

Emerging forest-based solutions and their Implications for forest management

Desafios y Oportunidades para una Bioeconomía forestal en el Sur de Europa

Towards a forest based bioeconomy

**I Congreso Español de Bioeconomía Forestal
Santander, 29-30 Noviembre 2017**

**Inazio Martínez de Arano
Mediterranean Regional Office of the European Forest Institute**





What to expect

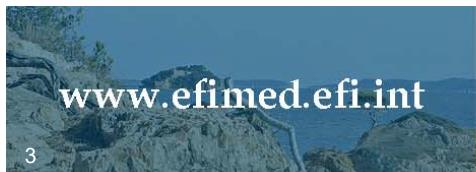
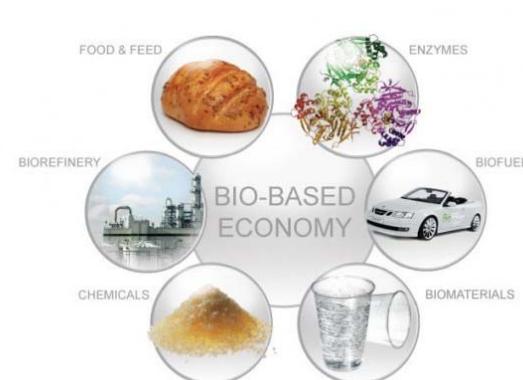
- Porqué la Bioeconomía no es *business as usual*
- El Sur de Europa es diferente... o no?
- Retos y Oportunidades
- Tres Implicaciones para la política forestal



La bioeconomía

Fuel based
Linear economy

Bioeconomy

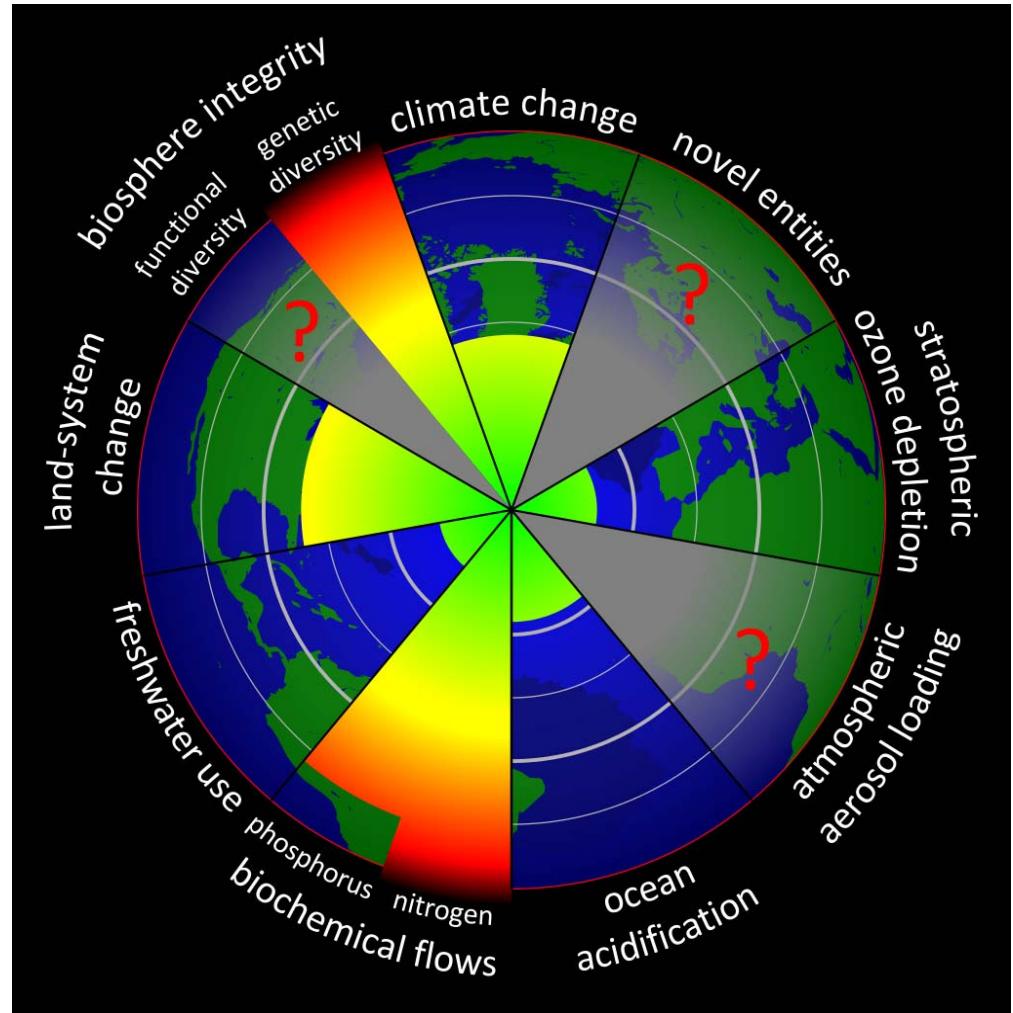




Boundaries for a safe operating environment

- **Cambio climático**
- **Diversidad biológica**
- **Ciclos de N y P**
- **Aerosoles atmosfericos**
- **“novel entities”**

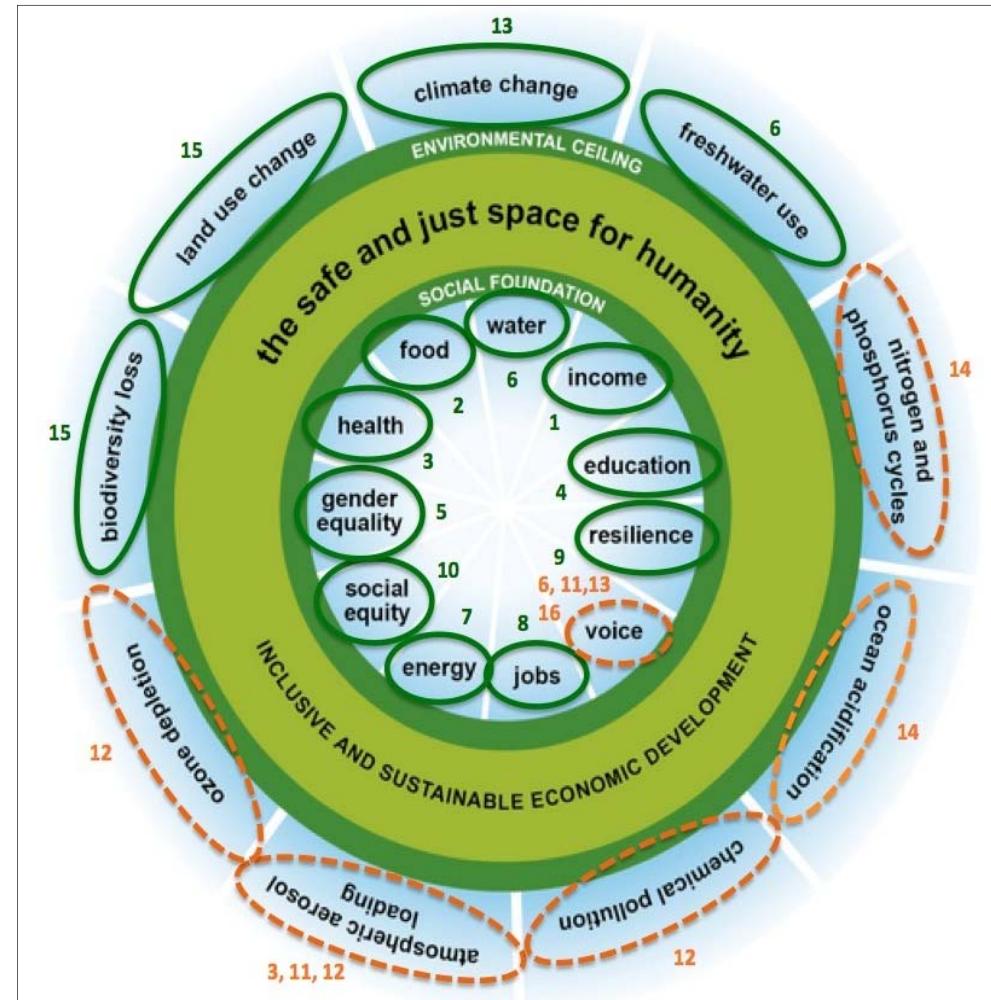
Rockström et al. 2009





Operating environment for humanity

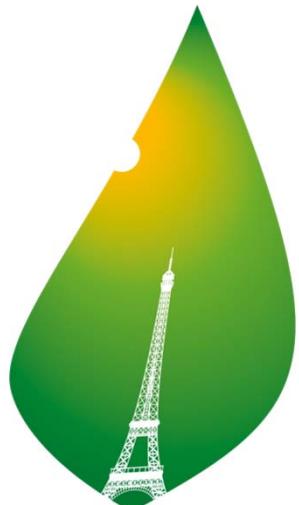
- *Agua,...*
- *Trabajo*
- *Prosperidad*
- ...
- *Dignidad*
- *Participación*
- *Indentidad.*
- ...



Rockström et al. 2009

Raworth 2017





COP21 · CMP11
PARIS 2015
UN CLIMATE CHANGE CONFERENCE





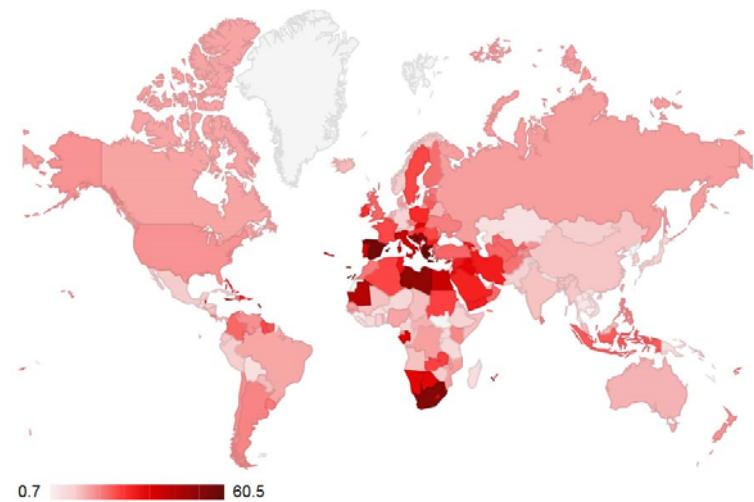
Global Change

Global change is shaking economic sectors and balance across regions

- *Population & consumption growth*
- *Emerging economies taking bigger share*
- *Europe and Med. Structural unemployment.*
- *Digital revolution*
 - *Industry 4.0*
 - *Sharing economy*
- *Biotech & nanotech revolution*



Youth unemployment rate, in % of youth labour force (2013)



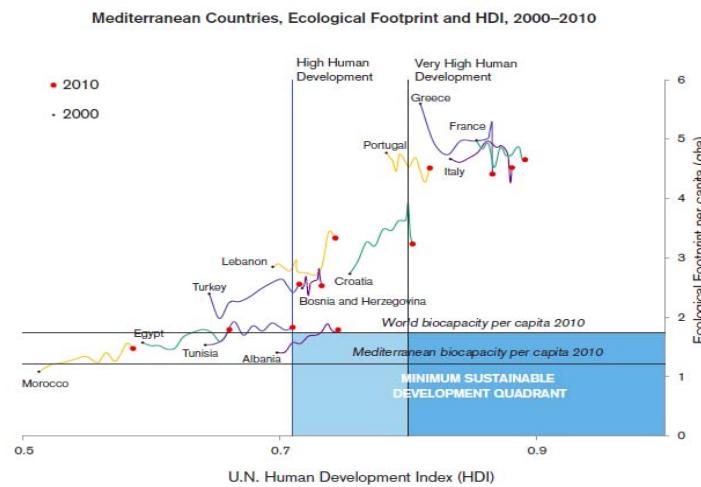
Source: ILO - Trends Econometric Models, April 2014.





Grandes Retos de la región Euromediterránea

- *Gestion de los recursos naturales*
- *Generacion de empleo*
- *Cambio climatico*
- *Relaciones euromediterraneas*



- *Hemos superado la biocapacidad x 2.5*

The Global Footprint Network (2015)

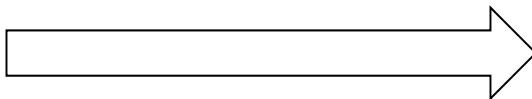




La bioeconomía

Fuel based
Linear economy

INNOVATION
Social, technological,
managerial you name it



Bioeconomía

An economic sector?

The Biologisation of the
economy?

A transformation of main Economic
sector?

PRESS RELEASE

Berlin, 10 May 2017

BIONNALE 2017: Biologisation of Industry Brings Opportunities
Development of products and company mergers



Un bio-sector emergente

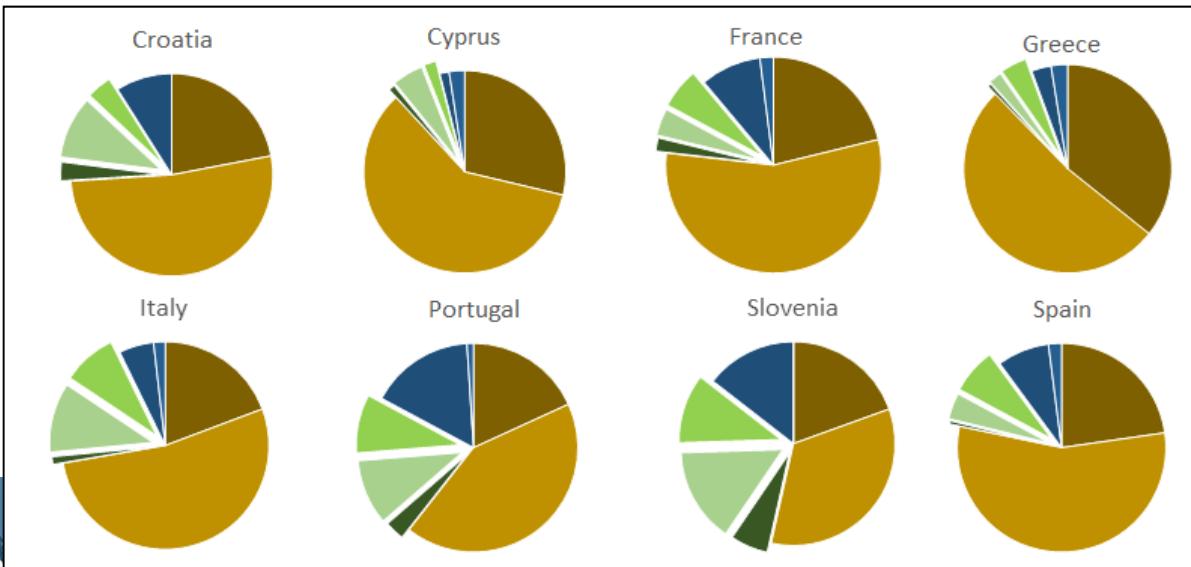




Bioeconomy as a sector

Country	Agriculture	Food & beverages	Forestry	wood products & furniture	Pulp & Paper	Fishing and aquaculture	bio-based textiles	bio-based chemicals & pharma	liquid biofuels	bio-electricity
Croatia	2,22	5,26	0,30	1,01	0,40	0,20	0,71	0,20	0,00	0,00
Cyprus	0,68	1,41	0,02	0,12	0,05	0,02	0,01	0,02	0,01	0,05
France	70,78	185,38	6,74	13,48	20,22	3,37	10,11	20,22	3,37	3,37
Greece	9,50	13,85	0,14	0,54	1,09	0,54	0,68	0,14	0,14	0,54
Italy	46,89	128,95	2,93	26,38	20,51	1,47	1,47	11,72	4,40	0,00
Malta	0,12	0,00	0,00	0,05	0,02	0,09	0,00	0,00	0,00	0,00
Portugal	6,95	16,22	1,16	3,86	3,48	0,39	5,41	0,77	0,39	0,00
Slovenia	1,27	2,21	0,39	0,98	0,72	0,00	0,42	0,52	0,00	0,00
Spain	43,00	105,12	0,96	7,65	13,38	1,91	7,65	7,65	1,91	1,91

Turn over b€, several years (JRC 2016)



- Agriculture
- Forestry
- Pulp and paper
- Bioenergy (biofuels and bio-based)
- Food Manufacture
- Wooden products
- Biomaterials (textiles, chemicals, pharmaceuticals)

data from JRC, 2016



What can forest bioeconomy do for greening key sectors?

