

D.C4.4

Adaptation capsules

May 2019

Coordinador

Socis



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Adaptation capsules

This deliverable includes a variety of factsheets developed by different authors during the training on adaptation to climate change organised by Life CLINOMICS project. These factsheets offer many ideas and solutions on adaptation to climate change for the economic sectors targeted in the project: agriculture, forestry, fishery and tourism.

The following adaptation capsules are included in this deliverables in English (they are also available in Catalan in [CLINOMICS webpage](#)):

- **Agriculture sector**
 - Irrigation and good water-saving practices
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 - Agriculture adaptation measures to climate change. Author: Robert Savé.
 - Agriculture and climate change. Organic agriculture. Author: Jordi Puig.
 - GUSTUM project. Author: Alba Secanell
- **Forestry sector**
 - Ecosystem services of forests. Author: Rut Domènech
 - Joint Technical Plan for Forest Management and Improvement (joint TPFMI)
 - Forest management for climate change adaptation. Author: Míriam Piqué Nicolau
 - Forests and adaptation to climate change. Author: Jordi Vayreda
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- **Fishing sector**
 - A more sustainable fishing model
 - Effects of climate change on populations of species of fishing interest: examples, trends and possible predictions. Author: Marc Farré
 - The Catalan model of participatory fisheries management. Author: Jordi Rodon
- **Tourism sector**
 - Best practices for a sustainable tourism
 - Communication, certification and labels for sustainable tourism
 - Climate change adaptation in the tourism sector. Author: David Saurí
 - The European Charter for Sustainable Tourism and its implementation in natural spaces. The process in Park of Garraf , Olèrdola and Foix. Author: Sofia Aparicio
 - Sustainable tourism and Biosphere project (Barcelona provincial council)
 - Involving society in climate change adaptation in the Tordera Delta - Annelies Broekman
 - Leader natura. Sustainable development in natural areas of Catalonia Author: Jordi Vilalta

Irrigation and good water-saving practices

Irrigation is and has for some time been the driving force behind agricultural development in many parts of Catalonia, leading to complementary activities that boost the local economy and ultimately encourage settlement in the area – improvements which have an impact on society itself.

From the point of view of infrastructures, irrigation canals play a greater role than that strictly related to irrigation as they are also used to cover water requirements for domestic, industrial and leisure use.

The aim of irrigation is to supply crops with sufficient water to be able to produce food for human consumption (fruit, vegetables and cereals) and for livestock farming (animal feed and fodder). Other types of production can also be seen such as aromatic and medicinal plants, flowers and ornamental plants, and some products for industrial applications like wood, fuels, etc.

Irrigation enables production to be increased, the quality of the crops to be improved and species to be grown that would not be viable without an additional supply of water. Irrigation is applied in different ways depending on the type of production aimed for.

Optimised irrigation requires knowledge of production factors. It is necessary to know the periods during the growing cycle in which the water supply will have a direct effect on the final yield. This approach not only enables us to know at what point water is the most limiting factor in terms of achieving the best yield, but it even enables us to draw up a plant growth model and reduce water consumption.

MAIN PURPOSES OF IRRIGATION

To provide the water required to grow crops

To prevent the concentration of salts in the soil

To prevent crops from freezing

To transport nutrients and pesticides



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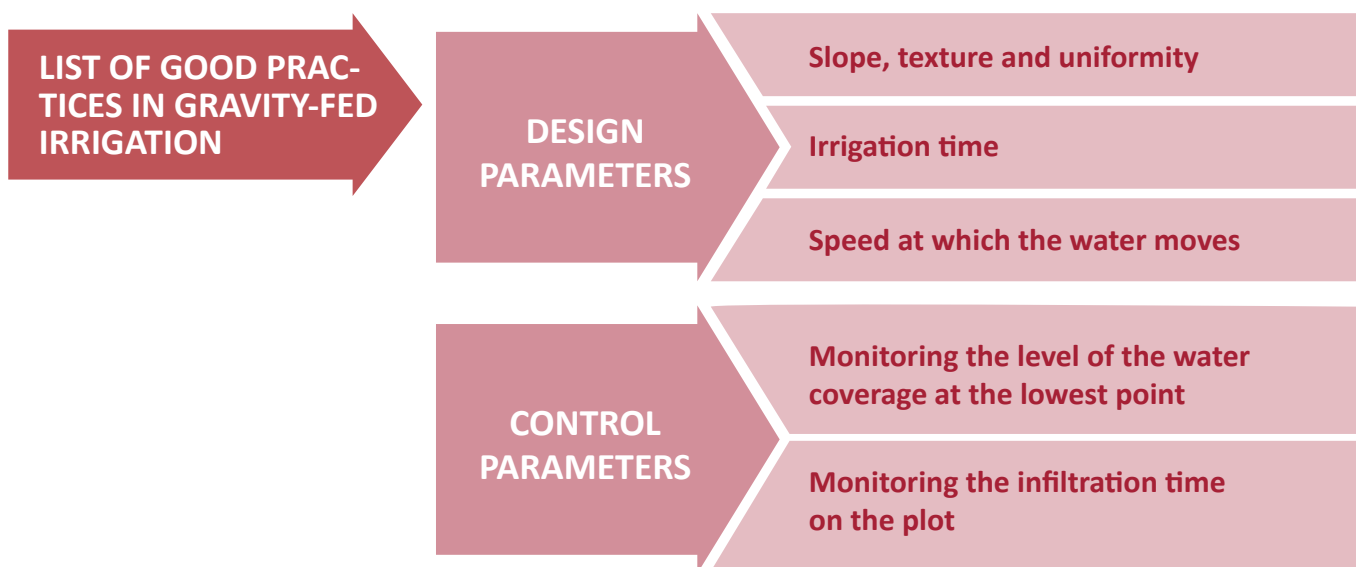
IRRIGATION SYSTEMS

Gravity-fed irrigation

Gravity-fed or surface irrigation is the oldest system. It is based on the movement of the water across the ground due to a slight difference in the level of the land. Therefore, the best areas in which to apply gravity-fed irrigation is flatter land with gentle slopes. The most common gravity-fed irrigation systems are basin irrigation and furrow irrigation.

