranean Environmental Technical Assistance Programme
MMA	Ministerio de Medio Ambiente (Ministry of Environment) (Spain)
NFF	National Forest Fund (Morocco)
NFI	National Forest Inventory (Italy)
NFP	National Forest Programme (Cyprus, Italy)
NGOs	non-governmental organizations
NIPF	non-industrial private forest (Portugal)
NMP	National Master Plan (Israel)
NOAA	National Oceanic and Atmospheric Administration
NSSG	National Statistical Service of Greece (Greece)
NWFPs	non-wood forest products
NWMP	National Water Management Plan (Morocco)
OECD	Organization for Economic Cooperation and Development
ONF	Office National des Forêts (National Office of Forests) (France)
ONS	Office National des Statistiques (National Office of Statistics) (Algeria)
ORF	Orientations Régionales Forestières (Regional Forest trends) (France)
ÖBF	Österreichishe Budesforste (Federal Forests) (Austria)
PASEGES	Panhellenic Confederation Union of Agricultural Cooperation (Greece)
PCF	Prototype Carbon Fund
PDR	Plan Directeur de Reboisement (Afforestation Leading Plan) (Morocco)
PDRN	Plan de Développement Rural National (Plan for National Rural Development) (France)
PEFC	Paneuropean Forest Certification
PNA	Palestinian National Authority (Palestine)
PNDA	Plan National pour le Développement de l'Agriculture (National Plan of Agricultural Development) (Algeria)
PNR	Plan National de Reboisement (National Reforestation Plan) (Morocco, Algeria)
R&D	Research and Development
REC	The Regional Environmental Centre for Central and Eastern Europe
RTM	Restauration des Terrains en Montagne (Restoration of Mountain Land) (France)
SCEES	Le Service Central des Enquêtes et Études Statistiques (Central Service of Surveys and Statistical Studies) (France)
SE	starch equivalent
SESSI	Service des Études et des Statistiques Industrielles (Service of Industrial Studies and Statistics) (France)
SFE	State Forest Entreprise (Turkey)
SFM	sustainable forest management
SICOP	Sistema de Informação de Cotações de Produtos Florestais na Produção (Forest Information System on Prices in the Production of Products) (Portugal)
SNB	Serviço Nacional de Bombeiros (National Service of Firefighters) (Portugal)
tCER	temporary Carbon Emission Reductions
TCM	travel cost method

TEMA	Turkish foundation for Reforestation, Protection of natural habitats and Combating soil erosion (Turkey)
TERUTI	Teritoire Utilisation (France)
TEV	total economic value
TKV	Turkish Development Foundation (Turkey)
TO	total outputs (Spain)
TOE	tons of oil equivalent
TSI	total social income (Spain)
UA	Undersecretariat for Afforestation (Egypt)
UK	United Kingdom
UMR ENGREF/INRA	Unité Mixte de Recherche École Nationale du Génie Rural des Eaux et des Forêts/Institut National de Recherche Agronomique (Combined Unit of Research National School of Rural Engineering of Waters and Forests/ National Institute of Agricultural Economics) (France)
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UN-ECE/FAO	United Nations Economic Commission for Europe/Food and Agriculture Organization
UNEP	United Nations Environment Programme
UNEP/MAP	United Nations Environment Programme/Mediterranean Action Plan
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
US$	US dollars
USDA	United States Department of Agriculture (Egypt)
USLE	universal soil loss equation
VAT	value added tax
vs.	versus
WFPs	wood forest products
WTA	willingness-to-accept
WTP	willingness-to-pay