Main sectors of green economy (UNEP 2011)

- Natural capital
- Renewable energy
- Manufacturing
- Waste
- Buildings
- Transport
- Tourism
- Cities

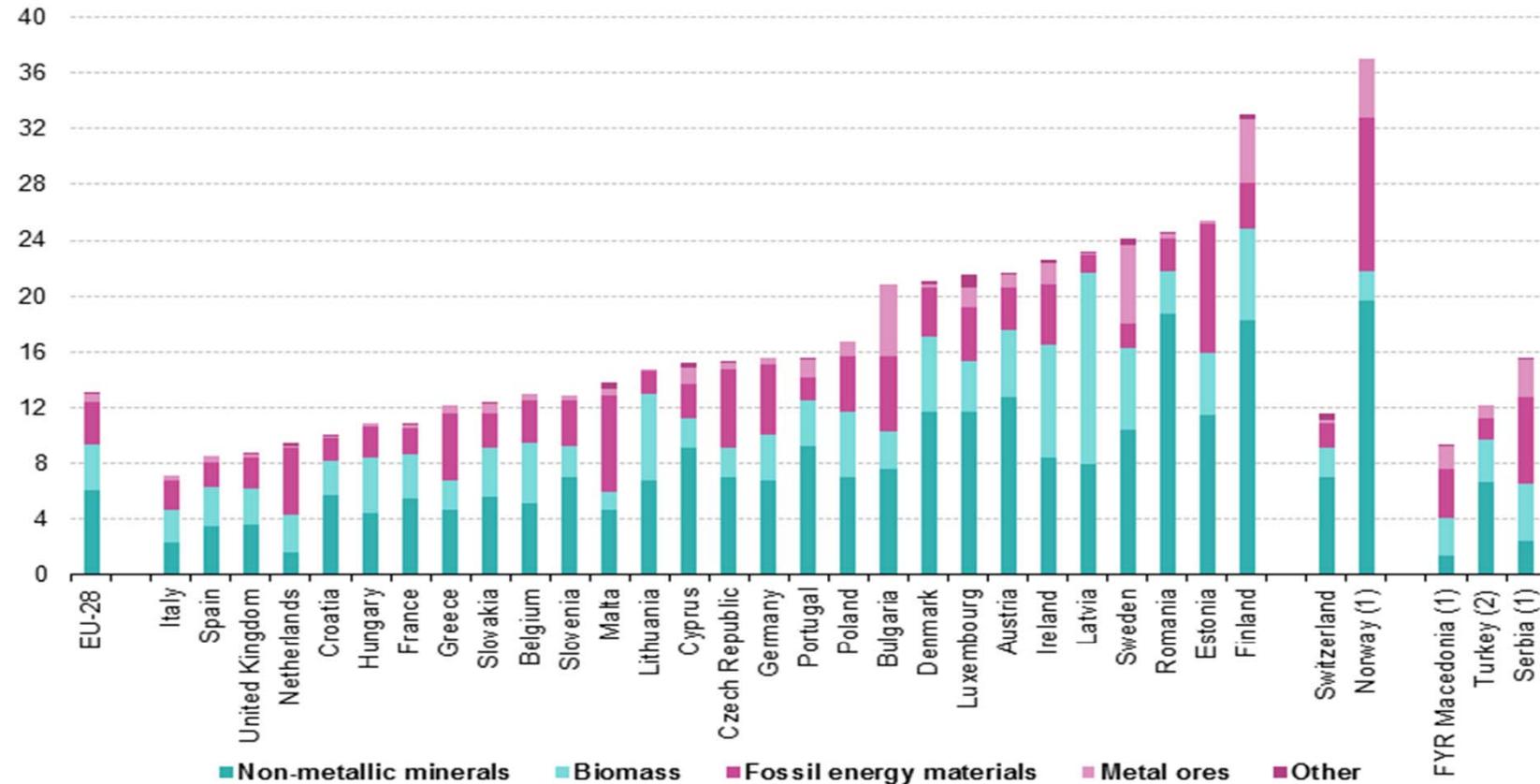
Main sectors of green economy
(Burkart, K, Mother Nature Network)

- Land management
- Renewable energy
- Green buildings
- Sustainable transport
- Water management
- Waste management





Material intensity in Europe



Note: 'Other' includes 'Other products' and 'Waste for final treatment and disposal'

(¹) 2015

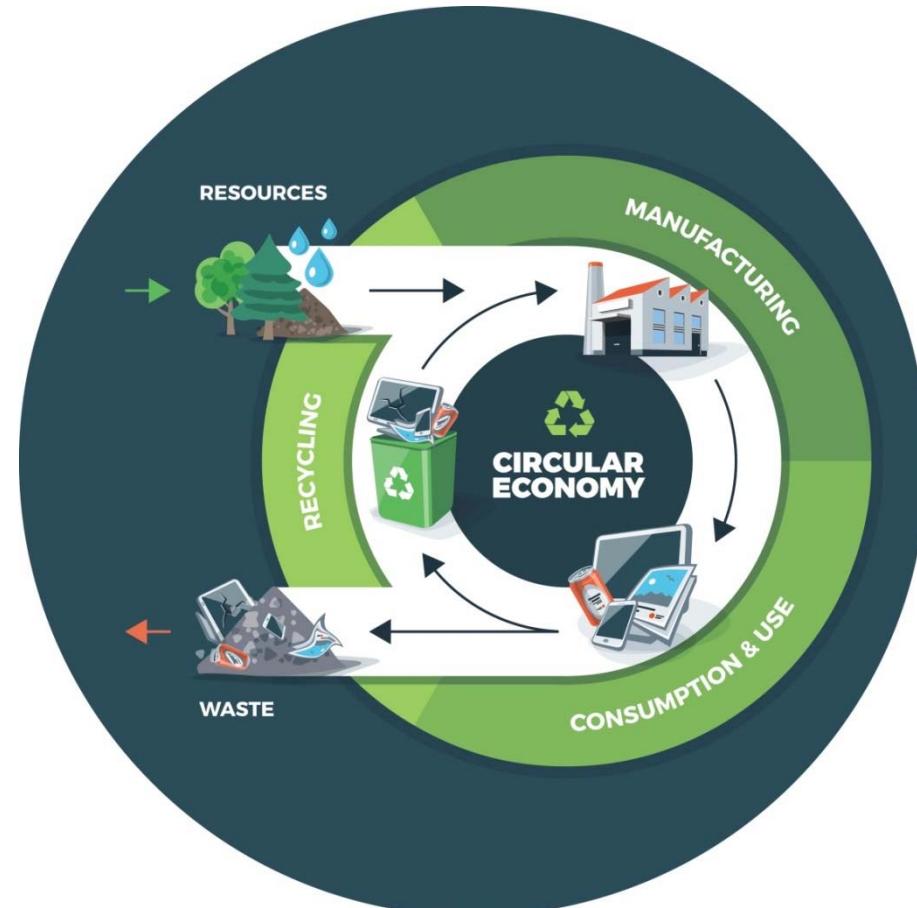
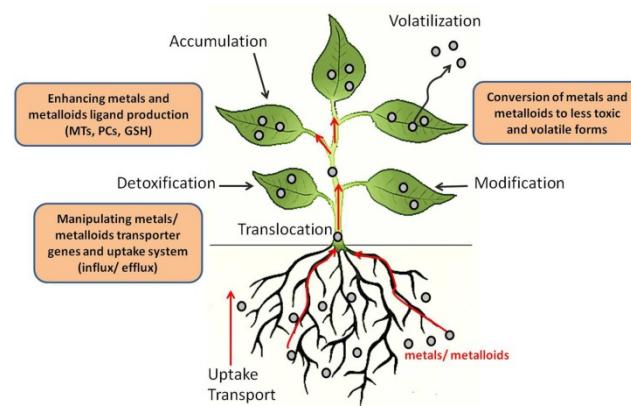
(²) 2014

Source: Eurostat (online data code: env_ac_mfa; demo_gind)





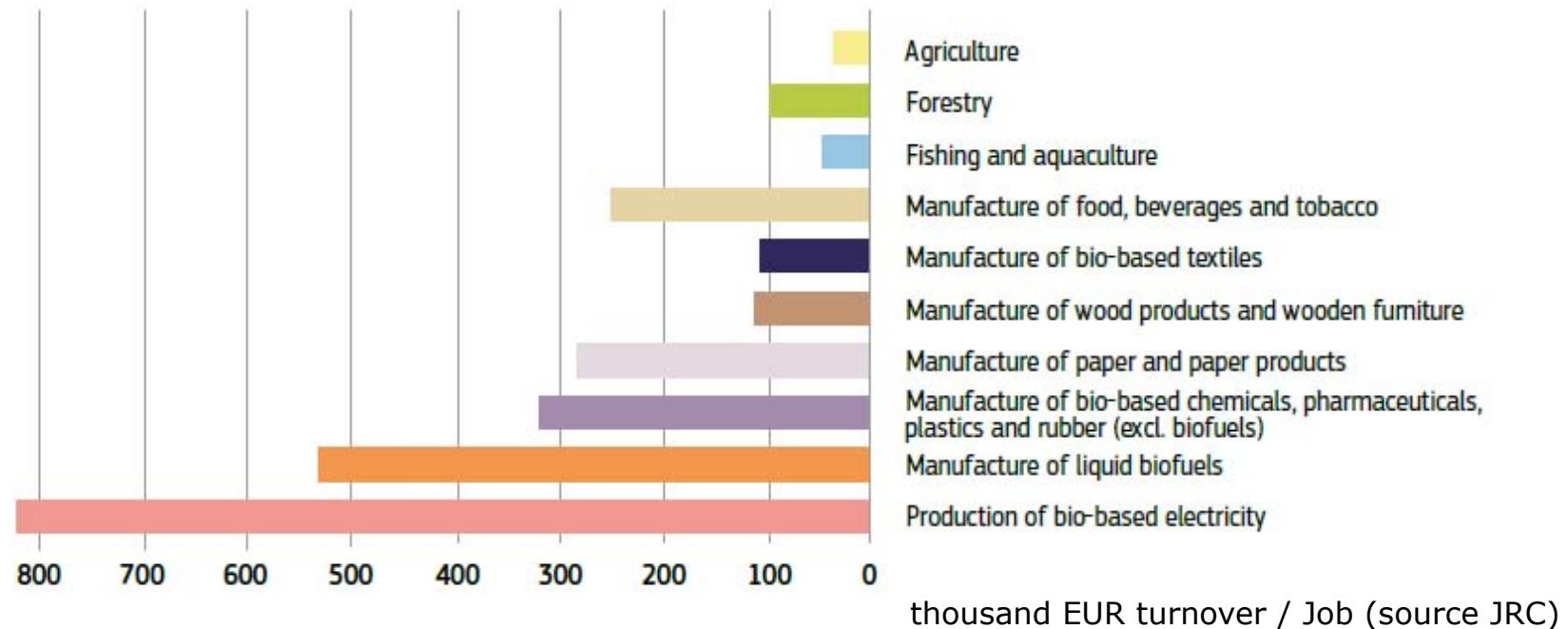
Una Bioeconomia Circular





Key questions for the circular bioeconomy

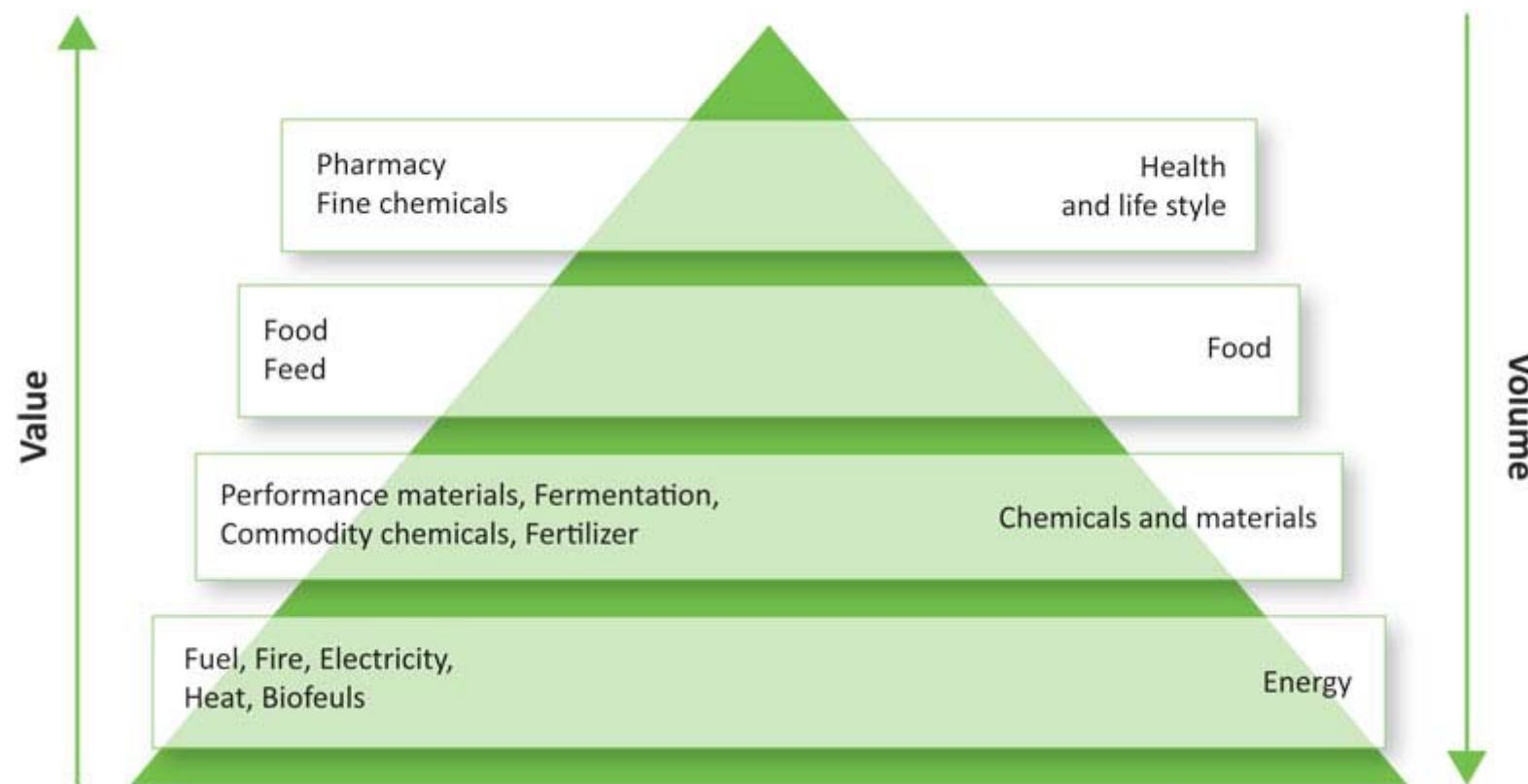
Maximizar beneficios sociales (empleo, prosperidad, bienestar....)





Key questions for the circular bioeconomy

Maximizar beneficios sociales (empleo, prosperidad, bienestar....)





