XII World
Forestry Congress

QUÉBEC CITY, CANADA

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FORESTS, SOURCE OF LIFE

CONGRESS Proceedings

A - FORESTS FOR PEOPLE

XII^e Congrès forestier mondial
XII World Forestry Congress
XII Congreso Forestal Mundial

QUÉBEC, CANADA 2003

Preface

Forming an integral part of the Congress Proceedings[1], the documentation produced before and during the event is collected in four volumes. The first three volumes contain the guest speakers' papers and the voluntary papers presented according to the program's three areas, 15 topics and 38 sub-topics. The fourth volume includes the final statement of the XII World Forestry Congress, the conclusions and recommendations, the keynote speeches and addresses, the organization report and the deliberations of the Congress, the list of posters presented, additional information concerning the event and the list of participants. Documentation is provided in the three official languages of the Congress: English, Spanish and French.

Under the program structure, guest speakers' papers and voluntary papers are presented in the following order:

General and special papers: these communications are presented by invited speakers. General papers cover program areas and key questions touching the overarching theme of the Congress. Special Papers introduce deliberations in each theme session. These papers are published in the three languages of the Congress.

Voluntary papers whose contribution is considered outstanding (level 1): because of their innovative content, their approach to questions and the orientations proposed, these communications are considered to be of major interest for the deliberations. These papers are also published in the three languages of the Congress.

Voluntary papers of great interest for the deliberations (introduction to a theme session, level 2): these high-quality communications are of great interest to many countries, or at least for the same forest region. These papers introduce deliberations in some theme sessions and are also published in the three languages.

Voluntary papers of great interest for the deliberations (level 2): these high-quality papers are of interest to many countries, or at least for the same forest region. They are grouped by sub-topic and most papers are presented during theme sessions. Summaries of these papers are published in the three languages.

Voluntary papers of interest for the deliberations (level 3): though of good quality, these communications are considered to be of less interest to the Congress; they report experiments conducted under specific conditions, are limited in application, or are of less interest outside the country of origin. Summaries of these papers are published only in the original language.

Other voluntary papers (level 4): due to the specialized nature of the topics covered, their limited connection with the Congress theme, or in some cases, limitations of form or style, some papers are considered to be of more limited

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interest. Only the title and the author's name and address are found in the Congress Proceedings.

All the papers are listed in alphabetical order by author name in the same sub-topic.

A total of 1,044 voluntary papers were accepted, evaluated and independently classified according to their level by revisers named by the Host Institution and the FAO. Many new versions of papers were reclassified in a higher category after the authors took into consideration the revisers' comments. Nearly 200 of these papers were selected for presentation during the Congress. In addition, 33 general and special papers were received and underwent the review process.

The Organizing Committee of the XII World Forestry Congress wishes to extend its sincere appreciation to the authors of these papers, and to the 269 revisers whose names appear below.

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Janaki Alavalapati
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Table of Contents

VOLUNTARY PAPER: OUTSTANDING CONTRIBUTION (LEVEL 1)

original - **0434**

The bioeconomics of Mediterranean oak woodlands: issues in conservation policy

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Abstract

The economic values of ecological services provided by oak woodlands in California and Spain are quantified, and implications for conservation policy discussed. Oak woodlands cover millions of hectares, are mainly privately owned, have tremendous biodiversity, and are the forage base for extensive livestock production. However, high opportunity costs stimulate fragmentation of these into smaller residential or cultivated parcels. Despite conversion pressure, landowners make management decisions reflecting their own utility for environmental services. Positive mathematical programming is used to determine landowner utility for woodlands in California. Detailed questionnaires have been used to develop total economic value of Spanish oak woodland *dehesa*. Various other approaches to assess amenity values are presented. Results contrast with traditional financial production models that undervalue Mediterranean oak woodlands and are the basis of historically destructive agricultural and land use policy.

Introduction

Oak woodlands and savanna are an extensive forest type in Mediterranean climate regions of the world. Known as *hardwood rangelands* in California, *dehesa* in Spain, and *montados* in Portugal, they cover almost 10 Mha (Figure 1). A relatively open overstory predominantly of oak species (*Quercus spp.*) allows a well-developed understory of annual grasses and forbs, scattered perennial grasses and woody brush species (Allen-Diaz *et al.*, 1999; Cardillo, 2000).