Compared to other irrigation systems, gravity-fed irrigation can lead to lower application efficiency values given that it requires the irrigation parameters to be more finely calibrated. This may mean an increase in the volume of water applied per unit area or unit of crop, with a higher proportion of water that will not be used for the crop and that will drain into deeper layers in the ground and may end up recharging the aquifers.

It is currently thought that gravity-fed irrigation is used on more than half of the irrigated land in Catalonia.



ADVANTAGES

- No costly installations are required on the land.
- Enables the use of poor-quality water, although not saltwater.
- Lower installation and maintenance costs.
- Suitable for salt washing.
- The irrigation is scarcely affected by the weather.
- No external power supply required to apply the water.

DISADVANTAGES

- Variability of the water infiltration.
- Requires the land to be well levelled, which may entail high costs.
- The irrigation strongly conditions the rest of the work.
- Requires a great deal of labour.
- Requires a specialised workforce.
- Difficult to carry out brief, frequent irrigation.

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IRRIGATION SYSTEMS

Sprinkler irrigation

Sprinkler irrigation is a widely used system which applies water to the entire ground surface in a similar way to rain. This is a system which can be used in many different ways, enabling light irrigation when the crop requires it during the early stages and abundant irrigation in periods of greater demand. It is also a system which is used in the fight against freezing, as the continuous formation of ice on the leafy parts of the crop allows for a safety margin when faced with a drop in temperatures to below freezing point.

Sprinkler irrigation systems are highly versatile: they enable highly diverse mobile or fixed systems to be installed but with the common feature of the sprinkler. This is the last element in the irrigation water distribution process. The sprinkler is one of the most important elements to take into account in order to irrigate correctly and evenly. It is of utmost importance to check its main features: the sprinkler height, type, quality, distribution, flow and pressure.

Currently in Catalonia the proportion of irrigated land covered by sprinkler irrigation is 10%.



LIST OF GOOD PRACTICES IN SPRINKLER IRRIGATION

Do not irrigate in high winds

Avoid irrigation when the sun is at its strongest

Work at a suitable pressure and control the uniformity of the irrigation

Monitor the difference at the filtration system inlet and outlet

Regularly check the cleanliness of filters and risers

Check the state of the crop vegetation

Monitor the salinity of the irrigation water

ADVANTAGES

Less labour is required. The system does not need to be manned for as long and is easy to use.

The system can be automated.

Applications adjusted to the needs of the crops or ground types.

The evenness of the application does not depend on the characteristics of the ground.

Can be adapted to most crops. Enables crops to be divided into plots during irrigation as each area can be watered as necessary.

Enables nocturnal irrigation.

Possibility to complement mobile irrigation systems with fixed systems.

Can be adapted to the shape and lay of the land.

DISADVANTAGES

The installations can be a physical impediment when carrying out some tasks on the crop.

Irrigation control is limited by atmospheric conditions.

High investment cost, usually higher than other irrigation systems.

Some sprinkler irrigation systems require higher working pressures and therefore also need pipes with a greater diameter.

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IRRIGATION SYSTEMS

Drip irrigation

Drip irrigation is based on the irrigation of certain points of the plant root system. This enables loss by evaporation to be minimised as it only wets part of the ground. This system is the most suitable for applying fertiliser together with the irrigation water or soil correctors. This is the ideal system for crops in which the parts exposed to the air are sensitive to moisture (such as fruit trees). This enables small doses to be applied, making it useful for support irrigation.

Drip irrigation in Catalonia is estimated to account for 32% of the irrigated land, the most widely used system being the pressurised irrigation system. It is expected that this will increase in coming years due to its water-saving efficiency compared to other irrigation systems.



LIST OF GOOD PRACTICES IN DRIP IRRIGATION

Ensure that there is an effective filtering system in place to avoid blockages

Monitor the pressure difference at the filtration system inlet and outlet

Monitor the uniformity of the irrigation with flow and pressure tests on some drippers

Check the state of the crop vegetation

Regularly check the cleanliness of filters and dripper lines

Regularly check that the emitters are correctly placed

ADVANTAGES

More efficient use of water and nutrients.

Can be applied to a wide range of land types.

Provides solutions on rugged terrain. Does not require terraces.

Better pesticide control.

Enables water with a high level of salinity to be used.

Reduces staffing problems; if irrigation is automated, there is practically no human intervention.

Enables the use of soluble fertilisers in the irrigation water.

Permanent, automatic system.

Water loss by evaporation is reduced.

It saves water as there is no need to water the whole area of land.

It interferes little or very little with other agricultural practices.

Precise water distribution and application flexibility.

The water is directly available at the root.

Not affected by wind intensity.

DISADVANTAGES

High initial investment, thus requiring financial analysis of the crop.

The installations need to be designed and assembled by highly specialised staff.

Quality control of materials used.

Requires farmers to be more specialised.

System maintenance and handling are particularly important to ensure that it is working properly.

The demands of the filtration system are very strict. The system must be cleaned thoroughly.

Problems may arise from damage caused by animals.

It is difficult to detect damage to the irrigation system. Damage is usually detected through plant behaviour.

Problems with the wet bulb volume in land with a high level of infiltration.

Risk of salinisation as a consequence of inadequate irrigation management.

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Water saving improvements | PRECISION AGRICULTURE

Precision agriculture is a step forward in the efficient management of agriculture holdings through the use of available technology. The main aim is to streamline consumption, both of water and fertilisers, applying the products where they are needed and in appropriate amounts. It seeks to reduce costs, save water and/or improve product quality. It also reduces the negative impacts on the environment. This practice is highly recommended given the current framework for efficient water resource management, such as the Catalan government's Plan for Efficiency in the Use of Farming Irrigation Water. However, it requires a high level of technical knowledge related to agricultural matters.