Key questions for the circular bioeconomy

FROM SCIENCE TO POLICY 3

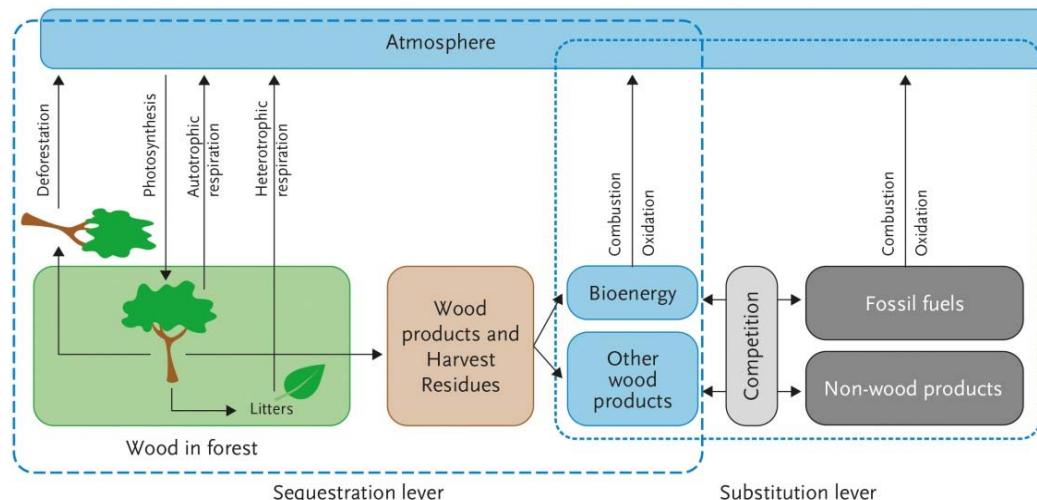
Maximizar beneficios Ambientales

- Carbon footprint
- Water footprint
- Dematerialisation
- Waste...

Forest biomass,
carbon neutrality and
climate change mitigation

...

Göran Berndes, Bob Abt, Antti Asikainen, Annette Cowie, Virginia Dale,
Gustaf Egnell, Marcus Lindner, Luisa Marelli, David Paré, Kim Pingoud and Sonia Yeh



17



19 December 2017

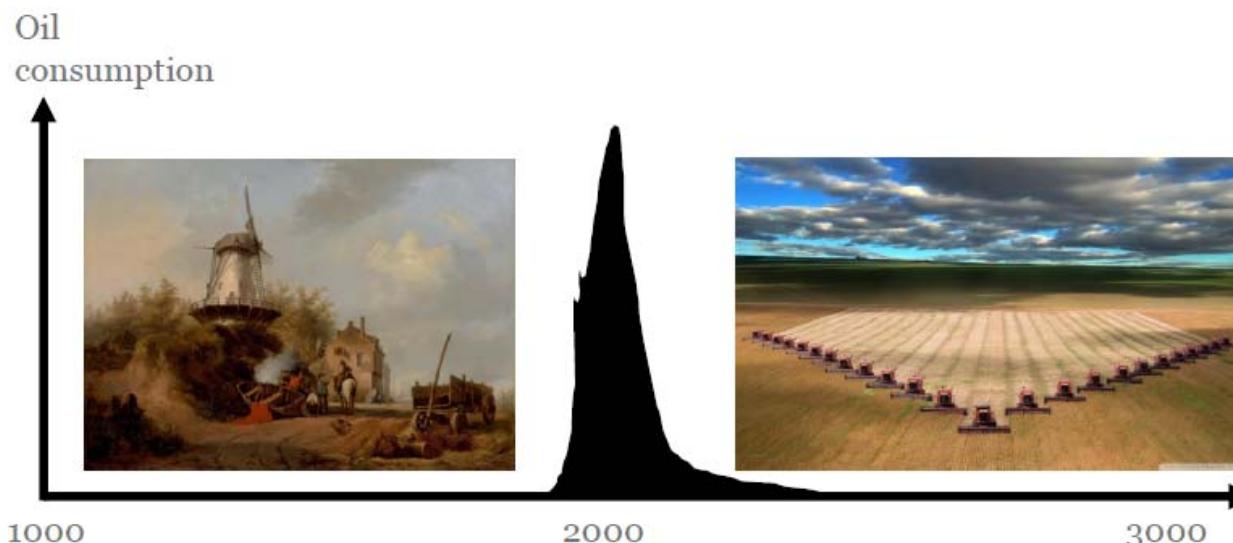


Key questions for the circular bioeconomy

Strong Sustainability



From bioeconomy to bioeconomy



Living off the land

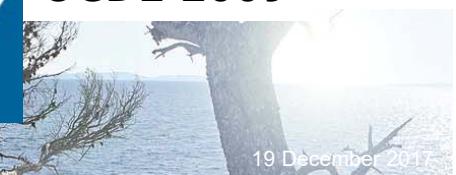
*A brief
moment
in history*

3000



18

OCDE 2009

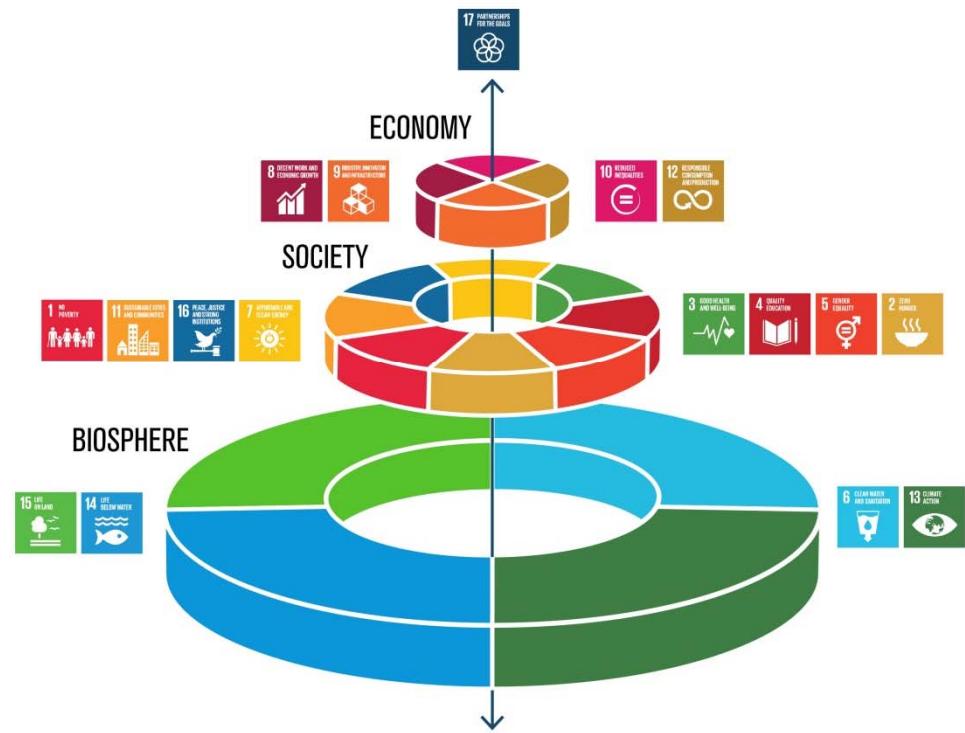
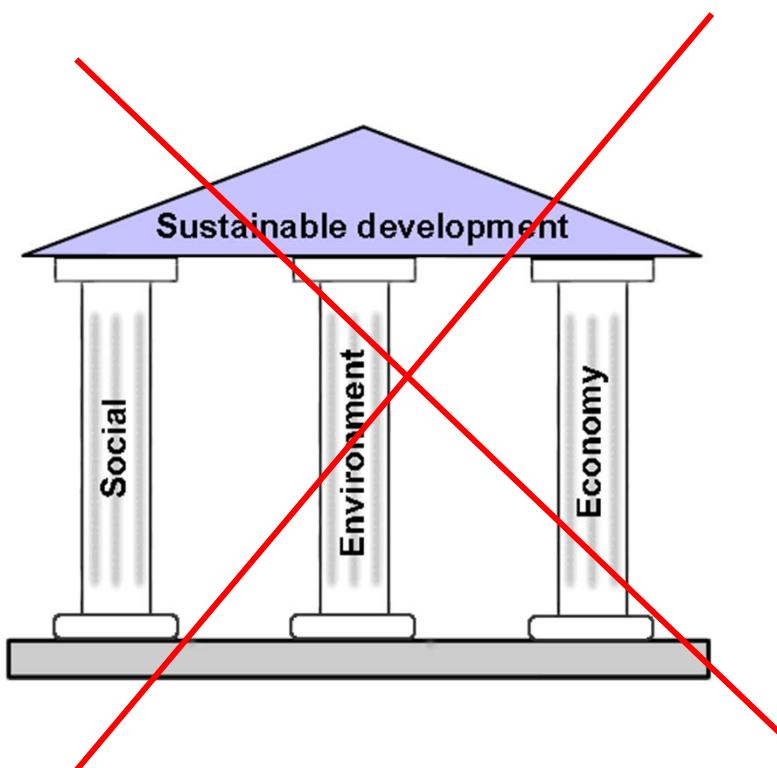


19 December 2017



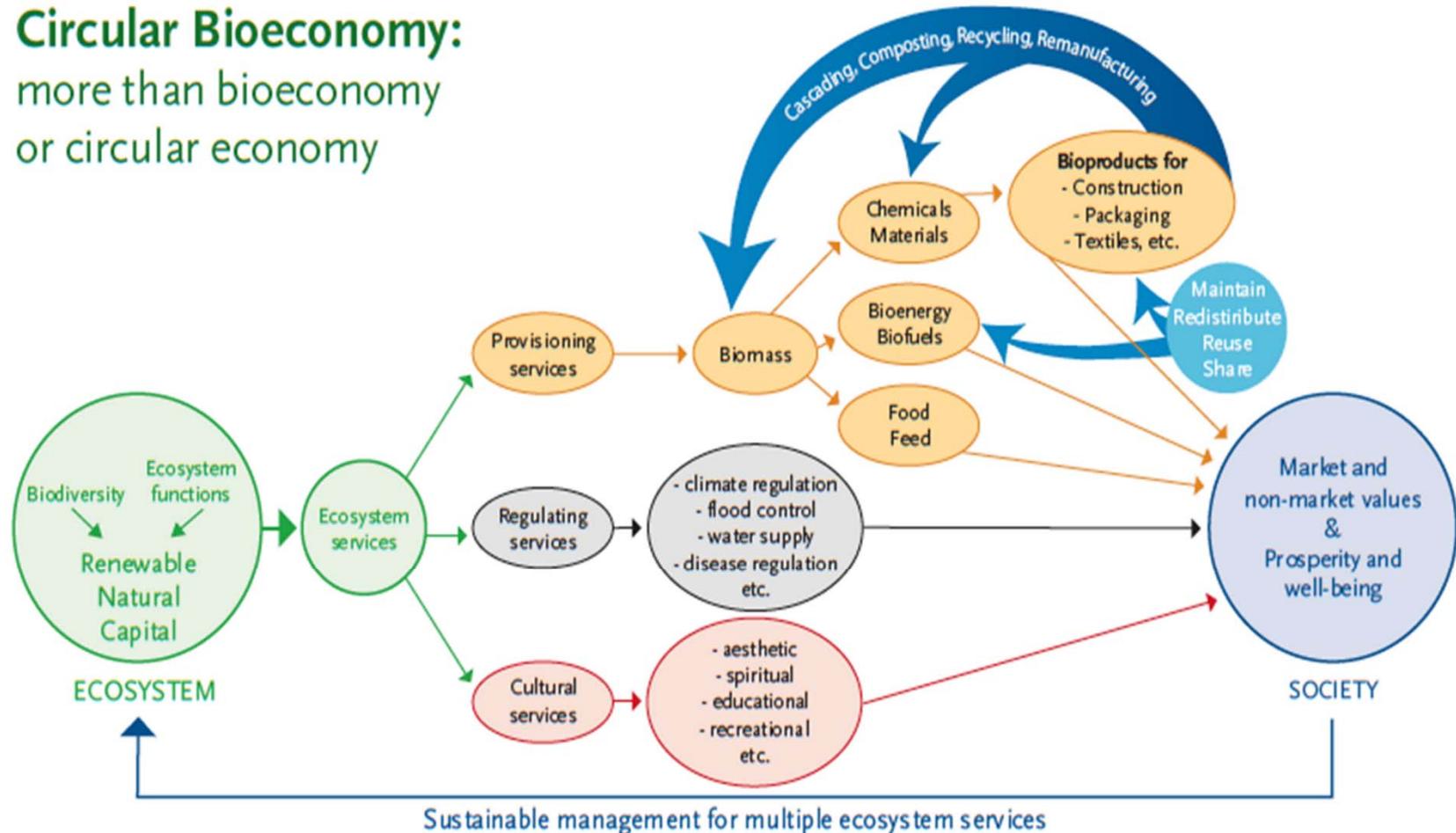
Key questions for the circular bioeconomy

Strong Sustainability





Circular Bioeconomy: more than bioeconomy or circular economy



EFI 2017





MENSAJE 1

La Bioeconomía Circular no es *BAU!*

A bioeconomy Strategy for France, 2017

- 1.**
ASSURANT LA SÉCURITÉ ALIMENTAIRE ET DES CONDITIONS DE VIE SOUTENABLES POUR LES GÉNÉRATIONS ACTUELLES ET FUTURES EN PRÉSERVANT LES RESSOURCES NATURELLES ET LES FONCTIONS ÉCOSYSTÉMIQUES DES MILIEUX
- 2.**
EFFICIENTE, RÉSILIENTE ET CIRCULAIRE, PRODUCTIVE DE FAÇON PÉRENNE
- 3.**
TOURNÉE VERS LES CITOYENS ET ANCRÉE DANS LES TERRITOIRES, QUI CONTRIBUE AU DÉVELOPPEMENT DE VALEUR ÉCONOMIQUE ET D'EMPLOIS
- 4.**
SOURCES DE SOLUTIONS INNOVANTES, PERFORMANTES ET ACCESSIBLES À MÊME DE RÉPONDRE À LA DIVERSITÉ DES BESOINS HUMAINS



19 December 2017



El sur de Europa ¿es diferente?

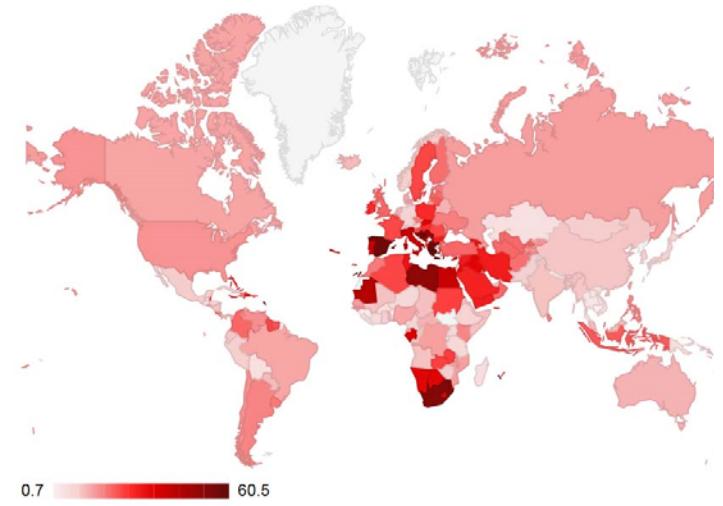
Southern Europe is also a buzzword



Contexto 1

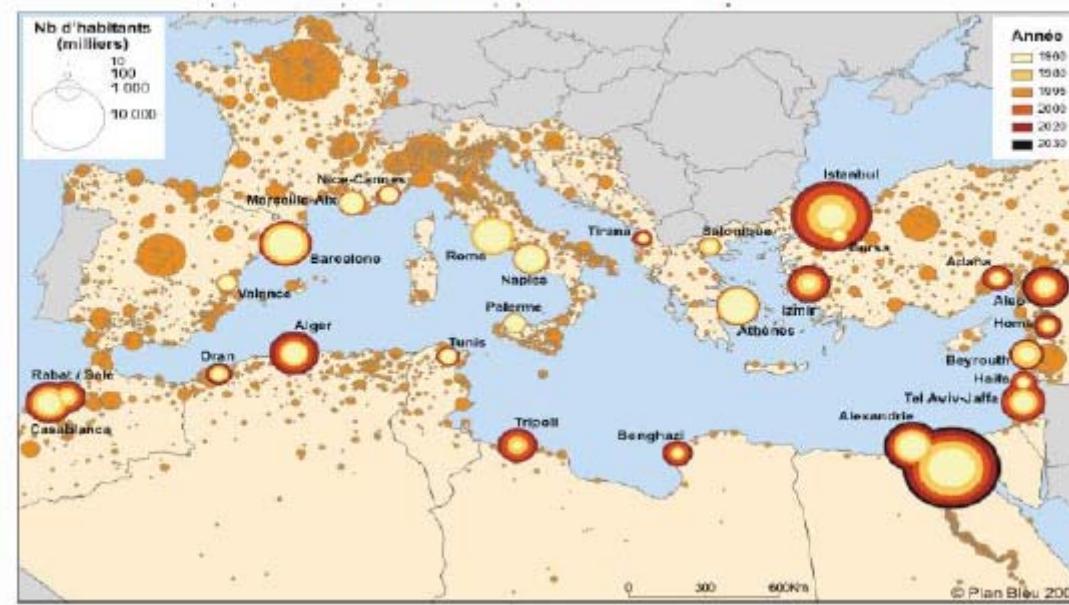
- High population (480 M. inhabitants)
- 66% of people lives in cities
- 30% of world tourism
- 60% of population in water scarce areas
- Structural unemployment
- Global biodiversity & heritage hotspot

Youth unemployment rate, in % of youth labour force (2013)



Source: ILO - Trends Econometric Models, April 2014.