In both California and the Iberian Peninsula livestock grazing is the main use. Commercial wood value is low, although cork provides valuable forest product in Spain and Portugal. Recently their ecological value has been recognized. California oak woodlands have the richest species abundance of any habitat in the state, with over 300 vertebrate, 5 000 invertebrate, and 2 000 plant species (Garrison, 1996). In Spain, the open oak woodlands known as *dehesas* support a number of endangered species, Europe's migratory birds (Diaz *et al.*, 1997), and unique cattle breeds. *Dehesas* have qualified as habitats to be preserved within the European Union Habitats Directive because of their high biodiversity. Public interest in open space, recreation and the purchase of large "amenity" properties

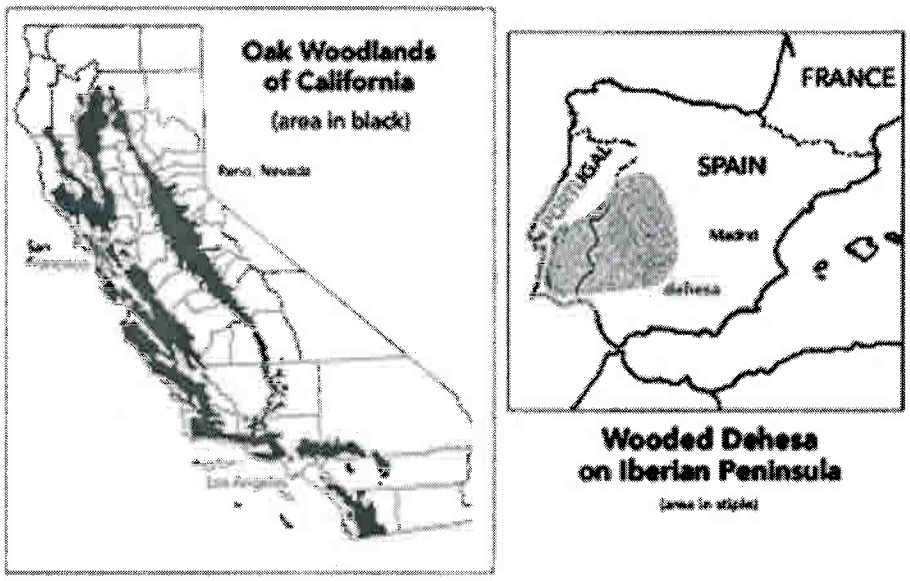

Figure 1 Californian oak woodlands and Spanish *dehesa*.

has increased steadily over the last 25 years, adding considerable value to Spanish and Californian oak woodland.

The continued supply of public values from private woodlands depends on their economic value and the opportunity costs of competing land uses. Economic and legal institutions such as conservation easements, property tax incentives, and cost-share incentives compensate owners for amenity values. Broadened product markets, including fee hunting, recreational leasing and mitigation banking, also increase returns and help maintain ecosystem services. In Spain, direct government compensation to private owners for environmentally sensitive silvicultural and grazing practices is increasing. This paper considers bioeconomic research in Spain and California and the implications for the development of conservation policy.

Trends in land use

In the mid-twentieth century, in California and Spain traditional financial production models, coupled with the low value of wood, supported policies that discouraged forest conservation, favouring instead more intensive agricultural and urban development. Beginning in the 1950s, prices for *dehesa* products fell, livestock diseases increased, and much of the rural population emigrated to urban areas. The Spanish government tried to increase animal production value through subsidies and genetic crosses. Higher livestock stocking in oak woodlands led to over-exploitation of forage, and suppression of oak regeneration. Government-sponsored afforestation with exotic eucalyptus and pine species, coupled with subsidies for clearing native oaks, resulted in a decrease of oak *dehesa* area (Diaz *et al.*, 1997).

In California, agricultural conversion, firewood harvest and development for housing have reduced oak woodlands by about half since the 1800s. Major losses from 1945 through 1973, were from oak clearing for enhancement of forage and livestock production, often supported by United States federal cost-share incentives and state policy. California's oak woodlands have decreased by over 400 000 ha in the last 40 years (Bolsinger, 1988). Since 1973 regional oak woodland losses have occurred from urban expansion, firewood harvesting, range clearing and conversion to intensive agriculture.

Self-consumption of resources

Financial models evaluating land conversion, tree harvest and wildlife habitat retention by landowners have poorly incorporated the economic values of environmental services. Oak woodland owners with positive values for environmental service consumption are both investors in and consumers of goods and services. Research in California and Spain is attempting to incorporate a landowner's utility from environmental services to better represent likely trends.