Regulated deficit irrigation (RDI)

This is based on reducing the water supply during the stages of crop growth in which a water restriction does not significantly affect the production and/or quality of the crop as all of the necessary evapotranspiration is covered during the rest of the cycle.

Woody species are the most suited to RDI. It is recommended to carry it out on adult trees so that the fruit yield is not affected. In Catalonia, the most common crops on which regulated deficit irrigation is carried out are citrus, olive and almond trees and grape vines. This technique can also be applied to extensive farming such as that of wheat or maize.

Originally, the aim of regulated deficit irrigation was to favour the growth of the fruit over the growth of the branches and thus regulate the growing period of the plant. Today, regulated deficit irrigation enables other benefits to be enhanced such as improvements in the appearance of the fruit and improved preservation post harvest.

The key factors when planning RDI are the crop and its production cycle. When the crop is in shallow soil with a very low water storage capacity, the effect of restricting the water is much more evident and effective as the water availability can be regulated more effectively. This irrigation system entails significant savings in terms of irrigation water and pruning work, which translates into a reduction of direct crop production costs and water consumption.

Support irrigation

This is based on maximising efficiency in the plant's water use, providing water in the growing stages in which the crop is at its most sensitive, considering the critical periods in which restricted irrigation could considerably affect the production and/or quality of the crop. This technique is used to maximise the efficiency of the available water resources when they are insufficient to cover all of the evapotranspiration requirements of the crop cycle. A very clear example is the olive tree. In this case of deficit irrigation, it is not a matter of maximising production (a situation which would require a volume of water that is not available) but simply to improve production in drought conditions by applying the volume of water available.

In the case of the olive tree, there are two critical periods leading to crop water requirements in drought conditions; the first corresponds to the stages of leaf growth, flowering, olive formation and shedding of flowers, and the second period starts when the fruit changes colour from green to yellowish shades, indicating that oil is beginning to accumulate in the pulp. This period is also important as it is when the tree builds up reserves for the winter.

Partial root drying

This system seeks to increase the efficiency of water use by reducing plant transpiration.

When the root system of a plant is dry and therefore detects a situation of drought, it naturally produces a substance (abscisic acid) which it sends to the leaves, causing the stomata to close and reducing transpiration and water loss.

This system is based on this mechanism, but if applied to just one part of the plant root system, the dry part generates the substance which enables the leaf stomata to close and the wet part supplies the plant with water without affecting the water potential of the leaves.

The system of partial root drying requires dry areas to be alternated to keep the formation of abscisic acid constant, as the plant stops producing this substance if the same dry area is maintained. The frequency of this alternation varies and depends on the type of crop and soil. To implement this system, each plant needs two rows of drippers, so that irrigation can be alternated, keeping one area wet and the other dry.

Crop monitoring

Crop monitoring is a technology that focuses on monitoring certain properties of the plants with the aim of detecting crop water stress in real time and reducing the time spent making decisions.

It is based on the placement of sensors in the field, which are connected to an interface with a data recorder and a transmitter that transmits the data to a computer using the telephone network (mobile or landline), all in real time.

This technology is currently used in both public and private research. However, elements such as soil moisture meters or stem diameter sensors are becoming increasingly common in commercial plantations.

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Opportunities and challenges of the local economy and society to adapt to climate change.

Modern agroforestry systems

Jaime Coello – jaime.coello@ctfc.cat

May 2018

Gestió Forestal Multifuncional, CTFC

What are agroforestry systems?

They are a combination of woody vegetation (trees and / or shrubs) in agricultural or livestock production systems. The objective is to obtain benefits from ecological and economic interactions (AGFORWARD, 2017).

Main types of agroforestry systems

Silvoables

annual or perennial
agricultural crops



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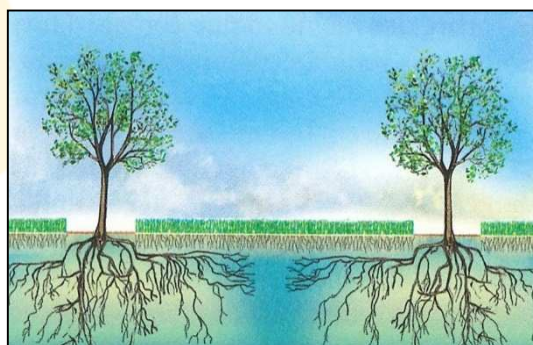
Silvopastoral

trees in pasture or
pasture under the tree



Basics of agroforestry systems

- More efficient and integrative use of available resources (electricity, water, soil) throughout the year.
- Positive interactions between agriculture, livestock and woody vegetation (microclimate improvements, indirect fertilization) more relevant than the negative ones (shadow).



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Environmental evaluation of agroforestry systems

Globally (accumulated production): more productive and profitable than pure systems. Productivity increase: 20-30% (Graves et al, 2007; Colomb, 2009)

Social evaluation of agroforestry systems

- Filtered agricultural leach (-46%; Palma et al, 2006).
- Less erosion by wind and rain (-78%; Palma et al, 2006).
- Sequestration and carbon fixation in the soil; more organic matter.
- More resilient and connected agrosystems (Rollin et al, 2013)
- More floral diversity and fauna (Woodcock et al, 2010).
- Prevention of forest fires with silvopasciculture.
- Compatibility (very interesting) with ecological production.



Social evaluation of agroforestry systems

- · Improvement of the farmer's perception.
- · Increase in the heritage value of the land.
- · Landscape improvement (ecotourism).



Legal framework increasingly favorable

Growing consideration in the CAP since 2005

Main institutions/ to know more:

European agroforestry federation(www.agroforestry.eu)

Spanish association of agroforestry systems(www.agfeagroforestry.eu)

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THE ADAPTATION OF AGRICULTURE TO CLIMATE CHANGE AND THE ROLE OF LOCAL AUTHORITIES

Baix Llobregat Agrarian Park- 6 June 2018

Agriculture adaptation measures to climate change

Robert Savé

Viticulture/ Fruticulture - Vegetal Production Area - IRTA

Soil and climatic conditions are one of the biggest factors in the development of agriculture. In our case, Catalonia is also included in the Mediterranean ecosystem which is characterized by double stress, drought, high temperatures and high levels of radiation in summer and low or very low temperatures in winter, along with or consequence of important climatic phenomena like the Oscillation of the North Atlantic (OAN), Oscillation of the Western Mediterranean (WeMO) and the Arctic Oscillation (AO).