Projected urban population by 2030



www.efimed.efi.int





Biocapacity

Ecological Footprint and biocapacity of Mediterranean nations

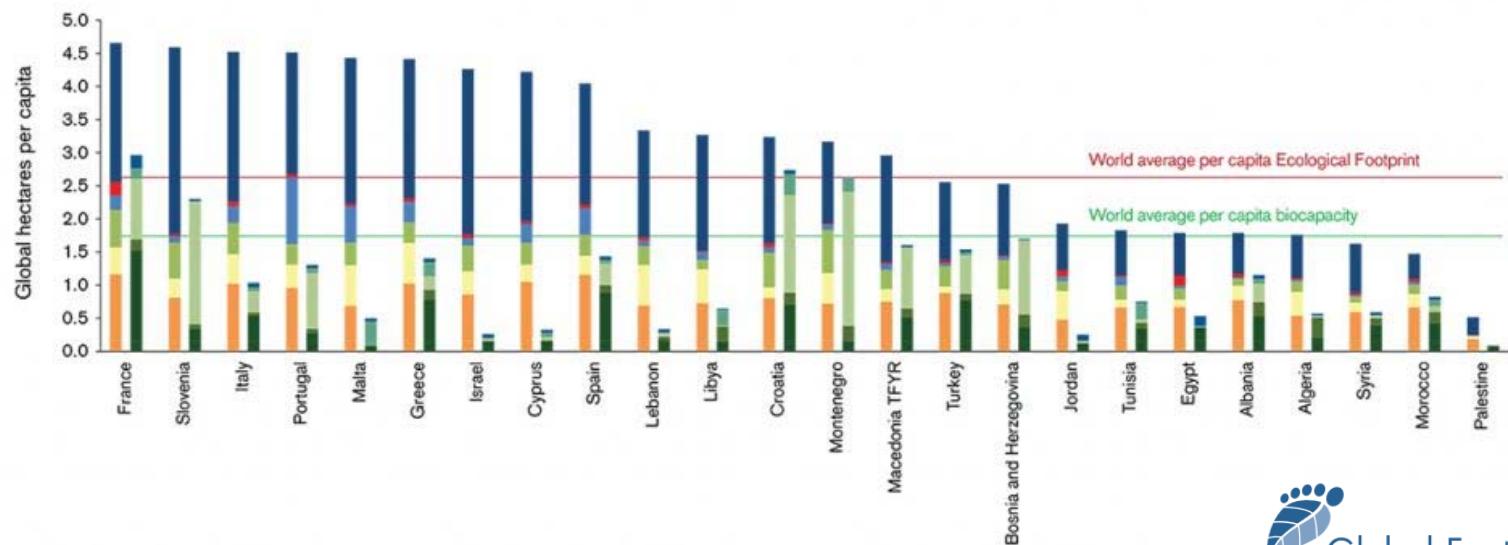
Every country in the Mediterranean region is running an ecological deficit, with its Ecological Footprint exceeding its biocapacity (according to 2010 data). Moreover, approximately 90 percent of people in the Mediterranean region live in countries whose Ecological Footprint is higher than the world-average biocapacity available per person. The graph below shows the Ecological Footprint and biocapacity by different land types for each country in the Mediterranean in 2010. The countries with the highest incomes currently have the highest resource demands in terms of Ecological Footprint. The carbon Footprint varies the most among countries and rises with higher per capita income levels.

BIOCAPACITY

- Built-up land
- Fishing ground
- Forest land
- Grazing land
- Cropland

ECOLOGICAL FOOTPRINT

- Built-up Footprint
- Fish Footprint
- Forest Product Footprint
- Grazing Footprint
- Crop Footprint
- Carbon Footprint



10



Global Footprint Network
Advancing the Science of Sustainability



www.efimed.efi.int



Dramatic climate change

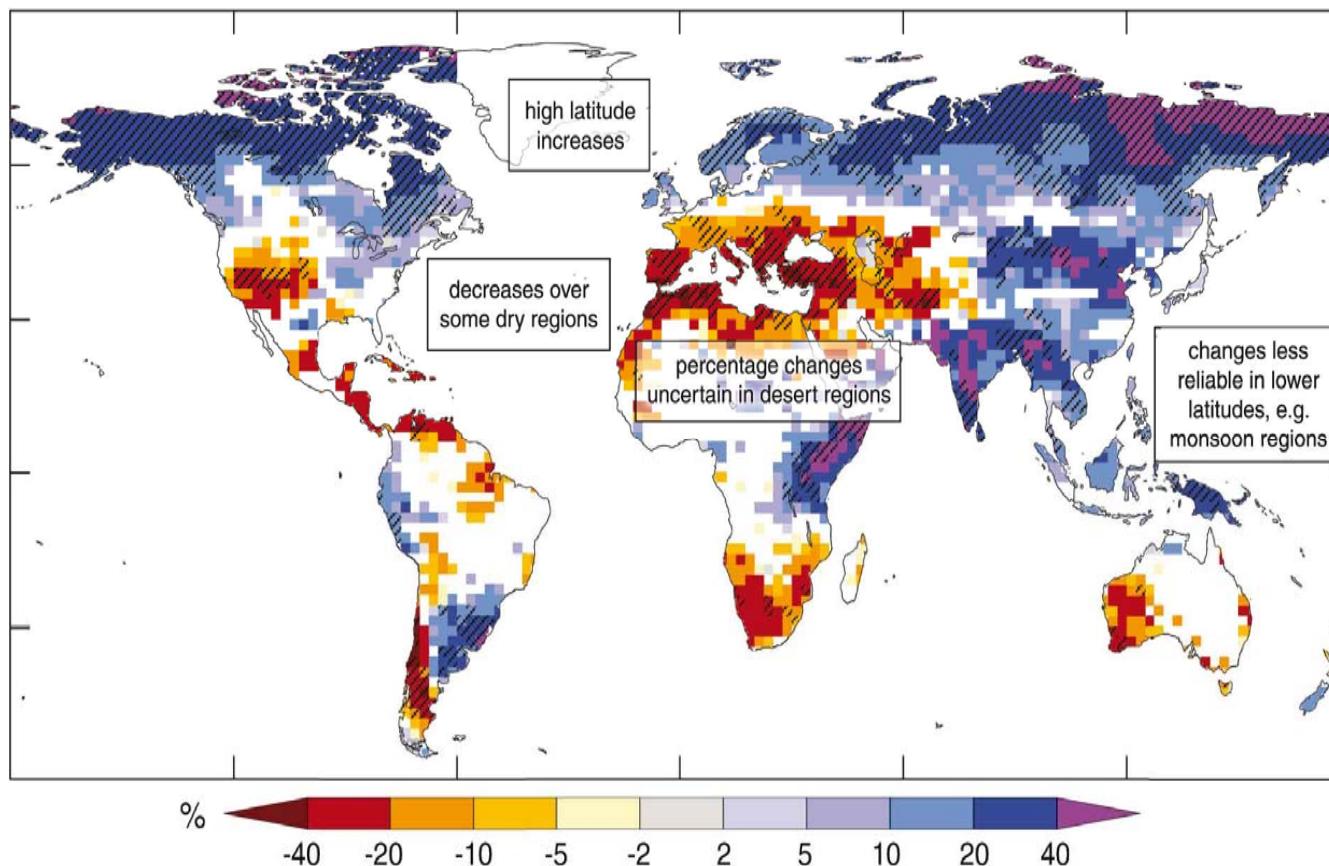


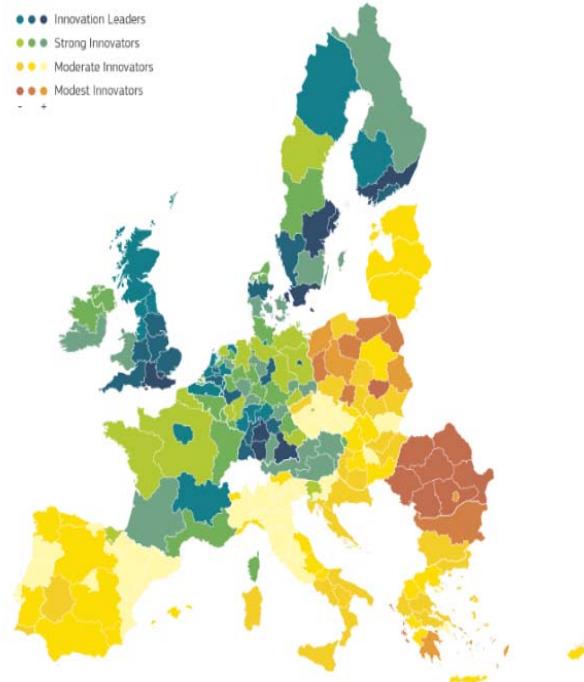
Figure 1. Percentage changes in average annual runoff projected by four climate models for the period 2090-2099, relative to 1980-1999. Source: IPCC. 2007. Climate Change 2007: Synthesis Report. Intergovernmental Panel on Climate Change.

Figure 3.5, p. 49



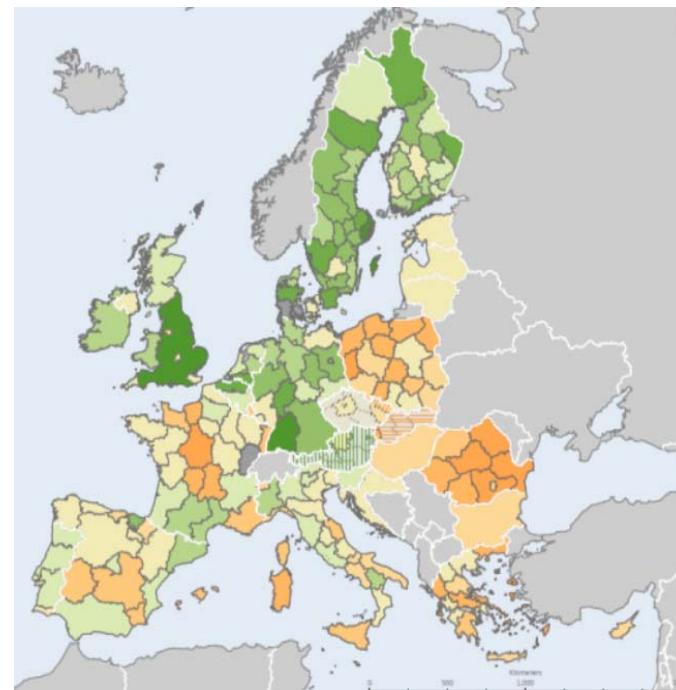


Capacidad Innovacion



Regional innovation scoreboard, EC 2017 (left),

Bioeconomy readiness



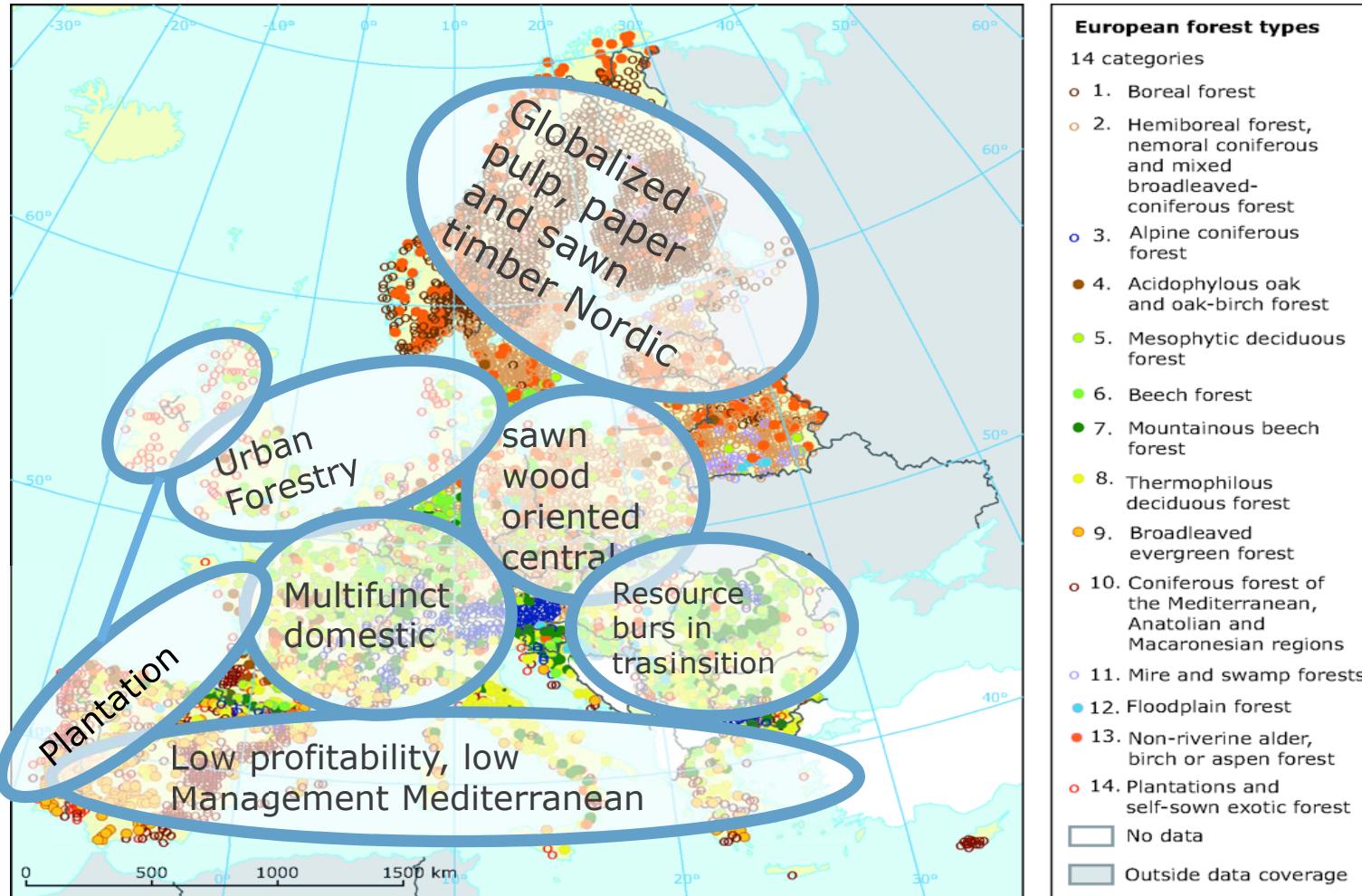
DG RESEARCH (2017) Rigght



www.efimed.efi.int



Contexto 2: el sector forestal



IIASA
2008
Study of
the Effects
of
Globalizati
on on the
economic
Viability of
EU
Forestry





Table 1. Regional Types of Forestry in the EU27.