In California hedonic pricing has been used to capture landowner environmental values (Standiford and Howitt, 1992). Traditional optimization concluded that existing markets would lead to oak clearing to increase forage yield. However, these models had a poorly specified objective function, omitting landowner utility from the amenity value of oak stocks. A positive mathematical programming (PMP) approach (Howitt, 1995) was used to derive missing elements of the true costs and returns of oak harvest and retention. The dynamic optimization model was constrained by actual landowner behaviour. The shadow prices derived from the behaviour constraint represents the marginal benefit of retaining trees. Figure 2 compares firewood stumpage price to the "apparent" hedonic price. The difference between the two curves represents the "cost" of overcutting firewood, or the self-consumption value of retaining trees.

Self-consumption of environmental services also plays a crucial role in private *dehesa* management. In Spain, this has been quantified in Monfragüe Shire (Mariscal and Campos, 2001). Landowner surveys reveal that landowners would be willing to lose a significant amount of money before selling their *dehesa* land. The smaller the property, the greater the proportion of the property value represented by self-consumption value (Figure 3).

Commercial production from woodlands

In California, oak cover trajectory, firewood harvest, and cattle stocking were modelled for different risk and land productivity conditions (Standiford and Howitt, 1992). Figure 4 shows the contribution of the three major commercial enterprises to total net present value (Standiford and Howitt, 1993). Fee hunting is important, ranging from 40% to 70% of woodland value. Firewood, the only major wood product, has low value compared to cattle or hunting enterprises. The marginal value of oak tree cover for hunt club habitat often exceeds the marginal value of the extra forage or firewood harvest value resulting from tree harvest (Standiford and Howitt, 1992). Diversification of enterprises provides a conservation incentive for oak woodlands.

Economic surveys of four *dehesa* estates in Monfragüe Shire (Campos *et al.*, 2001) include marketed commercial products, as well as significant contributions from self-consumption of environmental services (Figure 5). Results show that the omission of environmental service income undervalues the *dehesa* contribution to private and social income levels. Capital gains, also omitted in

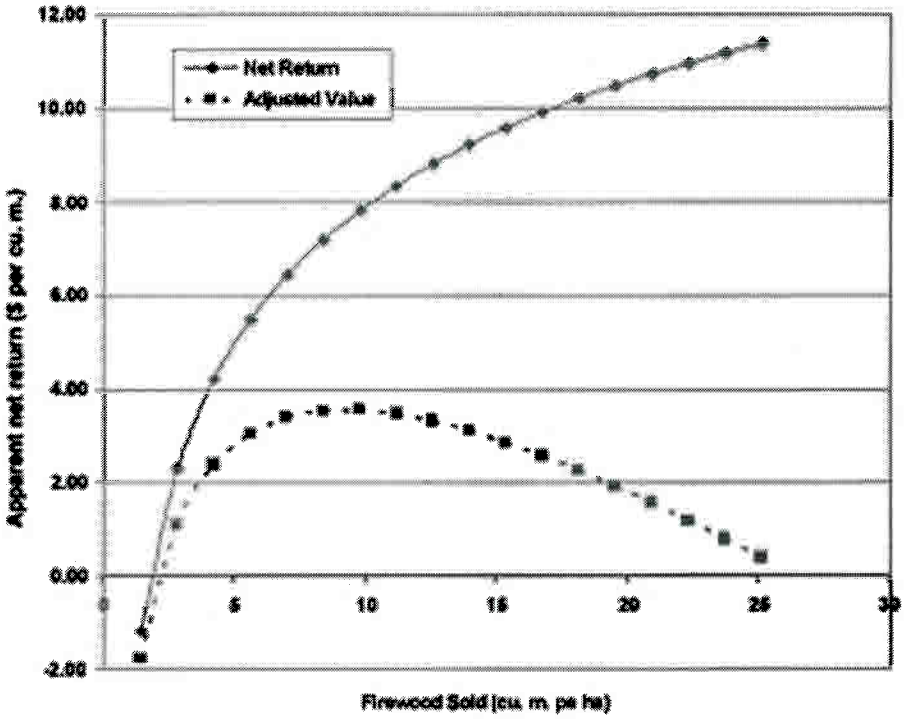

Figure 2 Net firewood return per cubic meter as function of amount of wood harvested (Standiford and Howitt, 1992).