These environmental conditions generate a large number of favorable or unfavorable situations, depending on the place and circumstance, so among the latter, it is necessary to highlight the environmental stresses (biotic and / or abiotic), with the particularity that due to the large number of energy that human activity has put into the system measurable as CO₂, the intensities and interactions between these stresses are increasing and more frequent.

Projections of climate models show reductions in the total amount of water available for this century and if we also take into account global change, which includes, among others, land uses, the increase in fixed and mobile population, the needs of the industry ..., that is to say our complex world-wide society, it is necessary to consider a predictable greater real competition for water, that will be necessary to be shared according to the needs (<http://www.irta.cat/ca/irta-laigua-solucions-mon-mes-sostenible/>; <http://medacc-life.eu/ca>; <http://www.fundaciocatalunya-lapedrera.com/ca/content/projecte accua>;

<http://demoware.eu/en>; <http://www.empresaclima.org/proyecto/vin-adapt/>;

<http://www.lifebroadmiclim.eu/es/>).

In the climate change scenario, which must be irrefutably associated with global change, which will continue at least throughout the present century, agriculture will play a very important role in maintaining the population and their state of health, in the development of wealth and in the maintenance of a stable sociocultural network in the landscape and in the supply of ecosystem products.

Climate change can increase the temperature in general, however where it is appreciable by society is at the local level, as these small changes in temperature can have a great influence on the balance of carbon source / sink, on plant growth (morphological and metabolic),

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on variations in the phenology of species and therefore in their relationships whether of predation, competition, symbiosis or pathogenicity (SeVi nº 3.450 / 4-7-2015).

Thus, certain areas of Catalonia are more exposed and potentially more vulnerable to climate change and consequently will suffer direct (lower productivity) or indirect (higher costs) effects on agricultural productivity.

This thermal increase, according to the third report of Climate Change in Catalonia in 2016, can reach significant increases of up to 4°C and rainfall not significantly lower, but with a tendency to reduce and be very irregular, all compared to the period prior to the 1980s.

http://cads.gencat.cat/web/.content/Documents/Publicacions/tercer-informe-sobre-canvi-climatic-catalunya/TERCER_INFORME_CANVI_CLIMATIC_web.pdf

Regarding climate change, we must add that there is great variability in everything, which generates tensions in society, in the system, which were not planned or were considered less intense, which are still and will be important and, consequently, they can generate serious dysfunctions in the models, but especially in the climatic projections, of population ..., such as:

- Unstoppable progress in globalization. - The improvement of conventional communications, but especially the development of information and communication technologies, lead to a global society, different from today. This generates reduction of trade borders, intensification of standardization processes and companies are adapting their strategies from a broader perspective of the competitive environment and in the location of many services.
- Interconnection of the energy vector with the power vector. (Reguant, F. & Savé, R. 2016. Food Availability and Sustainable Global Development. Chapter 2. The Food System: Globalization, Sustainability, Security and Food Culture. Thomson Reuters Proview Aranzadi. ISBN 978-84-9135-265-5). Because agriculture plays a relevant role in energy production, the integration of price trends is almost absolute. As a result, demand pressure on agricultural supply increases and volatile food markets become especially attractive for speculation..
- Fortunately, extraordinary development, currently unbalanced, of the so-called emerging countries, which generates demands in quantity and quality of food, which as a second derivative represents a greater pressure on natural resources.
- Biodiversity is undergoing important changes, which must be assessed with a new spatial, temporal perspective.

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(https://www.youtube.com/watch?time_continue=4&v=nIQWpsyoeoo) and without prejudices and valuations from current knowledge. It is interesting and good to generate alerts, however it would be as if we look at a photo that is part of a film and not in its entirety. The changes, the transitions are important for good and bad, can directly affect the everyday life and in the final results, but it is necessary to assess whether it is better to preserve or understand the continuous change.

- Sustained and growing economic and social inequality is a reality, even it gets hidden or diminished, it is a great problem that sooner or later will generate an important global problem in the stability of the system.

The situation of growing demand for agricultural products promotes the need for greater intensification of production, with the aim of obtaining higher productivity per unit area and external input, along with a clear and determined policy of environmental conservation. All this poses a great challenge for agriculture in the 21st century, as the practices used so far have clear limits, both in their income (use of non-renewable resources) and results (saturation of production and pollution associated). A last and very important effort of Catalonia has been to adhere to the strategy of the 4x1000 of the COP 21 and 22 (<https://www.4p1000.org/es>; <https://avicultura.info/el-irta-se-adhiere-al-proyecto-internacional-4-por-1000/>) and together with other Catalan research institutions, to generate the first map of carbon content in the agricultural soils of Catalonia.

(<http://www.irta.cat/ca/les-reserves-de-carboni-organic-als-sols-agricoles-de-catalunya-ara-es-mostren-al-geoindex-de-icgc/>). This provides the baseline, to be able to plan at the territorial level the incorporation of organic matter in the soils and so, in addition to promoting an increase in carbon sequestration and therefore allow the development of the main mitigation strategy, helps to adapt to climate change, as an increase in carbon, organic matter in soils promotes water retention and consequently, develops an adaptive strategy in the face of drought, mostly in the dry rainfed crops, in the 70% of our agricultural area.

The problems associated with climate change are known and well detected, the solutions to adapt and / or mitigate it, based on science and techniques, are known and available, never in a general sense and always under the consideration of the strictest common sense. Now we need to act. Therefore, an important demonstration and transfer task is opened ... nothing is new, however, everything is more complex, fast, frequent ...