Symbols

°C	degrees Celsius
C	carbon
cm	centimetre
CO_2	carbon dioxide
€	euro
g	gram(s)
ha	hectare(s)
kg	kilogramme(s)
kg CO_2	kilogramme(s) of carbon dioxide
km	kilometre(s)
km^2	square kilometre(s)
K_2O	potassium oxide
m	metre(s)
m^2	square metre(s)

m^3	cubic metre(s)
mm	millimetre(s)
m^3 o.b.	cubic metre overbark
m^3 u.b.	cubic metre underbark
m.t.	metric tonne(s)
N	nitrogen
NA	not available
NC	not calculated
N° (or no.)	number
%	per cent
P_2O_5	phosphorus pentoxide
q	quintal
t	tonnes
tC	tonnes of carbon
tCO_2	tonnes of carbon dioxide
tdm	tonnes of dry matter
TOE	tonnes of oil equivalent
US$	US dollars

1 Introduction

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Mediterranean forests, like all forests, produce a wide array of benefits. Timber and other wood forest products (WFPs) come readily to mind, but often they comprise only a minor part of these benefits. Non-wood forest products (NWFPs), such as pine kernels in Lebanon and cork in Algeria and Tunisia, can be of greater importance than WFPs, and often have a high potential to contribute to local economies. In many cases, the most important benefits provided by the Mediterranean forests are public goods and externalities, such as watershed protection and soil conservation. This multifunctionality has long been recognized. Indeed, since as far back as the 15th and 16th centuries, forest policy and management in some countries on the Mediterranean's shores, such as Catalonia and the Republic of Venice, have been aimed primarily at protecting rural welfare and conserving soil and water and only secondarily at timber production. However, a full realization of many benefits has been hampered by the lack of their recognition and of appropriate mechanisms to internalize them. As a result, forests are often degraded or lost, along with their benefits.

Only a few of the many benefits that Mediterranean forests provide enter formal markets, usually WFPs and some NWFPs. Other forest benefits are either traded only in informal markets, as is typically the case for many NWFPs, or do not enter markets at all. This market failure is due, in part, to the very nature of forest services. For example, scenic beauty is a public good that cannot be kept from people irrespective of whether they pay for it, and watershed protection is an externality that is enjoyed by people far downstream from the actual forest. Market failures can result from the lack of clear and enforceable property rights over forests and their benefits. Often this results in pressure on forest resources, such as deforestation and overgrazing in the southern Mediterranean countries.

These failures provide serious challenges to forests and local welfare. They need to be addressed properly in decision making related to forest policy, management and investments. At present, both public policy and private management decisions are often made based on a very partial and incomplete view of the forest benefits. These decisions usually capture only the market values involved, with consideration of non-market values being rare. In many cases, this makes alternative uses of forestland appear more attractive; in others, it makes the benefits of good forest management appear to be minimal. Under these conditions, forest management decisions are often suboptimal, with forests and the benefits they provide often being lost or degraded.

Inadequate recognition of non-market forest values by decision makers is common in the Mediterranean region, where official statistics

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usually reflect only marketed, tangible forest products. Relevant valuations of non-market benefits are not only scarce and site specific, but are often disseminated inadequately. The threat to forests is, of course, not solely due to insufficient valuation and inadequate dissemination (Kengen, 1997). To attribute, for example, deforestation in Morocco to a lack of knowledge of forest values would be taking a narrow view of the problem, as it is influenced by various other factors. In other cases, the estimates, even though properly calculated and disseminated, are not captured within the decision-making process because they do not fit to the local needs, preferences or mentality of rural communities (Grimes *et al*., 1994).

This book addresses the gap in valuation. It is the first effort to estimate the total economic value (TEV) of forests on a large scale in the Mediterranean region. Previous efforts have focused almost exclusively on estimating the value of individual forest benefits, often at a specific site: hydrological services (see Bruijnzeel and Bremmer, 1989; Aylward *et al.*, 1998; Bruijnzeel, 2004); option uses – pharmaceutical (see Simpson *et al*., 1994; Barbier *et al*., 1995; Mendelhson and Balick, 1995; Pearce and Puroshothaman, 1995); and other extractive or non-extractive values of NWFPs (see Ruitenbeek, 1989; Godoy *et al*., 1993; Grimes *et al*., 1994; Lampietti and Dixon, 1995; De Beer and McDermott, 1996). Few have attempted to estimate the benefits of a nation's forests as a whole (see Adger *et al*., 1995; Willis *et al*., 2003).