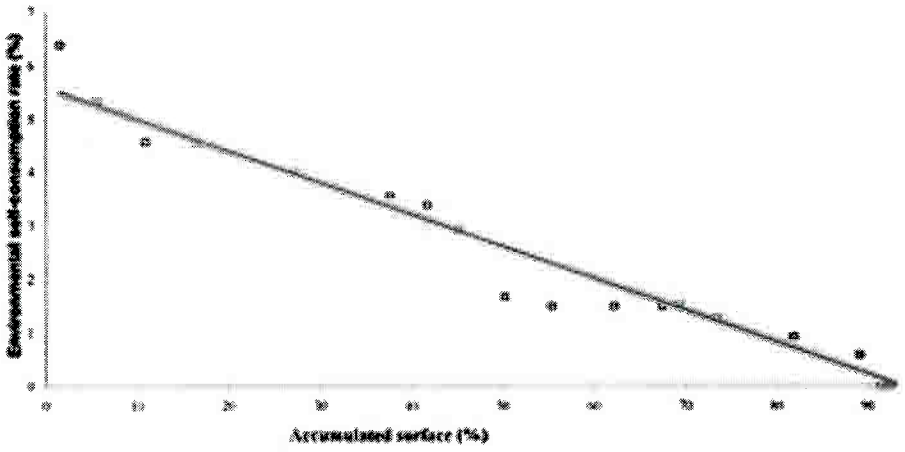

Figure 3 Owners' self-consumption of environmental services in *Monfragüe* shire (year 2000)

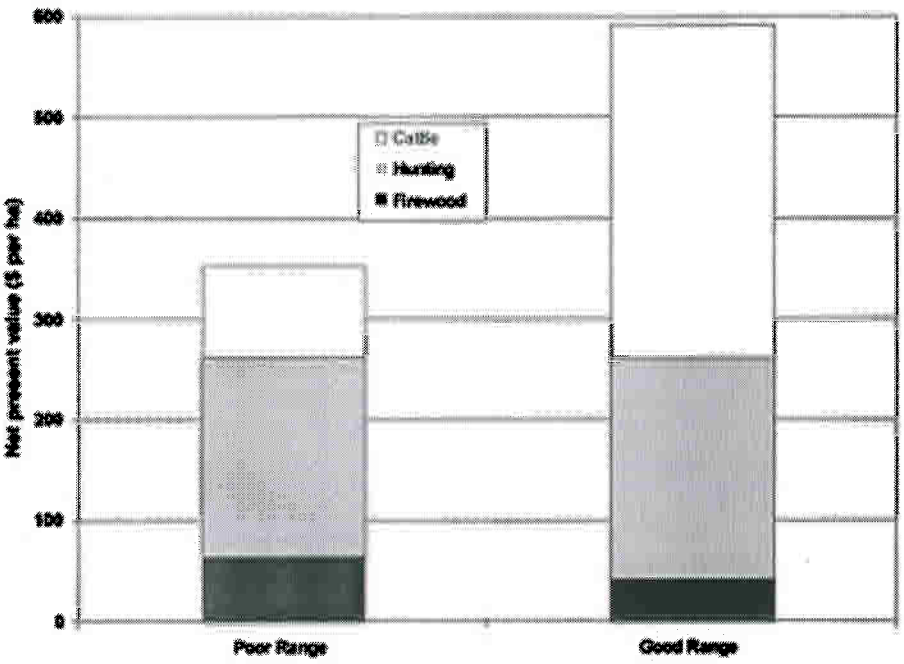

Figure 4 Net present value of California oak woodlands from various commercial enterprises (Standiford and Howitt 1993).

national accountings, have been the *dehesa's* most important source of private income over the past 25 years. The margin for livestock from the case studies was negative, but from grazing services (leased land) was positive. The negative livestock value was compensated for by European Union Common Agricultural Policy (CAP) subsidy for livestock production. Economic contributions from wood harvesting are low on holm oak properties. However, when cork oaks are present, cork harvest represents a significant contribution to value (Pulido *et al.*, 2002).

Opportunity costs of oak woodlands

In much of California, wood harvest, grazing, hunting and other extensive management practices are a small fraction of actual land value. Some woodlands can be converted to high value, intensively managed agricultural products, such as wine grapes (Merenlender, 2000), or subdivided for housing. Grazing land value may be less than 10% of the value for intensive agricultural use, or less than 1% of the value for housing. These higher value land uses fragment oak woodland habitats, diminishing their environmental values (Merenlender *et al.*, 1998).