Type 1: Globalized regions/ Nordic–Baltic	Globalized pulp/paper industry-oriented, raw material production oriented regions in Nordic countries, and related supply regions in the Baltic states
Type 2: Wood production oriented regions/Central Europe	Raw material production-oriented regions in Central Europe supplying sawmilling/pulp and paper industry, and related supply regions
Type 3: Plantation-oriented/ (mainly) “Atlantic Rim” Western Europe	Regions based on plantations, mainly supplying to pulp/paper forest industry, for the most part in “Atlantic Rim” Western Europe
Type 4: Broader, multifunctional forestry oriented regions/Western Europe	Broader, multifunctional forestry-oriented regions with industries mainly catering to domestic consumption in Western Europe
Type 5: Urban society service influenced regions/North-western Europe	Regions with forestry dominated by/oriented toward serving urbanized societies and comparatively little raw material production-oriented forestry in North-western Europe
Type 6: “Countries in transition” regions/Eastern Europe	Regions dominated by restitution issues, “countries in transition,” weak, broken, private forestry tradition, weak infrastructure, and uncompetitive domestic forest industries in Eastern Europe
Type 7: Low forest management intensity regions/ Southern Europe	Regions dominated by low forest management intensity (if any), comparatively high importance of non-wood forest products, forest fires in southern Europe





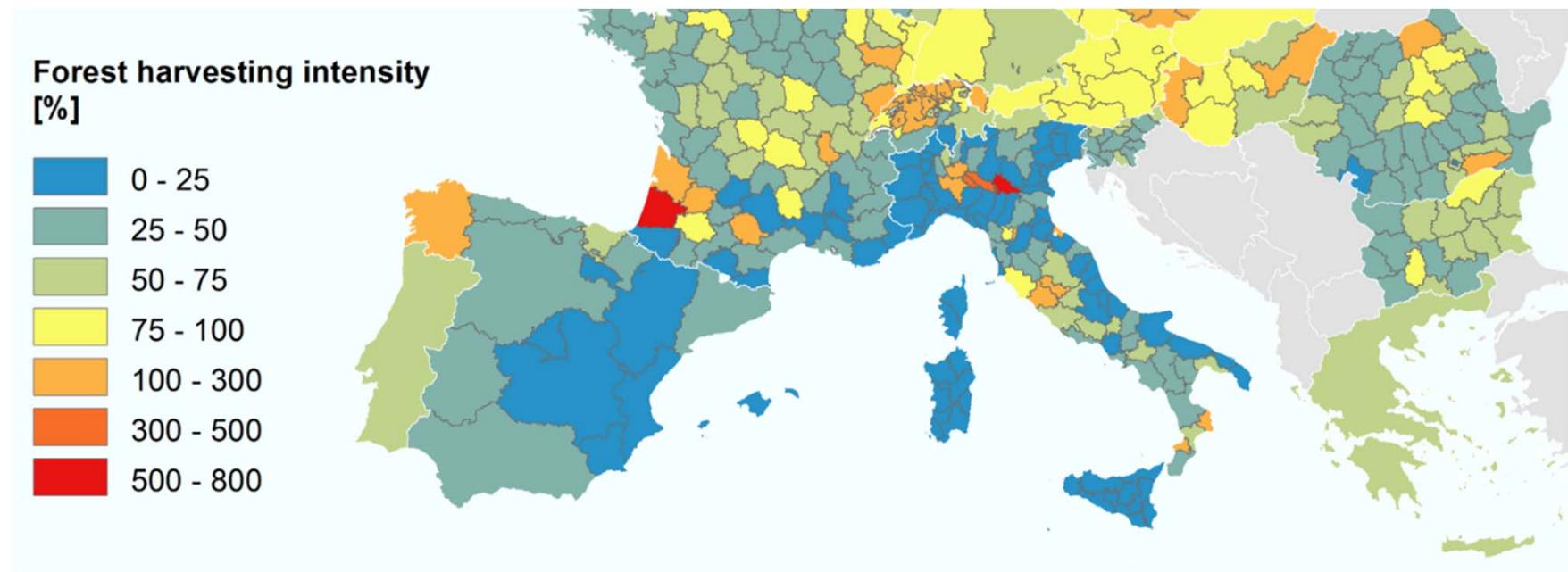
Table 6. Strategic options to respond to globalization and their regional suitability (number of stars indicating suitability).

	Option 1: No commercial operation	Option 2: Niche / diversify	Option 3: Commodity- competitiveness	Option 4: Next-generation products
Type 1: Globalized regions / Nordic-Baltic		*	**	***
Type 2: Wood production-oriented regions/Central Europe		**	***	**
Type 3: Plantation-oriented/(mainly) "Atlantic Rim" Western Europe		*	***	*
Type 4: Broader, multifunctional forestry oriented regions/Western Europe		**	***	**
Type 5: Urban society service- influenced regions/Northwestern Europe	**	***		*
Type 6: "Countries in transition" regions/Eastern Europe		**	***	
Type 7: Low forest management intensity regions/ Southern Europe	**	***		**





Harvesting intensity in Europe



Source: Levers et al 2014





One of the world most radical *forest transitions*

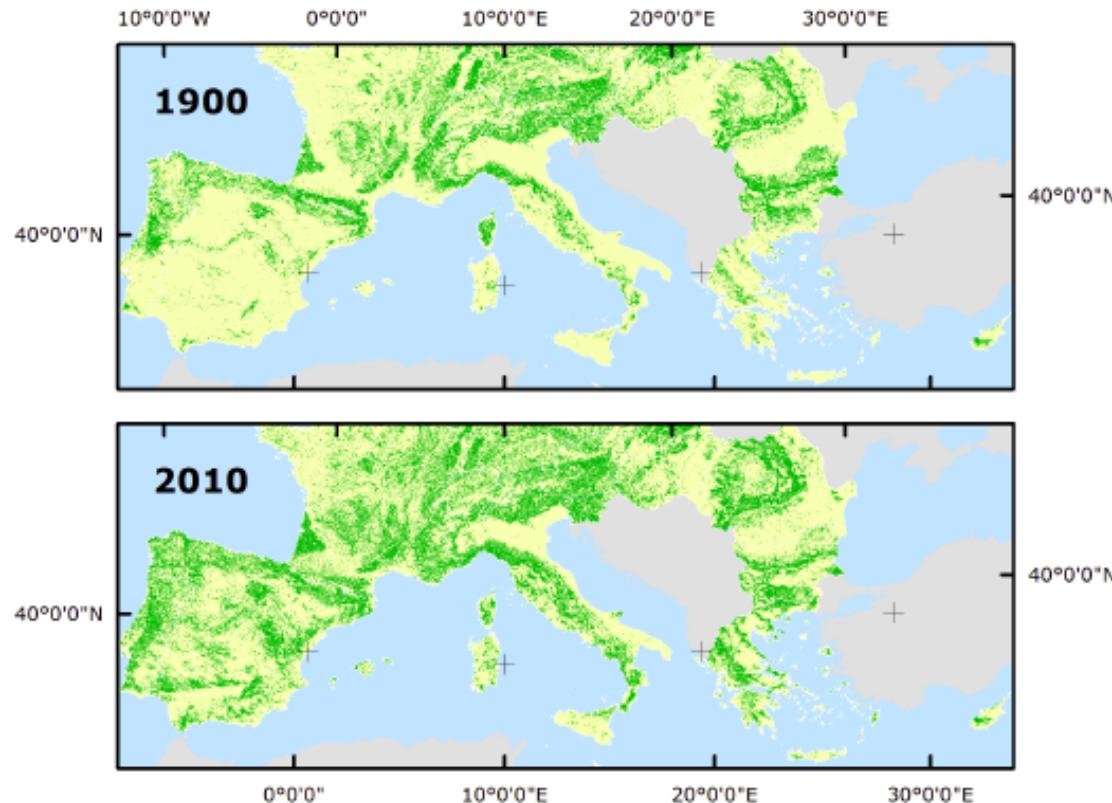


Figure 1. Estimated expansion of European forests since 1900. Based on data from Fuchs, et al. (2013).





Forest fires

- 500.000 ha /yr in Med Europe
- > EUR 2 500 Million /yr in combat??
- Economic and ecological damage



www.efimed.efi.int

Trend: area burnt in WE
burnt area in southern EU countries

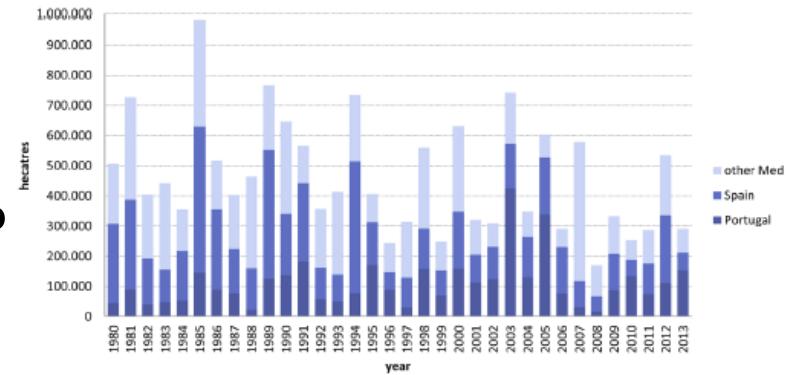
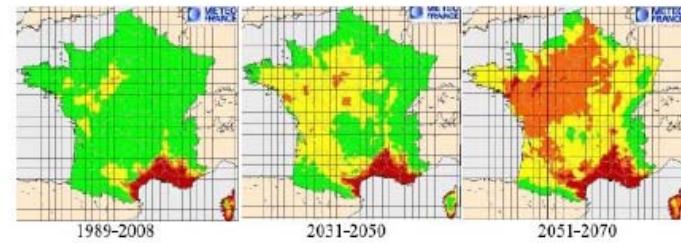


Figure 2. Total burnt area in southern EU countries (PT, ES, FR, IT and GR). Total average for 1980-2014 is 454 000 ha/yr. Data from Greece after 2009 is incomplete. Source: JRC.

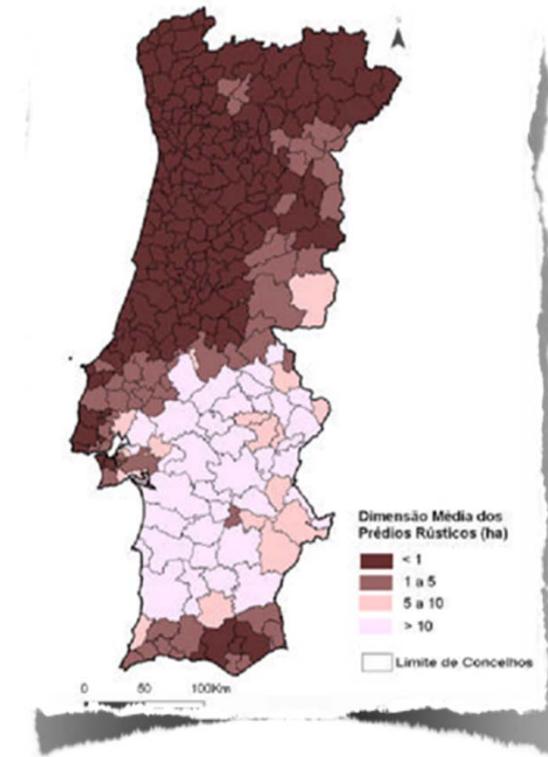


France needs + 20%
budget but 2040

mission interministérielle Changement climatique et
extension des zones sensibles aux feux de forêt,
2010



Mediterranean Forests: Fragmentation



Castilla and Leon
1.000.000 owened by 700.000
thousen owners



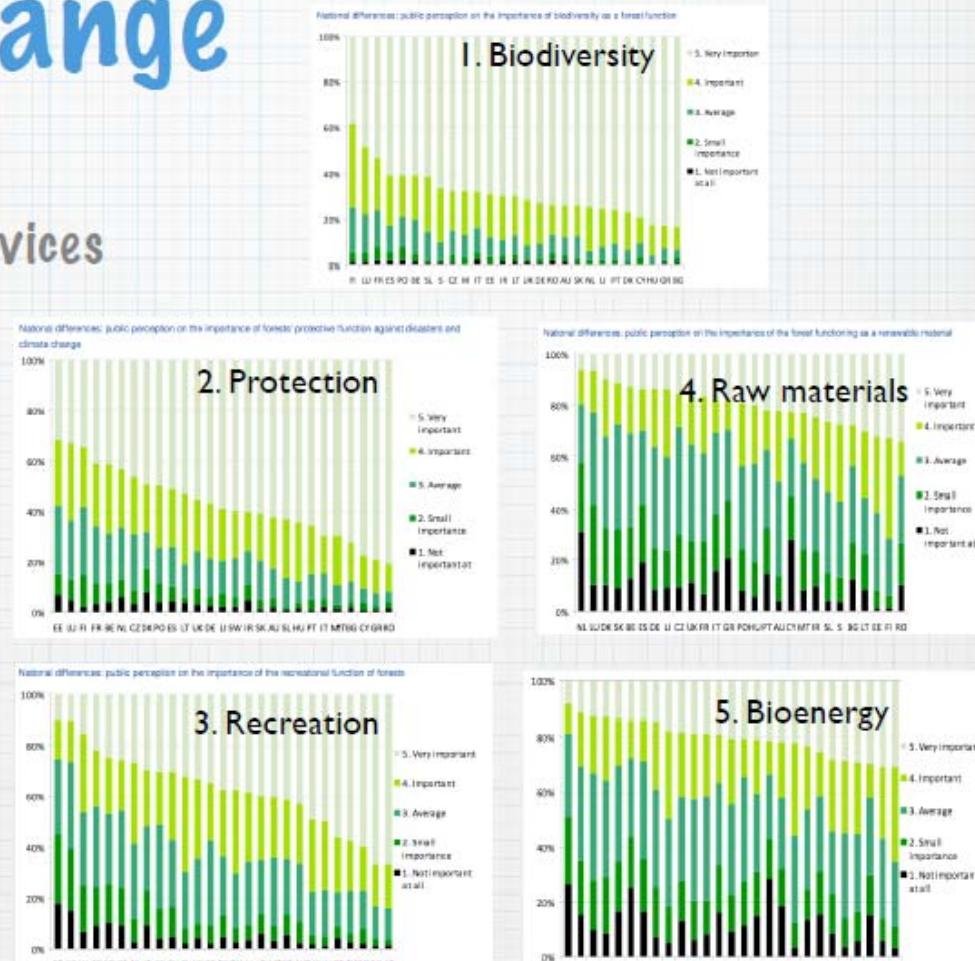


Forestry in the cross-roads: social values

Social Change

- * Society favors environmental services

Forest should be managed for...



license to operate,

license to PES

Consume behaviour





Up to 30% of the land in Natura 2000

- Ecological hotspot
- Lack of value

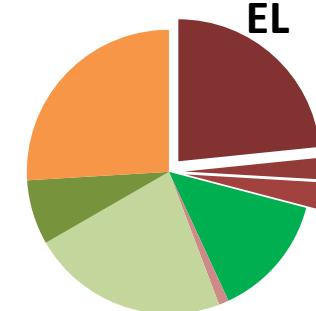
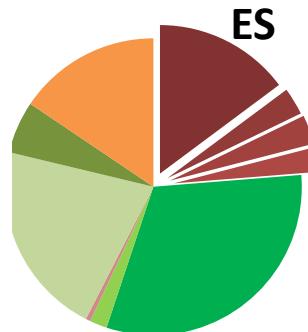
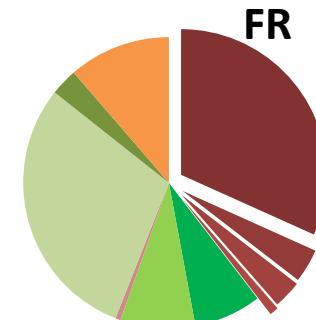
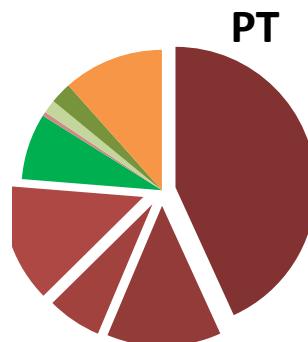
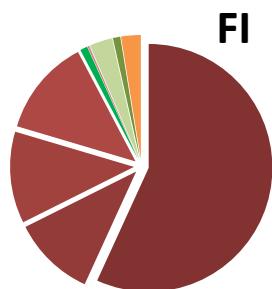
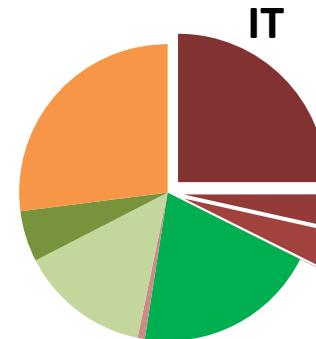
European Commission
2012. Natura 2000
Network