This book provides a comprehensive analysis of the economic value of Mediterranean forests, including not just commonly measured benefits such as timber but also, more importantly, the public goods and externalities they provide. Uniquely, it brings together forest valuations at the national level from 18 Mediterranean countries, based on extensive data collection by local experts. It uses a coherent analytical framework for collecting these valuations in a consistent way; it analyses these estimates from a per-country and cross-country perspective; and it uses these results to propose policy recommendations to be undertaken locally, within individual countries and across countries.

The book is structured in three parts. Part I provides an overview of the problem and of the approach followed, and summarizes the results. Chapter 2 begins by presenting a broad overview of forests in the Mediterranean region. The forests in the countries that ring the Mediterranean are broadly described in terms of their geography, environment, institutions and socio-economics. Particular emphasis is given to how Mediterranean forest types differ from other forests. The analysis in this book initially was intended to focus specifically on Mediterranean forests. Because most available data do not distinguish between forest types, however, the analysis had to be broadened to include all forests in Mediterranean countries – the first of many compromises that had to be made in light of data constraints. Examining the many diverse benefits that these forests provide requires a consistent and coherent analytical framework. Chapter 3 describes the framework used in this book – that of TEV – and the methods used for valuing the forest benefits in the country chapters (Part II); it discusses in detail the common approaches and the constraints encountered in arriving at comparable results among the country chapters. Chapter 4 then synthesizes the estimated values of forests in the Mediterranean, drawing from the results of the country chapters; it makes a cross-country comparison among the estimates and the valuation methods used in each country and presents aggregated estimates at subregional and Mediterranean levels.

Part II provides detailed national level case studies of 18 countries and territories bordering the Mediterranean Sea (Chapters 5–22). Each chapter follows a similar structure, allowing for comparison across them. Following the framework outlined in Chapter 3, each country case study classifies forest benefits according to the TEV framework. Each benefit is first discussed qualitatively; efforts are then made to estimate quantitatively the value of each benefit. These estimates are based on a wide range of valuation methods and approaches, drawing on official statistical information supplemented by relevant results of local surveys. Although every effort was made to follow a consistent approach, data scarcity and other constraints often forced deviations. The estimates thus obtained are placed within the context of the institutions and policies affecting forests in each country. The chapters identify the areas where further valuation

efforts are needed and the gaps in the present policy and institutional framework of each country.

Part III highlights the institutional and policy implications that result from the valuation efforts of the country chapters. Chapter 23 provides an overview of the forest institutions and policies at the Mediterranean level; examines the social, economic and environmental constraints in the countries analysed; and proposes new policy approaches to be undertaken at regional and country level. Recent years have seen increasing attention paid to participatory processes throughout the region. Many countries have adopted explicit decentralization policies. Chapter 24 discusses these processes as key challenges in the Mediterranean and provides a comparative analysis of forest policy elements across the countries studied. Chapter 25 discusses the current networks of cooperation and emphasizes the need for an international agreement on Mediterranean forest conservation and development.

At the methodological level, approaches such as TEV are often discussed but seldom implemented. This book describes the valuation techniques necessary to estimate TEV, discusses in detail the approaches taken to value a wide range of benefits (often in the context of severe data scarcity) and examines ways to overcome the problems encountered. Thus, the book is meant to provide a unique data source for the region and a methodology that can be applied to other parts of the world.

At the policy level, new approaches for a sustainable forest management are needed in the Mediterranean to internalize the provision of positive public goods and externalities and overcome significant social, economic and environmental constraints (soil erosion, risk of floods and rural outmigration) associated with forest degradation. However, insufficient knowledge on the nature and magnitude of forest benefits in the region creates a severe constraint to addressing these issues. This book captures these forest values in a holistic picture at national and regional level and, based on these estimates, proposes realistic policy recommendations for improving sustainable forest management.

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