In Spain, there have been dramatic increases in rents for organized hunts as a kind of conspicuous consumption in the post-Franco era (from 1975). This has resulted in many *dehesa* owners converting to hunting reserves. To convert

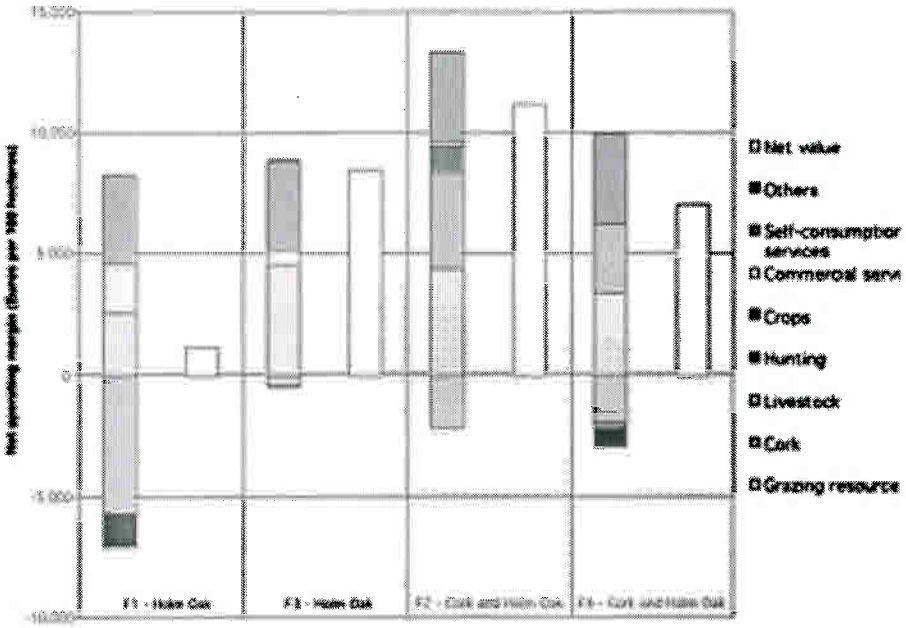

Figure 5 Net margin of various production values for four *dehesa* case studies in the Monfragüe shire.

to hunting, game fences are put up and the shrub layer is allowed to return. The regeneration and maintenance of *dehesa* systems is neglected, jeopardizing agro-sylvo-patoral systems that have maintained ecological values for centuries.

Values and markets for amenities

Ecological and aesthetic woodland values are increasingly important in both areas. In California, amenity values are part of high property values. Contingent valuation of different spatial arrangements of oak stands showed that woodlands with at least 100 oaks per hectare (10 meter spacing or less) were worth 27% more than open land (Diamond *et al.* 1987).

An oak woodland of 3 400 ha in southern California had positive effect on both individual home and land parcel values (Standiford and Scott, 2001). Undeveloped land immediately adjacent to the undeveloped woodland is 17% more valuable than land 0.3 km away. Individual homeowners are also willing to pay a premium if native oak stands are near their residence, so woodland open space increases overall value of the entire community. A 1% increase in oak cover and open space size increased total community home and land capital value by US$2 million. This increases annual property tax accruing to local government, justifying public financing of oak restoration efforts, and the purchase of open space.

A study of public demand for environmental values in Monfragüe National Park's oak *dehesa* ecosystems demonstrated their value to the Spanish public (Campos, 1996). The demand curve developed showed that the value of recreation and conservation services to *dehesa* visitors was high, and inversely related to an individual's frequency of visits.

Current and emerging policies

Diverse policy approaches have been adopted to conserve oak woodlands. In California, most oak woodlands are in private ownership, subject to many levels of oversight and regulation. Oak protection, land use and development ordinances may affect a landowner's management at local and county levels. At the state level, water quality, fire protection and timber harvest regulations may be a factor. Proactive, incentive-based programmes are rare, but one is the California Land Conservation Act of 1965. This provides reduced property taxes to those who contract with the county not to develop their lands for ten years. Approximately 70% of the oak woodlands of the state are under this type of contract (Huntsinger *et al.*, 1997). A state sponsored voluntary education programme appears to have contributed to a reduced rate of oak cutting over the last ten years, but in general, oak woodland landowners are suspicious of and hostile to government intervention (Huntsinger *et al.*, 1997).