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Agriculture and climate change. Organic agriculture

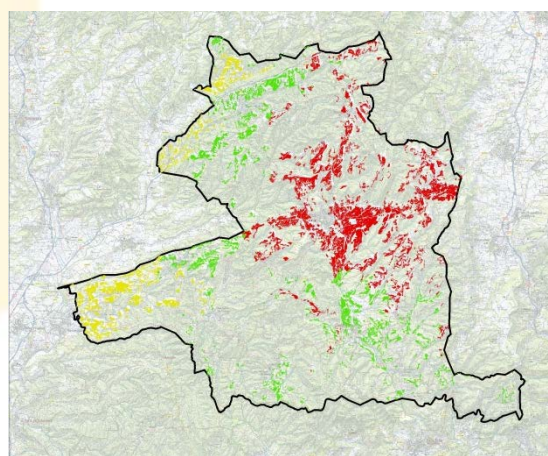
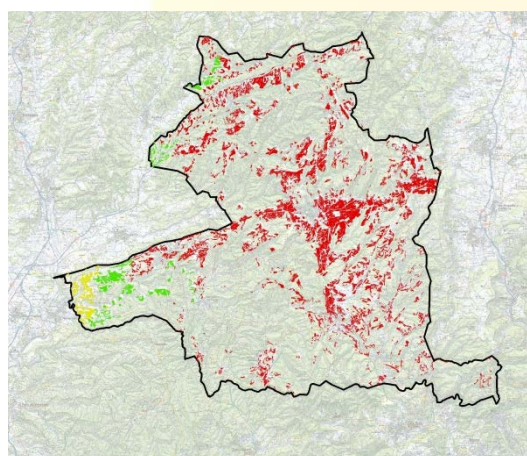
Jordi Puig (L'Espigall)

Agriculture is one of the sectors that will suffer most from the effects of Climate Change. In this sense, the creation of adaptation strategies in order to reduce the adverse effects on agriculture are essential.

In this sense, climate-based agricultural planning is essential in order to advance actions, anticipate new water supplies, change varieties or establish new ways of managing agriculture.

At the planning level, work is being done to detect what may be the optimal potential distributions of various crops in specific areas of the territory. Also, work is underway to determine new irrigation needs or production loss forecasts in order to generate new food supply scenarios.

Current and future climatic suitability of a crop in the current and future scenario (2030-50)



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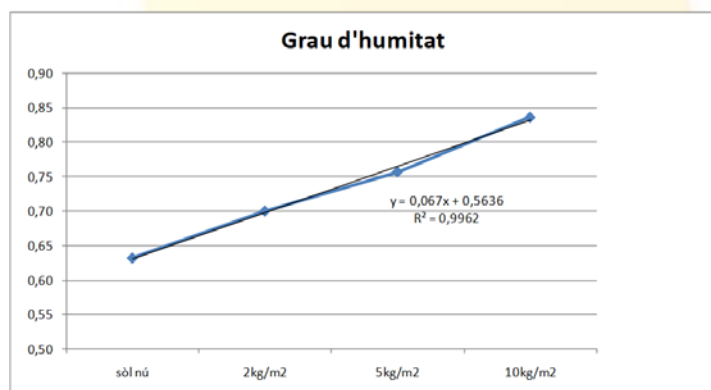
Parc Agrari del Baix Llobregat - 6 June 2018

Various strategies emerge from this planning process, but one of the most powerful is organic farming.

Many of the instruments, processes and requirements of organic farming are aimed at increasing the resilience of agricultural systems, making them more self-sufficient. However, this type of agriculture is especially interesting in the face of Climate Change, as it takes into account the basic parameter for tackling climate change.

Soil when it has a good structure and richness of stable organic matter can be a powerful agent for mitigating the effects of climate change, as it allows to store more water in the soil, reduce erosion, store carbon stably and generate higher quality food.

Columna1	sòl nú	2kg/m2	5kg/m2	10kg/m2
unitat mesura	126,34	140,55	151,37	167,21
% absolut	63,17%	70,00%	75,69%	83,61%
% relatiu		11,25%	19,82%	32,36%



Relationship between organic matter applied to the soil and its conservation of moisture

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GUSTUM project– Alba Secanell (Leader de Ponent Association)

Gustum is a project funded by the DARP and the EAFRD which is coordinated by a Local Action Group (LAG), **Leader de Ponent Association**, but in which the 11 Catalan LAGs take part.

Its aim is to encourage the creation of economic activity in the territory through the **promotion and marketing of local, artisanal and quality agri-food products and synergy with other sectors of the territory**.

Therefore, the project works along the following lines:



PRODUCTS & PRODUCERS LOCALS

Identify them, value them and promote them



TOOLS

Providing tools to producers to help them promote and market their product



CREATE SYNERGIES

Linking the agri-food sector with tourism, gastronomy and small businesses



COOPERATIVE WORK

Encouraging associations in the sector

The **Gustum project** was born in 2011 at a time when **there was little culture of the local product**, but at the same time there was a boom based on this concept, so the actions that were carried out were, among others:

- Support for producers at professional agri-food fairs
- Promotion of local markets
- Promotion of new fairs linked to local products
- Olive oil campaign in schools

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Currently, **the project has grown** and the situation of the local product is already more consolidated, so more **cross-cutting actions** are proposed in order to focus on areas where there is a greater need.

The lines of action are as follows:

- **Actions in schools:** to teach about the value of the agri-food product produced in rural areas.



Screening in the 'Cúpula Gustum' of audiovisual materials that allow to know **how, who and where the foods that are eaten daily are produced.**

- **Support for promotion and comercialitization:** design actions aimed at promoting local products and producers and provide them with tools.
 - ☐ Promotion of the campaign in the restaurants 'Aquí, vins catalans'
 - ☐ Gastronomic sessions at the Lleida School of Hospitality
 - ☐ Free diagnosis and advice service for agri-food companies
 - ☐ Territorial actions to promote the local product
- **Support for territorial initiatives:** support initiatives in which various territories and / or various producers are involved to promote the local product.
 - ☐ Lleida craft beer route
 - ☐ Territorial brand Vall del Corb

www.gustum.org
@infogustum

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Ecosystem services of forests

March 2019

Rut Domènech– rut.domenech@ctfc.cat

Multifunctional forest management, CTFC

What are ecosystem services? (ES)?