3 Biomass availability

High weight of agro-biomass



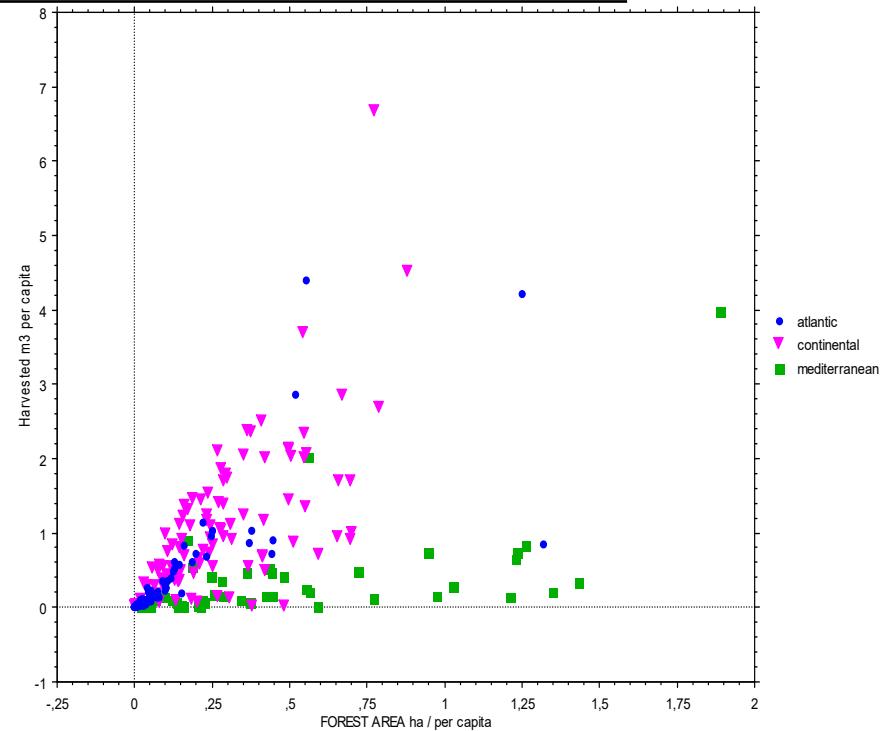
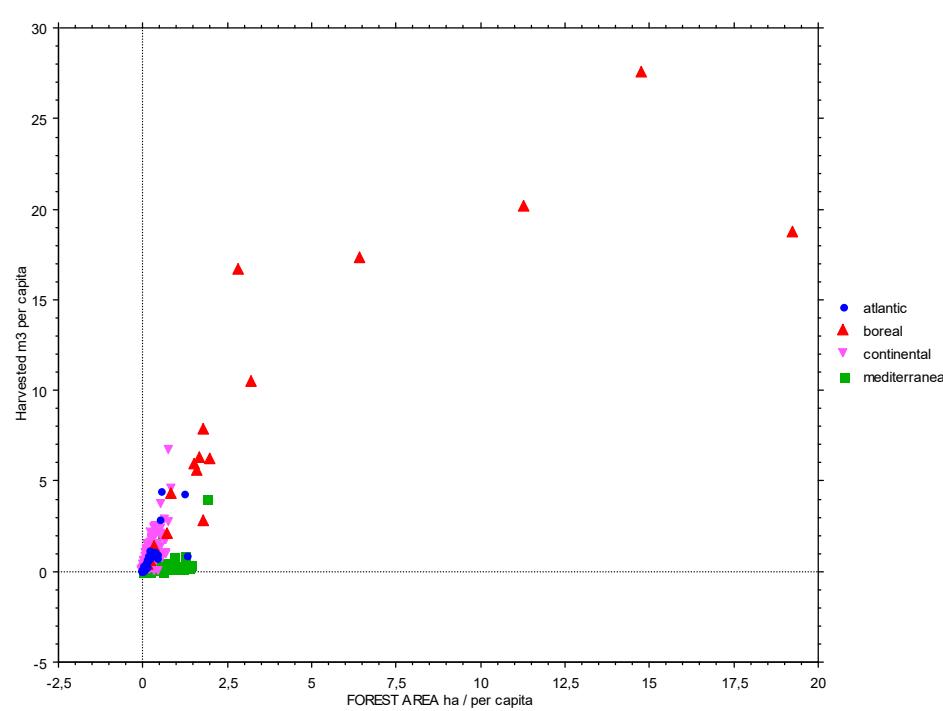
- ForestProduction
- Forest residues
- wood residues
- BlackLiquour
- Lignocellulosic crops
- Grassland
- Other land use
- Agricultural residues
- Agrifood residues

Base on data from **S2Biom** project



Availability of forest and forest biomass in Regions

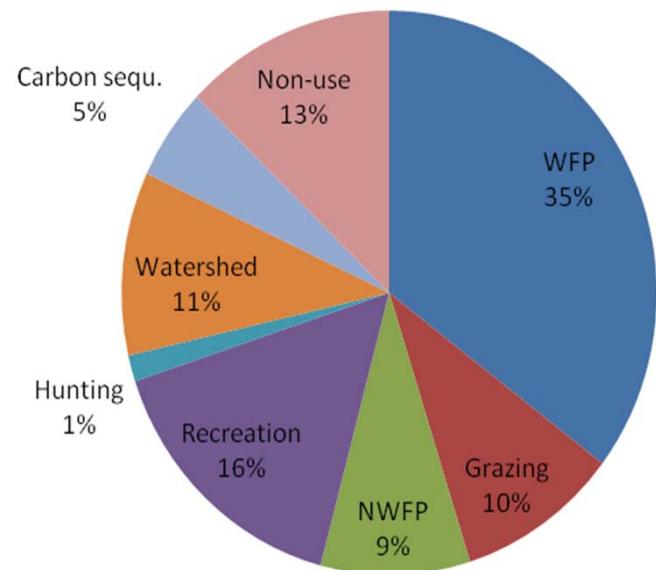
	Forest ha inhab ⁻¹	std	Harvest m ³ inhab ⁻¹ yr ⁻¹	std	Increment m ³ ha ⁻¹ yr ⁻¹	std
Atlantic	0.11 ^a	0.22	0.35 ^a	0.74	5.16 ^a	0.69
Boreal	4.17 ^b	5.06	9.04 ^b	8.08	3.06 ^b	0.56
Continental	0.29 ^c	0.2	1.08 ^c	1.00	4.14 ^c	0.61
Mediterranean	0.43 ^d	0.44	0.42 ^{ad}	0.65	3.73 ^{cd}	0.78





Los servicios ecosistémicos y los productos no madereros son muy valiosos!!

- NWFPs in EU are 10% of the value of wood
- > 150 NWFPs are traded internationally..
- EU is a global leader in supply (cork, tannins...)
- The EU = 50% of global NWFP imports
- 25% of European families pick ≥ once /yr



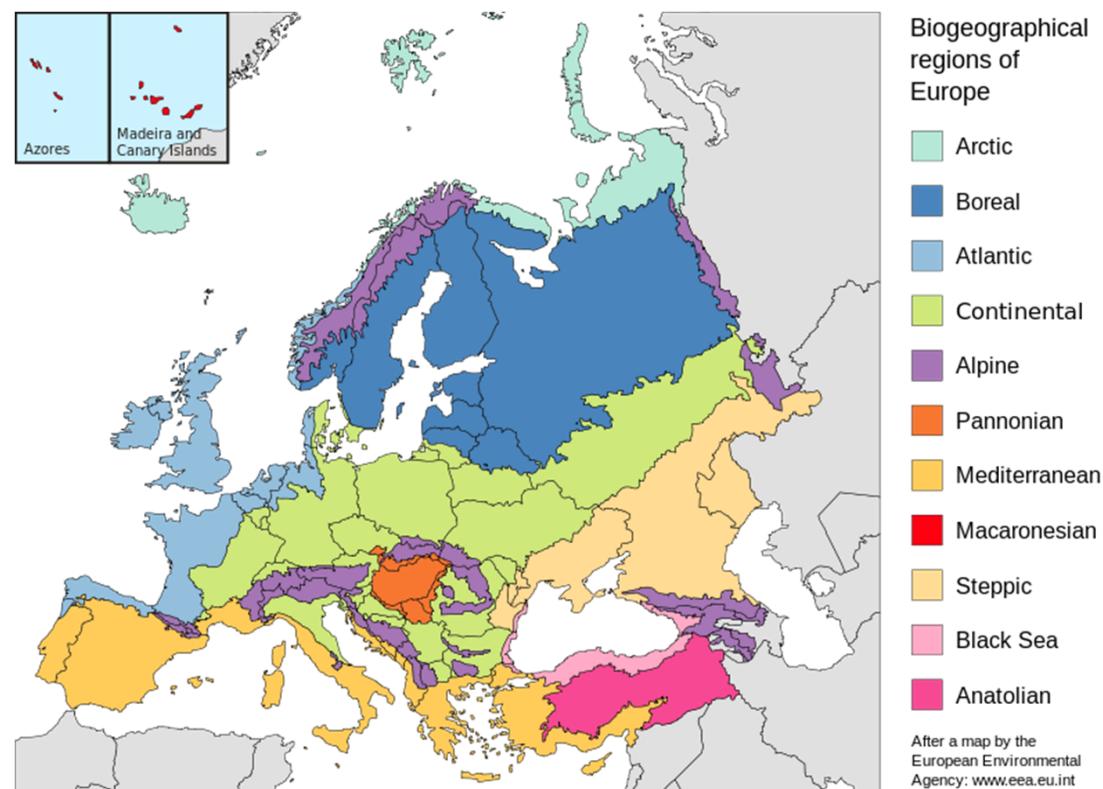
Merlo & Croitoru 2005





Context 4. Diversidad!!!

1. Southern Europe is Diverse!!





Context 5. Sectores tractores??

Construction?

42% del consumo energetico

50% uses material & 33% residuos

Textil y Moda?

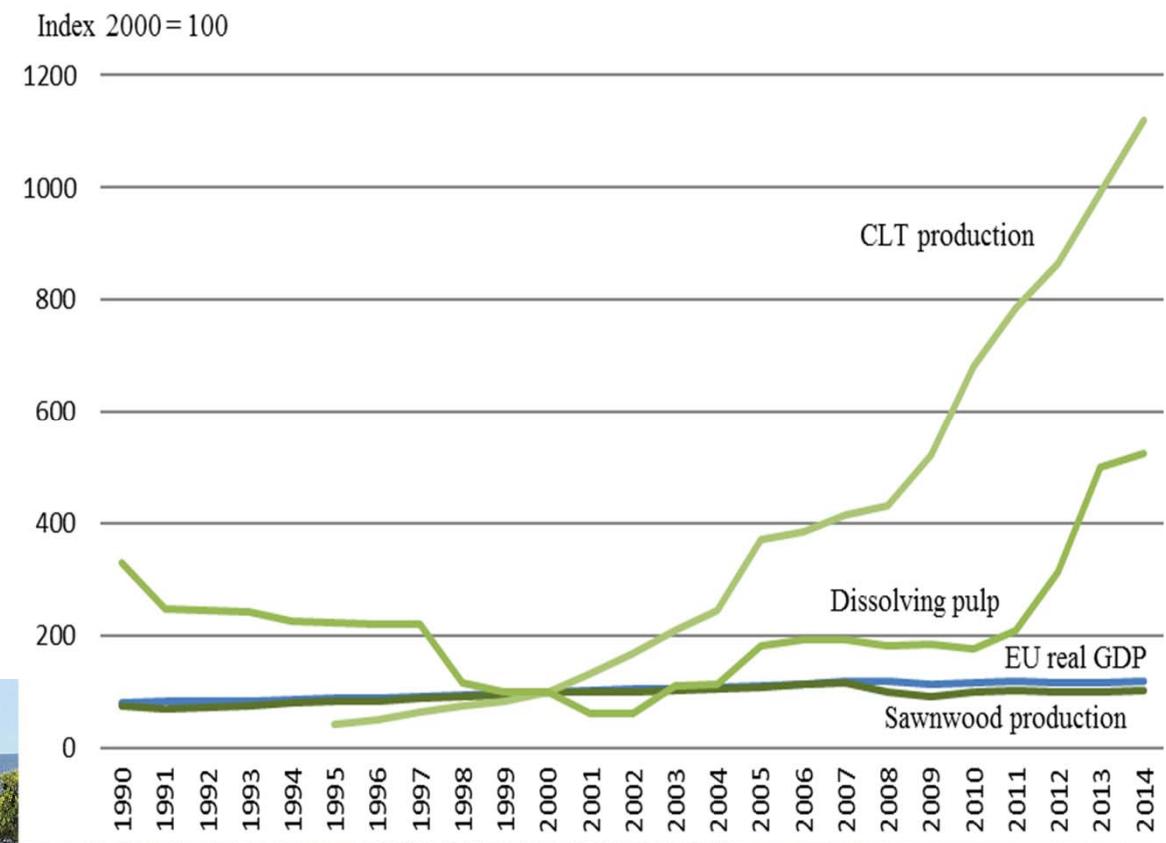
- Polyester (60%)
- Algodon (30%)

Automaticion?

Plasticos?

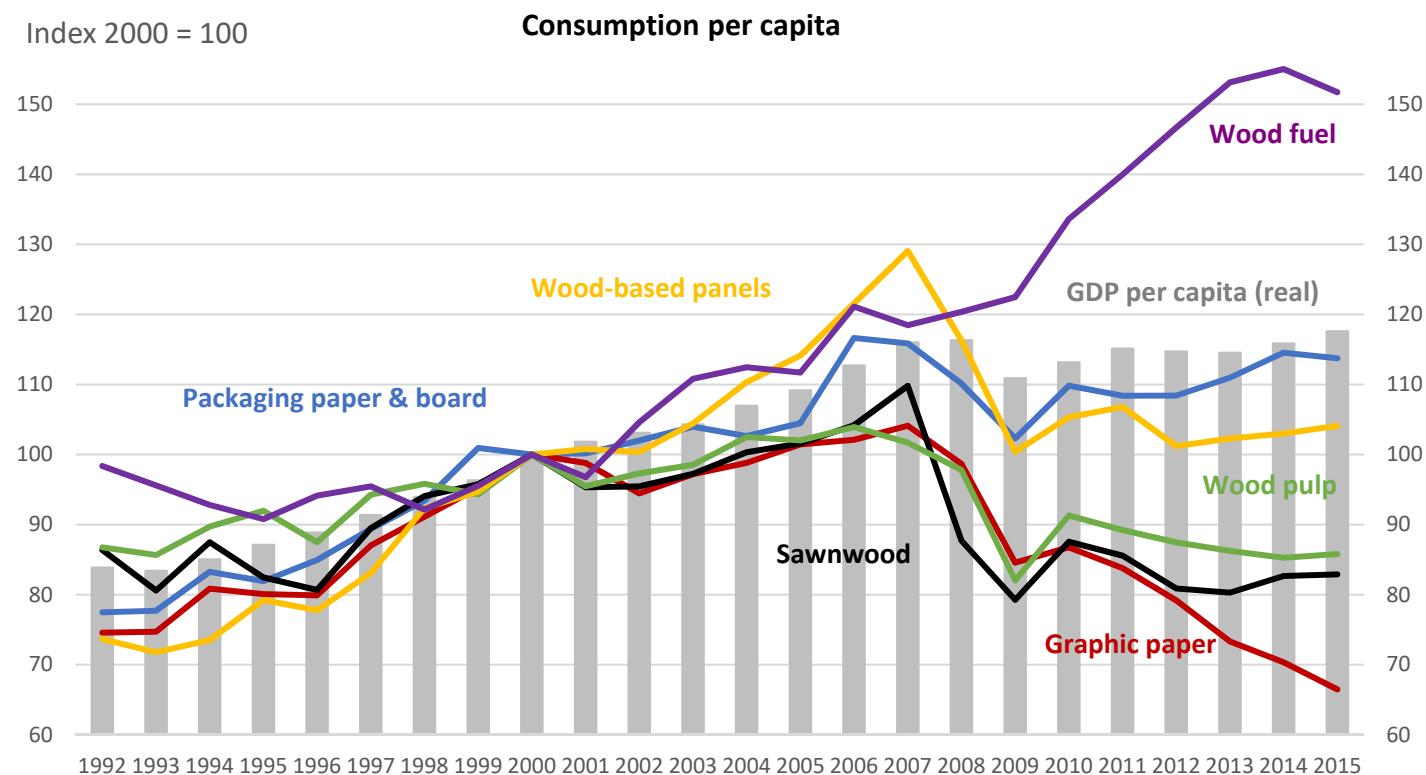


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Context 4. Sectores tractores??