In California non-governmental organizations are playing a growing role. One of the largest initiatives for oak woodland conservation is the "the land trust movement." Land trusts vary from local groups, operating with volunteer staff and little or no direct budget, to regional groups with staff and some funding, to large international groups, such as The Nature Conservancy. In California, there are 132 land trusts, conserving over 400 000 ha of land (LTA, 2000). Land trusts purchase or accept donations of conservation easements. A conservation easement establishes a permanent deed restriction limiting the kinds of development on a property. For example, urban development rights for an oak woodland property may be sold or donated to a land trust, which then holds these rights in perpetuity. The landowner benefits from the capital value of the rights donated or sold, and society benefits from the land's ecological value (Huntsinger and Hopkinson, 1996). Funding comes from private and public sources, and varies among trusts and properties.

There are tax incentives for donation of conservation easements. The market value of the property rights donated reduces the land's basis. Considered a charitable donation, this reduces taxable income, and the owner's income taxes. Lowering land basis also reduces inheritance tax. There is no longer a need to sell parcels to pay inheritance taxes, identified as one of the major constraints to intergenerational transfers of large, extensively managed oak woodlands (Johnson, 1997). The proposed reform of United States estate taxes may reduce this conversion pressure, but also a donation incentive.

On the Iberian Peninsula, the extensive transhumance, political and demographic upheavals and property changes that occurred in the Middle Ages favoured creation of large extensive farms under the military, clergy and nobility (Trujillo and Mata, 2001). Land title reforms in the nineteenth century shifted these and many common properties into private hands. A proactive program of *dehesa* conservation has been developed at the provincial, national and pan-European levels, commonly providing direct subsidies to agricultural producers. Typically, *dehesa* landowners get a quarter to a third of their operating income

as subsidy. In recent years, there has been a shift away from European Union (EU) CAP subsidies that emphasize intensification of livestock production. There is a deepening interest in the maintenance and viability of "low-intensity agriculture," which includes the *dehesa* and *montados* of Spain and Portugal, to reduce environmental degradation and provide rural employment.

In Spain the *dehesa* has cultural and environmental importance. With little public land, interest in conserving privately owned open landscapes is great. There is also a long tradition of overlapping and diverse property rights, so there is perhaps not the same inclination to assert such an absolutist form of private landownership in Spain as in the United States. Nature Preserves controlled at national, regional and local levels often include active agricultural enterprises within their borders, but owners are subject to Preserve goals and regulations.

Some aspects of oak woodland conservation draw on Spanish interest in cultural heritage, and a reassertion of regional pride after suppression during the Franco era (1939–1975). Beef, ham and cheeses carry regional appellations that are government regulated. The premium prices that can be charged for some products, such as acorn-fed hams, can help increase *dehesa* profits.

In Spain, livestock subsidies are the main source of public funds for *dehesa* owners, but this tends to stimulate high animal numbers, threatening oak regeneration. However, there are aggressive and comprehensive strategies to minimize land use conversion in the *dehesa*. The European Commission, the Spanish government, and even regional authorities, can intervene in *dehesa* land use. In 1985, the European Economic Community (EEC) put nature conservation measures in CAP reform for the first time. The new CAP supports land uses compatible with nature and cultural heritage conservation. EU subsidies cover planting and maintenance costs for five years, and income loss resulting from reforestation. By December of 1998, 225 988 ha were reforested with native oaks under EEC Regulation 2080/92, and 82 455 ha of mature cork oaks were improved (Mariscal and Campos, 2001).

Future work

Mediterranean oak woodlands have been undervalued by traditional financial production models. New approaches to evaluating self-consumption of environmental services, and the quantification of the utility of amenity values, offer promising approaches to representing value to landowners. California studies show that woodlands increase community values, providing information on the supply side of open space. Spanish work on public demand curves for recreation and conservation shows the demand side for oak open space values. Future work will include demand and supply studies in both countries.

In diverse social, political and ecological contexts, how can the full range of oak woodland values be analysed and represented in ways that will stimulate conservation? In Spain, the concept of a "total economic value" that includes numerous values that are difficult to quantify has increased attention to extensive agriculture in the public policy arena. In California, the political leverage points for this information are not fully identified. Collaboration between Spain and California offers an opportunity to contrast the contribution of various forms of bioeconomic analysis to conservation policy and ultimately to the land-use patterns, economic functioning and ecological structure and function of oak woodlands.

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