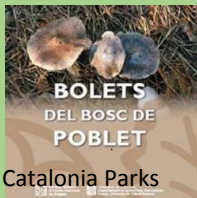
"The benefits that society obtains from ecosystems – the direct or indirect contribution of ecosystems to human well-being" (IPBES)

Main types of ecosystem services of forests

Provisioning services: Supply services, with a direct use (monetizable) for society.

Wood

Woodworking, barrels, sawmill, structures, paper, biomass, sticks and bars or new applications (construction, sustainable fashion, etc.).



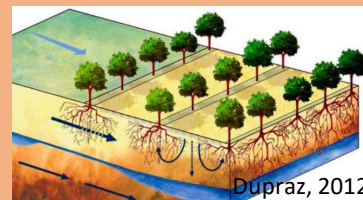
Non wood forest products

Hunting, pine nuts, mushrooms, truffle, cork, pastures, chestnut, resin, honey, aromatic and medicinal plants, green chemistry or other forest fruits.



Regulating and supporting services: the benefits that we get from regulating ecosystem processes, which help reduce certain local and global impacts.

- Climate regulation (local and global)
- Water regulation, soil protection, associated risks
- Biodiversity habitat
- Improvement of air and water quality



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Opportunities and challenges of the local economy and society to adapt to climate change.

Ecosystem services of forests

March 2019

Rut Domènech– rut.domenech@ctfc.cat

Multifunctional forest management, CTFC

Cultural-social services: Related with recreation, leisure or more general cultural aspects.

- Work and maintenance of rural population
- Leisure activities
- Cultural landscapes and ecotourism
- Feeling of belonging
- New tendencies: health and forest

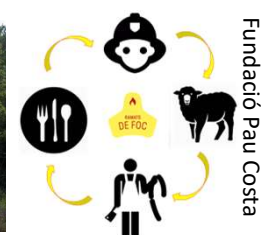


Management optimization

Forests provide humans with goods and services and **are potentially multifunctional** by nature. The use of ES by people implies different objectives, preferences and priorities in the management and perception of multifunctionality. There are tools that help to prioritize and manage different uses.



Payment for an Environmental Systems (PES) The PES is a transfer of resources (economic or in kind) between social agents with the aim of encouraging more sustainable actions by the owners / managers of environmental resources.



Fundació Pau Costa

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Joint Technical Plan for Forest Management and Improvement (joint TPFMI)

A joint technical plan for forest management and improvement (joint TPFMI) is a forestry regulation document (FRD).

What are forestry regulation documents and what are they for?

- To improve KNOWLEDGE of the potential uses of the land
- To be able to REFLECT on its future
- To SET OUT objectives
- To FORECAST benefits and improvement and conservation work
- To rationalise DECISION MAKING
- PLANNING AND MANAGEMENT TOOL

They are a practical, useful tool for forest managers which, given the different realities of the forestry sector and property, enable a response to be given to management proposals for all forest land in Catalonia whilst helping the forest authorities to approve and monitor planned work.

What requirements do FRDs meet?

- They facilitate quick and economical land planning.
- Administrative authorisations for forest exploitation and improvement work
- Possibility to modify planning.
- Reference document for the management and monitoring of forest property and administration.
- Forestry subsidies.
- Forest certification (PEFC) and CAT Forest warranty mark.
- Forest insurance (civil liability, fires).
- Tax and legal benefits and improvements (very important).



Joint TPFMI

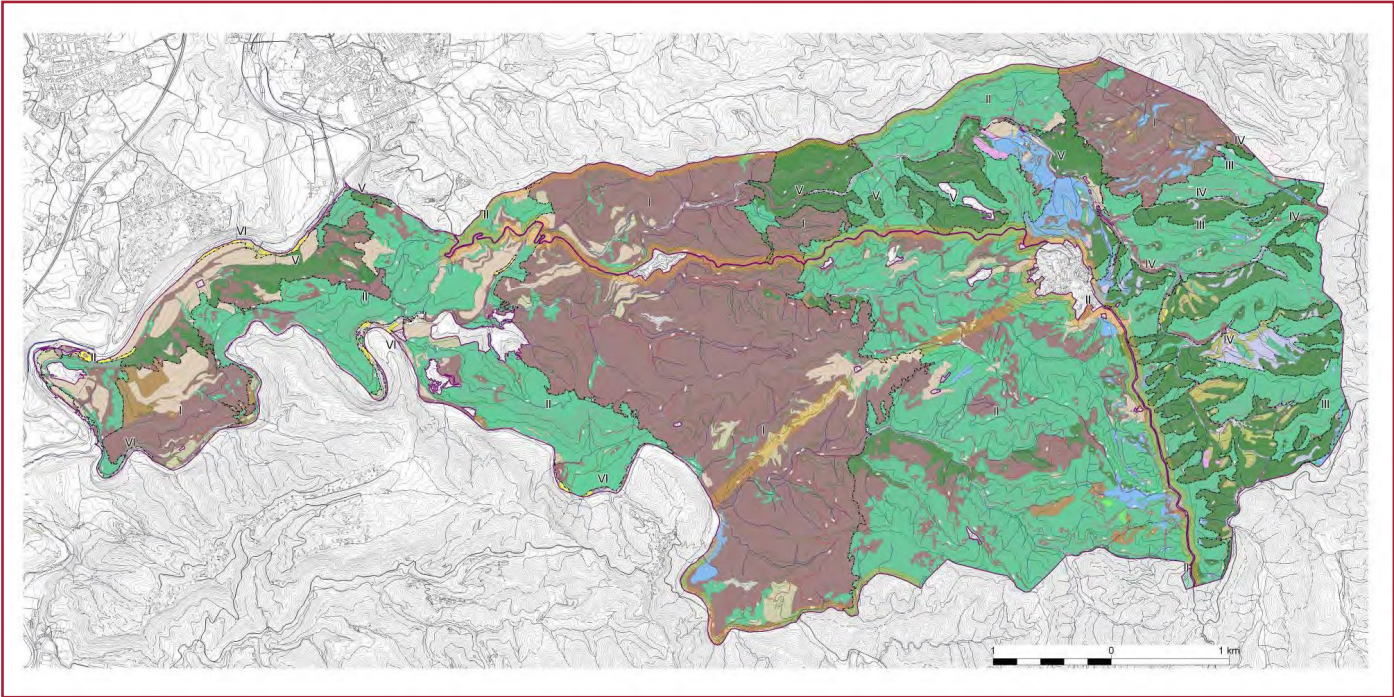
This is a type of forest management tool that enables a forecast of forestry activities to be drawn up and agreed jointly between different owners and forest estates. This enables forest planning over a large area rather than individual management on small estates included in the technical plan for forest management and improvement (TPFMI) and individual forest management plans (IFMP).