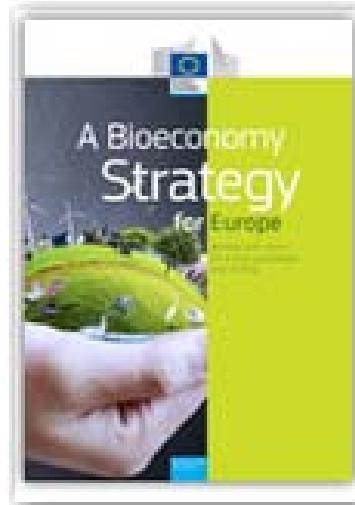
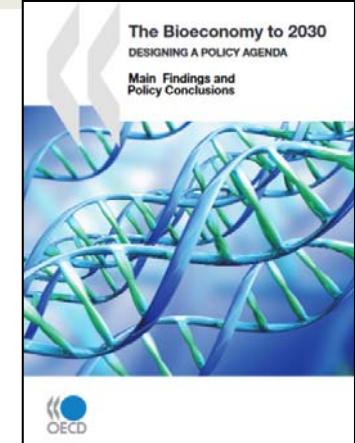




Approaches to the bioeconomy

(Bugge 2016)

- **bio-technology** centred pharma and research/ commercialisation of bio-techs. Solutions for multiple sectors
- **bio-resource** transformation of biomass for food, feed feedstock and manufacturing
- **bio-ecology (agro ecology)** focus on sustainability and ecological processes, local products organic farming....

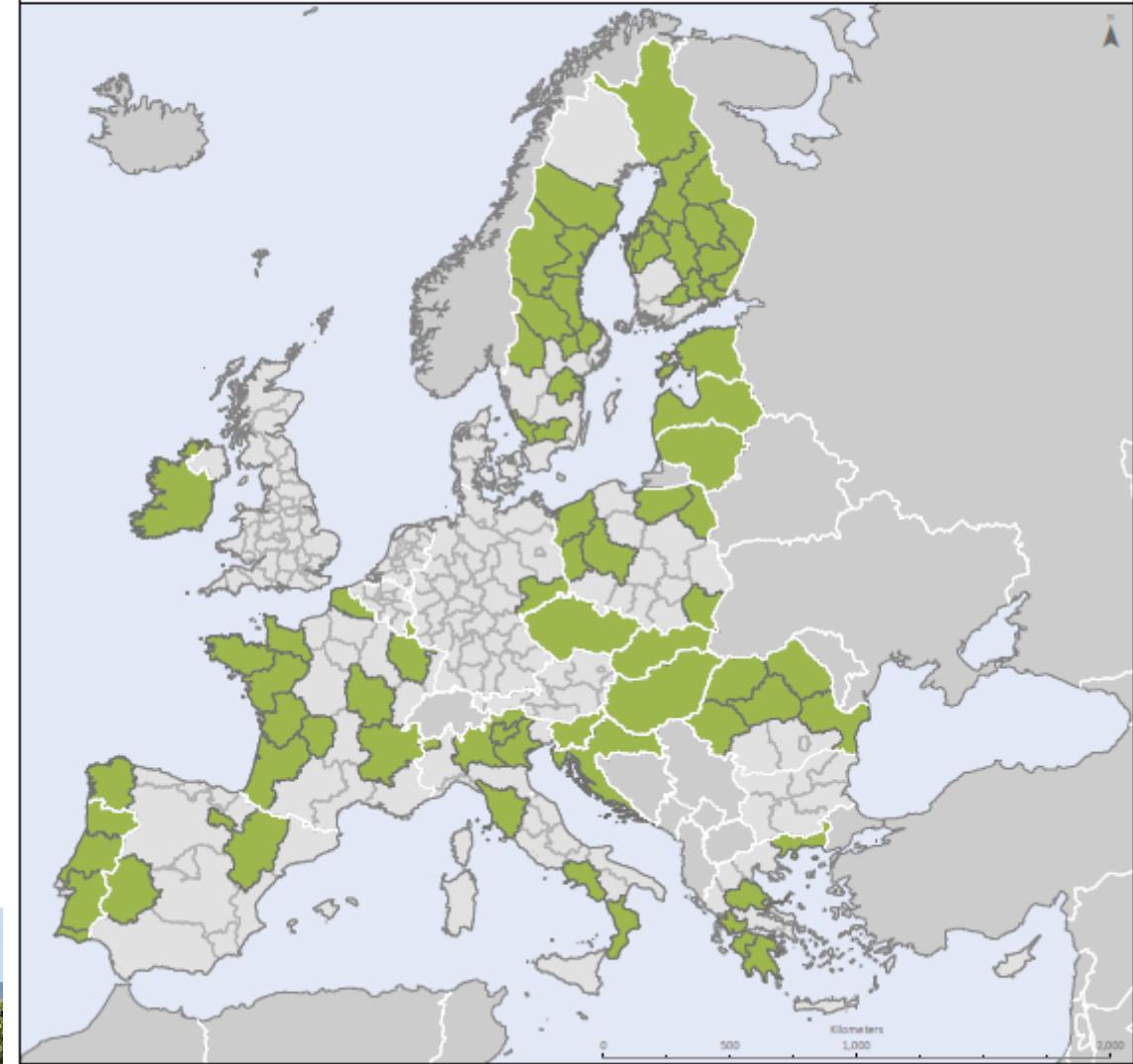




Forest bioeconomy in RIS-3 Smart Specialisation Strategies

Mapping of EU
Member States' /
regions' Research and
Innovation plans &
Strategies for
Smart Specialisation
(RIS3) on Bioeconomy
(DG Research 2017)

EU-28 regions/Member States with Bioeconomy R&I priorities
(2014-2020) related to Forest-based Bioeconomy





Regional bioeconomy profiles

DG Research 2017.

Regions with-out biomass value chains

- Type 1: Research driven bioeconomy
- Type 5: industrial biotech driven bioeco

Regions with biomass value chains

- Type 3: Incipient
- Type 4 Advanced
- Type 6 Integrated

Regions with agro-ecology approach

- Type 2: Regions with a natural resources and heritage driven bioeconomy profile





Mensaje 2

DG Research 2017.

La receta de la Bioeconomía mezcla:

1. Biotechs / 2. Bioresource / 3. Agro ecology

La bioeconomía surge en la intersección del con otros sectores

La disponibilidad y diversidad de biomasa no deja lugar para los *comodities*. Es importante apostar por aplicaciones de alto valor y baja intensidad material, incluyendo servicios terciarios...

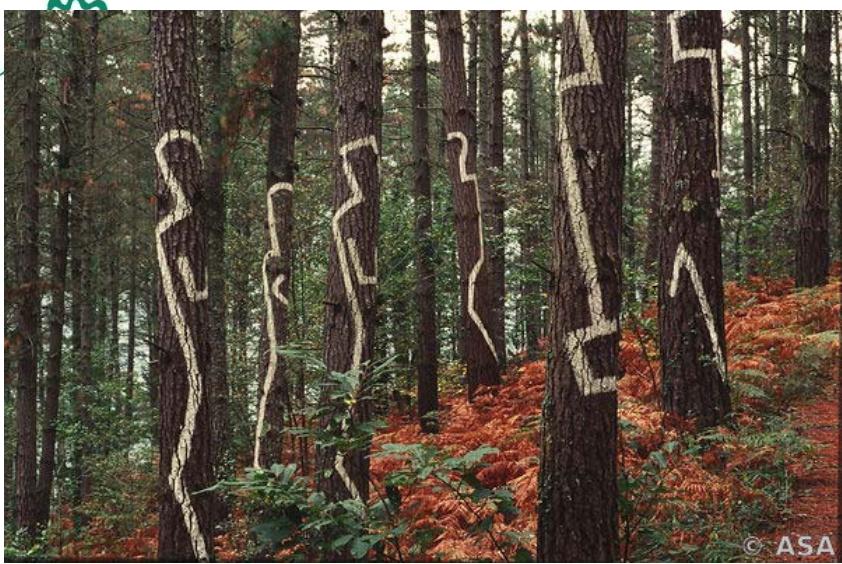




Mensaje 3

La bioeconomía está aquí! (y cada paso da muchas lecciones!)





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Oliver Strewe Photography



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19 December 2017



Wood construction in Italy

Drivers

- Energy transition
 - But lack of tight regulation
- Tech developments CTL, NCN
- Seismic & fire performance
- Dry, speedy, prefabricated construction

Barriers

- Lack of strong advocacy
- High inertia (path dependency)
- Main contractors are key element
 - Risk aversion
 - Lack of industrial ecosystems
 - Tendering process

Humerkoski (2016), Fraggiacomo (2017)



The screenshot shows a news article from the website '24 ORE IMPRESA & TERRITORI'. The headline reads 'L'edilizia in legno in Italia raggiunge quota 700 milioni'. Below the headline is a photograph of a modern wooden house at night. To the right of the main article, there is a sidebar with various news snippets and a video section.

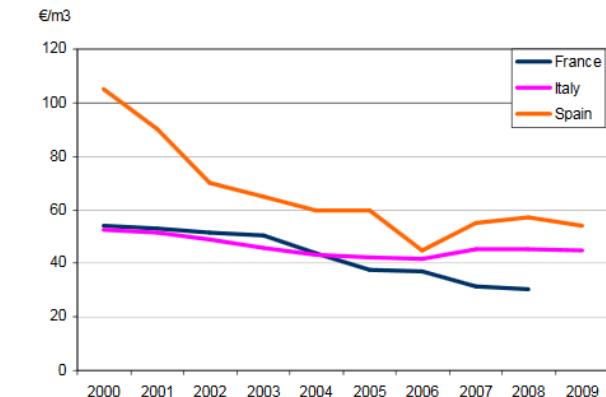
The image is an invitation card for a bioeconomy dialogue. It features a photograph of a forest at the top. Below the photo, the text reads: 'Invitation to participate in the first Bioeconomy Dialogue: Engineered wood products and wood construction in the bioeconomy: Opportunities & challenges for Southern Europe'. At the bottom, it says 'Sant Pau Art Nouveau Site, 29 November 2016'.



***Made in Italy* is 20% Italian wood**

- 7% market share, 4th in EU ranking
- National increment: 35Mm³, harvest rate 30% energy=60%
- Poplar plantation (80.000 ha) = 40% of native components
- Poplar new plantation rate -50% since 1970s
 - Low price
 - Environmental regulation
 - No Social perception on positive externalities

	Import x 1000 m³	Export x 1000 m³
Belgium	228	209
Bulgaria	34	0
Croatia	18	18
France	0	217
Italy	457	0
Serbia	0	106
Spain	5	13
Hungary	0	214
TOTAL	742	777



Fraggiacomo 2017, Coaloa 201, Nervo et al 2011

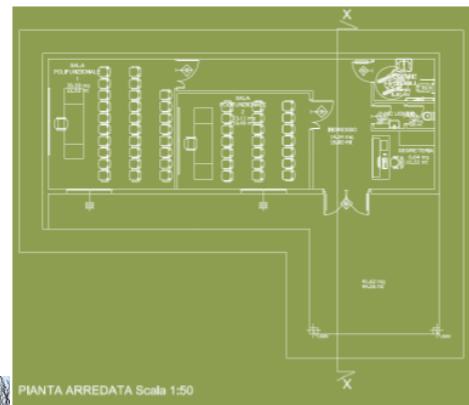




Made in Italy is 20% Italian wood

- Mediterranean conifers offer opportunities
 - Standardization vs. adaptation to local materials
 - Short supply chains?

The development of a short procurement timber chain in Sardinia



Construction of the first Xlam building in Sardinia (Carbonia) made of locally-grown maritime pine timber



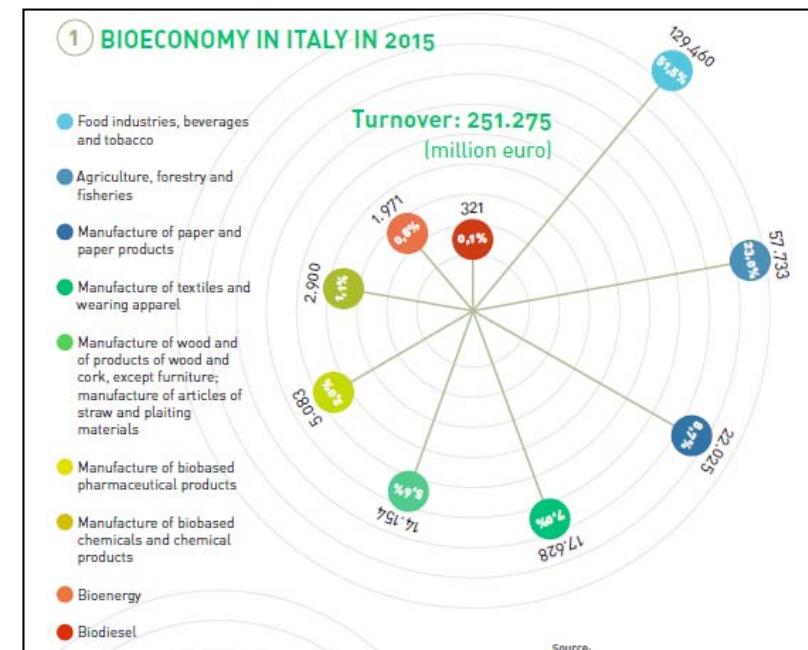


Made in Italy is 20% Italian wood

- Not in BIT
- Yes in RIS3



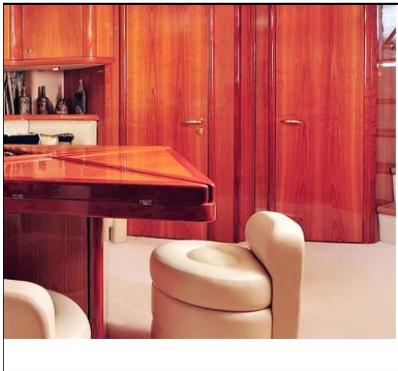
NJT2 Forest bioeconomy priorities	
Valle d'Aosta	• Sustainable construction and renewable energies are prioritized under <i>Sustainable Mountain</i>
Calabria	• Sustainable construction is one of the 5 pillars, with a clear focus in wood construction based on local resources.
Lazio	• energy efficiency in buildings (timber construction not directly mentioned).
Veneto	• Furniture and sustainable construction are priorities under <i>sustainable living</i> . Nanotech, ICT and material science are key KETs



garnica

Challenge the ordinary

Garnica has facilities and offices in Logroño, Fuenmayor, Baños de Río Tobía, Valencia de Don Juan and Samazan.