- Encouraging community management. Forest land owner associations
- Facilitating access to forest planning and land management
- IT applications from support to the drafting of documents
- Participative work group. Participation by different stakeholders in the area.

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TPFMI - Joint management map



Centre de la Propietat Forestal

Plan boundaries	Fire prevention infrastructure	Usage/vegetation	
<div><div></div>Area boundary</div>	<div><div></div>Planned defence line</div>	<div><div></div>Holm oak</div>	<div><div></div>Stone pine</div>
<div><div></div>Usage/vegetation boundary</div>	<div><div></div>Not covered by the order</div>	<div><div></div>Arbutus</div>	<div><div></div>Red pine</div>
<div><div></div>Forestry unit boundary</div>	<div><div></div>Crops</div>	<div><div></div>Riverside woodland</div>	<div><div></div>Black pine</div>
Road network	Woodland types	<div><div></div>Wasteland</div>	<div><div></div>Rocky outcrops</div>
<div><div></div>Primary road</div>	<div><div></div>Meridional black pine forests</div>	<div><div></div>Scrub</div>	<div><div></div>Valencian oak</div>
<div><div></div>Main road</div>	<div><div></div>Mediterranean mountain and low-lying riverside formations</div>	<div><div></div>Pasture</div>	<div><div></div>Downy oak</div>
<div><div></div>Management network road</div>	<div><div></div>White pine forest with a coastal influence</div>	<div><div></div>White pine</div>	

There is no difference between the management map of a technical plan for forest management and improvement and a joint plan. The joint plan covers a much larger area formed by a large number of private forest estates; each owner will obtain a TPFMI once the joint TPFMI has been approved.

Joint TPFMI *



* Next, check the steps to follow throughout the process.

Steps to follow to draw up a joint TPFMI

- First of all, an association of owners has to be formed. No individual requests will be accepted; all requests must be via an established forest land owners association.
- Present the forest coherence document to the CPF (Forest Ownership Centre). The CPF must first assess the viability of the joint TPFMI. This is a document for information purposes which, on the one hand, contains the obligatory technical and formal contents and, on the other hand, facilitates the drawing up of the FRD. (It can be downloaded directly from the CPF website: <http://cpf.gencat.cat>).
- Once it has been filled out and submitted. The CPF will assess whether or not it makes sense to go ahead with the joint plan. (Please note: it is not necessary for all of the owners in the association to participate in the joint plan from the beginning; they can join later (however, there is a minimum % required at the start which will be determined by the CPF expert).
- When the forest coherence document has been approved by the CPF. We must wait for the assistance period for drawing up the FRD to open and then present a request to draw up the joint TPFMI (proposal, report, budget and forest coherence document). (Please note: if no assistance is required it is possible to start drawing up the documents immediately).
- Once assistance has been granted, the FRD will start to be drawn up together with the expert from the owner's association and the expert from the CPF, who will form a work group. The document will be continuously worked on and validated so as to not have to make any modifications, corrections, etc. (Reference documents for drawing up the FRD are also available on the CPF website).
- Once the document is complete it is presented to the CPF for their approval.
- When the joint TPFMI has been approved. All of the owners with an interest therein are to fill out the agreement to join the joint plan.
- Each owner is to request the individual membership agreement and will obtain the TPFMI for their forest, which will be an extract from the joint TPFMI. This technical plan can be obtained free of charge or at a relatively low cost. Owners are entitled to expand on or modify the planned forest activities (for example: incorporating a new road into their individual technical plan that is not proposed in the joint plan). In this case they are to modify the individual technical plan and present it to the CPF so that they can validate it and include it in the joint plan.
- From that moment onwards, the forest activities in the joint plan will commence.
- Other owners in the association can be added at any time to complete the total area covered by the plan. There is no set time period.

Legal framework

Law 6/1988 of 30 March regarding, regarding forests in Catalonia

Law 7/1999 of 30 July, relating to the Forest Ownership Centre

Modification of law 7/1999 of 30 July, relating to the Forest Ownership Centre > IFMP creation

Resolution AAM/246/2013 of 14 October under which forest planning documents are regulated.

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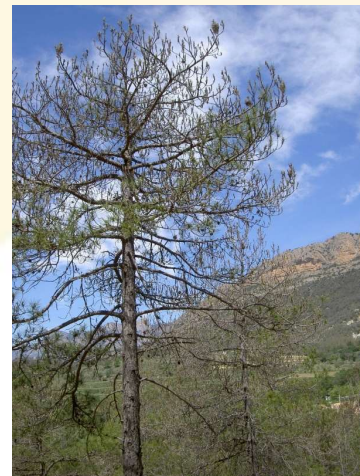
Opportunities and challenges of the local economy and society to adapt to climate change.

Forest management for climate change adaptation

Vilafranca del Penedès, 21 March 2018

Climate change impacts(CC)

There is a variety of climate change impacts on forest ecosystems depending on geographical zones. The outstanding impacts in the Mediterranean ecosystems are: decay and mortality of trees, affectation of diseases and plagues, changes in the area of distribution and composition of species, production decrease and forest fires.