G-Brick S.I.P

G-Brick Deco

G-Brick Cover



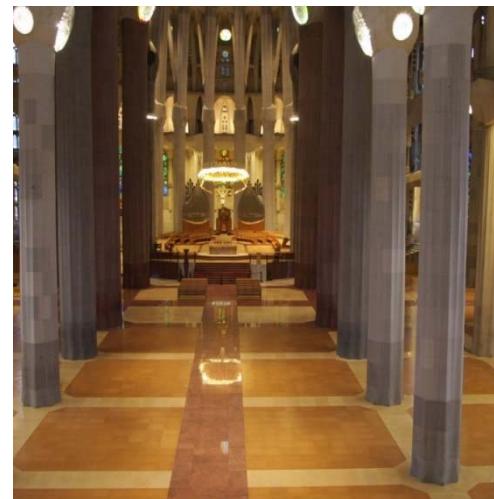
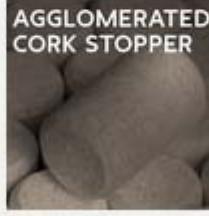
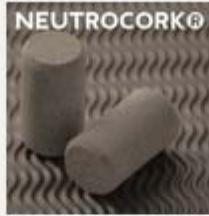
Moving to local wood in 2006, upstream integration in 2016

- Competing in long laminated beams *commodity* markets
- Investing in upstream supply vs investing in engineering
- 70K tons of dust/yr. opens new opportunities





Is Cork !!



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New startup from Amorim Cork Ventures applies cork in refrigeration equipment

11/07/2017

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with facilities, mentoring and prototyping



we invest

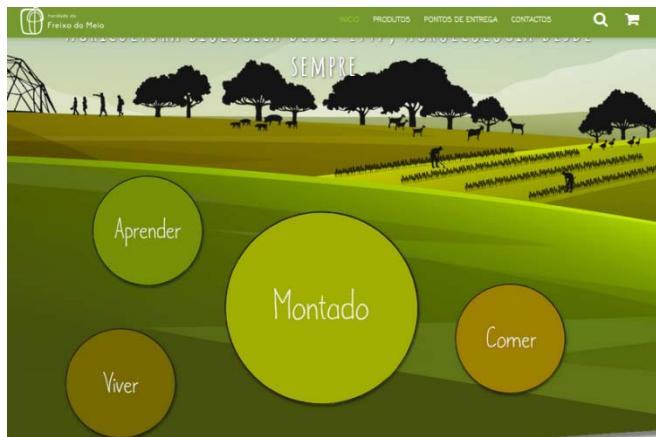
in startups





Biomass supply, intensification vs PES

Herdade do Freixo do Meio



New tree plantation set to experience shorter growth times

Posted by [Ejays44](#) on Wednesday, June 22, 2016 · [Leave a Comment](#)



Amorim, a leading company in the natural cork industry, is partnering with 10 of the largest cork growers to plant a trial 250 hectares of cork forest that will produce a harvest after an initial 10 years.

The oak from which cork stoppers is made, *quercus suber*, currently can't be harvested until 34 years after

[WWW.CORKINDUSTRY.COM](http://www.corkindustry.com)

Drip irrigation
High density
Tree farming
Intercropping (wood/herbs)



[Eventbrite](#)

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EVENT ENDED

Medicinal mushrooms: Two day educational retreat at Hifas da Terra HQ.



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Integrative Oncology: the role of medicinal mushrooms



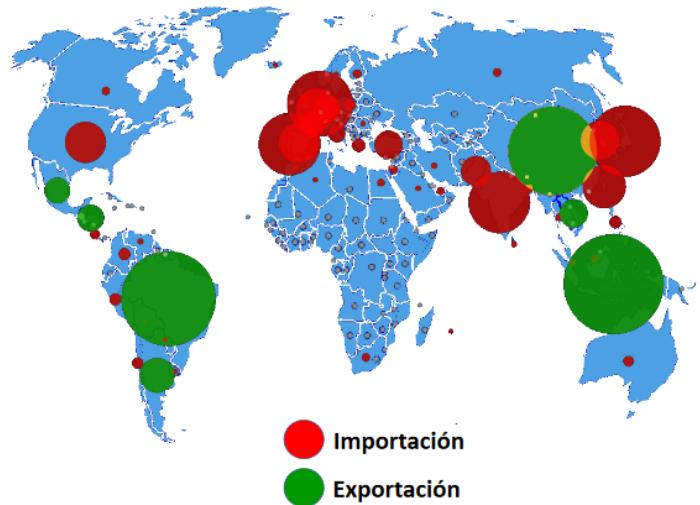
Events you might like:

MON. 20 NOV 16:00
Health 2.0 Galicia Chapter 2www.efimed.efi.int



About Resin!

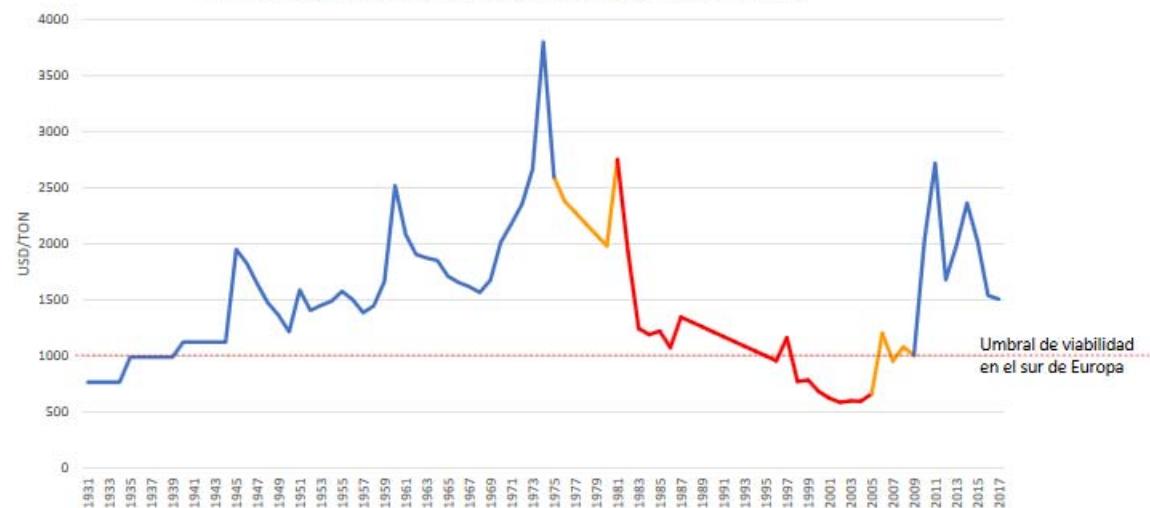
Mercado mundial de resina
Año 2015



XX century peak

- 250.000 tn/yr in
- 25.000 jobs

PRECIO HISTÓRICO DE LA RESINA EN EL MERCADO MUNDIAL



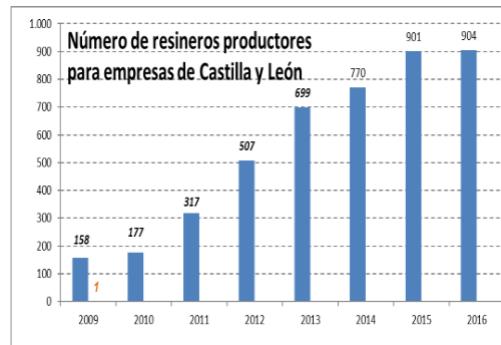
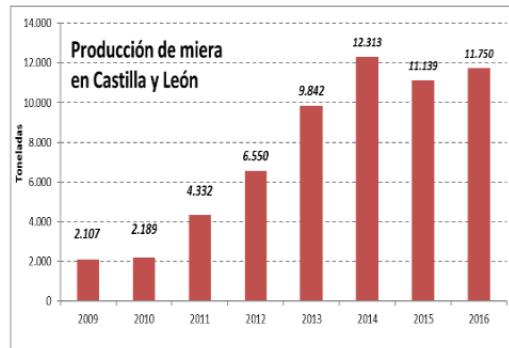
www.efimed.efi.int



Castilla y Leon has recovered production, created direct jobs and attract investments



GRUPO RB – Luresa Resinas



Structural reasons

- Chinese forests reaching production limits
- China is building processing capacity
- Green chemistry push
- Economic downturn made the job attractive again

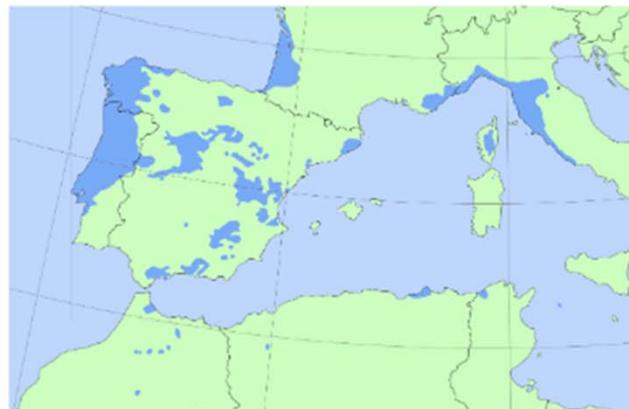




Forest chemistry



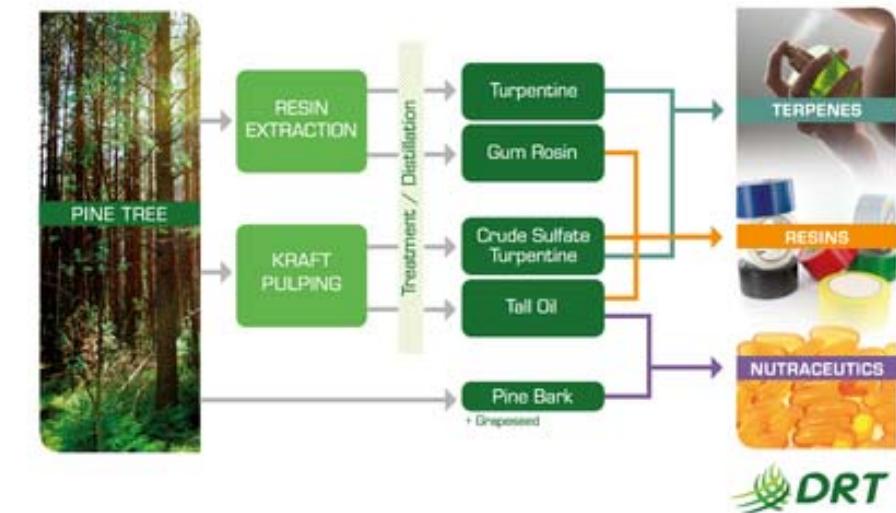
Pinus pinaster



Distribution map of Maritime pine (*Pinus pinaster*) EUFORGEN 2009,
www.euforgen.org.
Adaptado



- 1,200 employees
- 8 production sites in France China (1) and India (3)
- 50 scientists
- 80% export markets
- Importing natural resins



Xylofutur annual conference 2017

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Is About ICTs *social* innovation and territorial marketing

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Deer

Latest auctions



Description	Reserve	Date hunting	Closing Auction	Output Price	Current price
 Chamois Type A. Code: 376 Headquarters: Guímara. They may hunt chamois with over 78 tax points. ...	Ancares Leoneses	30/10/2015	0 1 18 D H M	€ 1,800	€ 2,050 Tuesday, March 17, 2015 - 12:00
 A. Corzo Type Code: 80 Headquarters: Valmala. Permit duration: 3 days. ...	Sierra de la Demanda	12/05/2015	0 1 18 D H M	€ 500	Tuesday, March 17, 2015 - 12:00
 A. Corzo Type Code: 363 Headquarters: Quintanar de la Sierra. Permit duration: 3 days. ...	Sierra de la Demanda	04/21/2015	0 1 18 D H M	€ 500	€ 550 Tuesday, March 17, 2015 - 12:00
 Chamois Type A. Code: 106 Headquarters: Cofiñal. May be hunted chamois with over 78 tax points. ...	Mampodre	10/16/2015	0 1 18 D H M	€ 1,500	€ 2,250 Tuesday, March 17, 2015 - 12:00





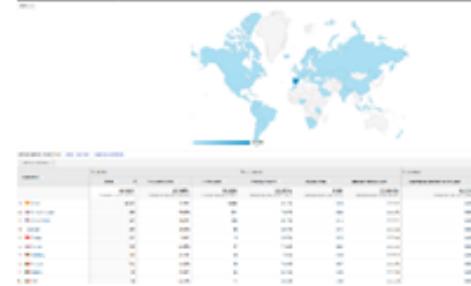
www.subastasdecaza.com Data-mining



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Gomez, R (2014)



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Key policy and research issues

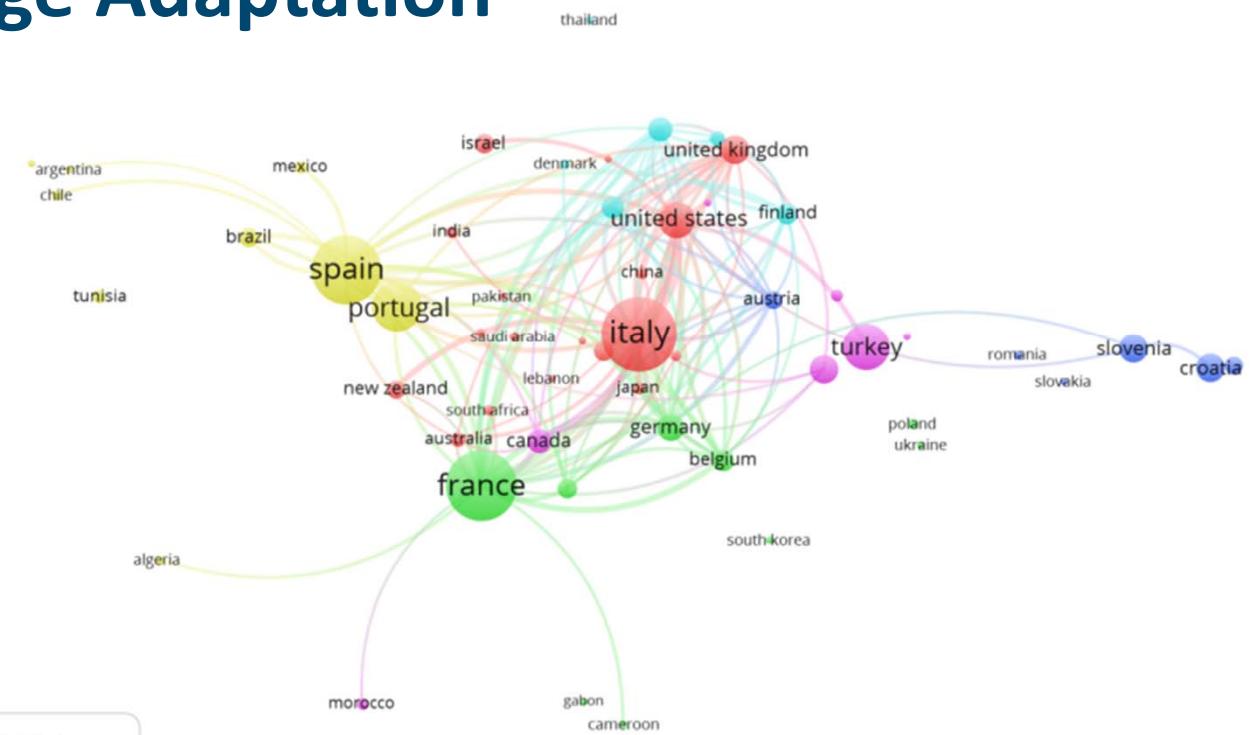
- **Regional dimensions:** Scale and coherence
- **Engaging society:** multifunctionality, awareness, consumers
- **Sustainability:** from SFM to sustainable value chains, from technical prescription to social consensus
- **Securing supply of biomass:** Intensification, mobilization, de-fragmenting ownership, benefit sharing...
- **Financing Industrial modernization:** risk taking
- **Technologies and skills:** new education





- **Regulatory framework:** better informed policies, bio=bio

- **Climate Change Adaptation**
- **Innovation**
- **Cooperation**



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Gracias!