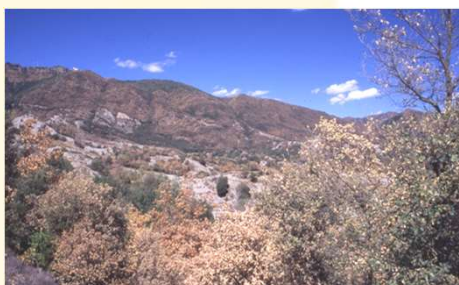
Mortality of trees due to drought and plagues

Forest management

Forest management is an important tool to reduce the negative effects of climate change in forests (FAO, 2010). The principles of sustainable forest management can be applied to reduce the sensitivity and vulnerability of forests to the climate change and thus improve its **ability to adapt to climate change**.



Leave decay symptoms due to drought



Slope with dry trees (high affectation to vitality and production)



Large forest fire

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Forest management for climate change adaptation

Vilafranca del Penedès, 21 març del 2018

Management measures I: Silvicultural treatments and logging

- Forest thinning and sprout selection.
- To promote the more adapted and vigorous species.
- To make progress on the maturity of forests.
- Supporting natural regeneration of forest.



Improve climate change adaptation of forests: Increase resistance and resilience

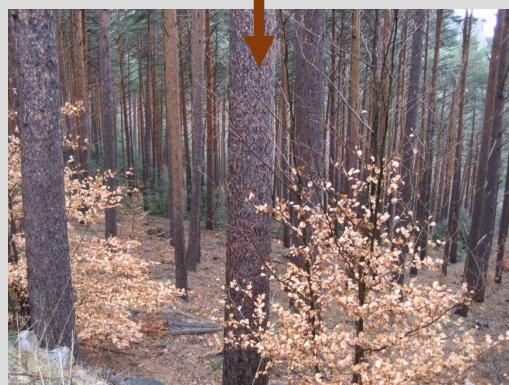


Resilience: it's the capacity of a forest in front of disturbances (drought, plague, illness, fire, strong winds) to survive and return to its original state.

More complex and biodiverse forests have higher resilience, as they have more mechanisms to surmount or resist disturbances.

Management measures II: promoting mixed forests and biodiversity

- Promoting mix and diverse forests, specially leafy trees.
- Planting species adapted to the climate.
- In conifer plantations, to intersperse leafy trees and promote mixed plantations.



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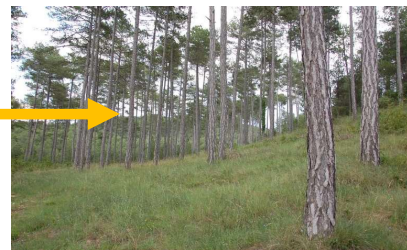
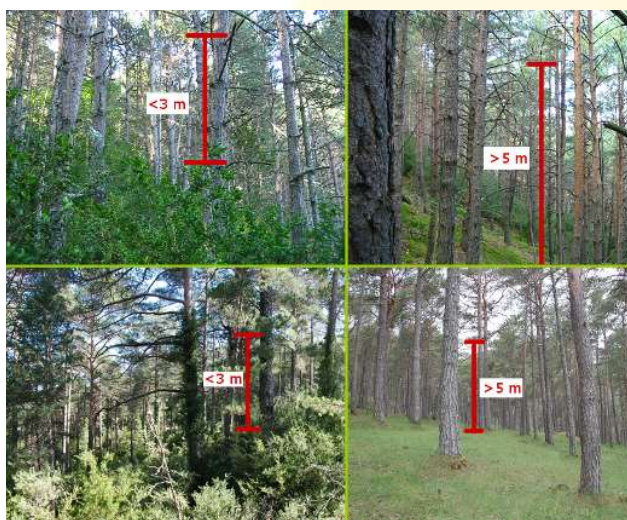
Forest management for climate change adaptation

Vilafranca del Penedès, 21 març del 2018

Management measures III: Prevention of large wildfires

- To promote structures resistance to wildfires progression and that prevent active and virulent canopy fires

Forest structures with low combustible biomass and vertical and horizontal discontinuity of vegetation strata that is more resistant to fires.



Active canopy fire



Passive canopy fire



Surface fire

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Forest management for climate change adaptation

Vilafranca del Penedès, 21 març del 2018

Impacts and measures for climate change adaptation (Vericat et al, 2012)

Main evidences of CLIMATE CHANGE	Main ADAPTATION MEASURES
Temperatures increase (annual average, summer)	Improving the vitality of forests
Reduction of rainfall	Implementing density reduction treatments: selection of sprouts and thinning
Increase of days without rain	Restoration of degraded areas and areas affected by wildfires
Heat waves	Adaptations in regeneration actions
Episodes with high intensity rainfall	Encourage natural sexual regeneration
Severe droughts	Adaptation of reforestation: species, genotypes, planting techniques, heterogeneity
Main IMPACTS on forests	Reduction of vulnerability to fires
Reduction of growth , carbon sequestration forest production	Modifying the combustible model at forest stand scale with silviculture treatments
Weakening of forest, decay and mortality , due to water deficit and strong droughts	Design of strategic forest management areas for the prevention of large forest fires
Regeneration problems due to more arid conditions, phenological and physiological changes	Increased resistance and resilience favoring heterogeneity
Increase of wildfires frequency and intensity	Specific and phenotype diversification. Promotion of mixed masses and diversified undergrowth
Increase of erosion processes and soil degradation	Diversification of structures
Mechanical damages due to storms and strong winds with high energy	To maintain and promote "diversity islands"
Increase of growth in locations without hydric restrictions due to temperatures rise.	Measures to facilitate genetic adaptation
Pests and diseases more severe and frequent	Conservation of 'genetic reserves' and maintenance of genetic diversity
Alteration of plant communities: composition change and genetic changes (extinction, migration)	Assisted migration

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Authors: Míriam Piqué Nicolau, Centre de Ciència i Tecnologia Forestal (CTFC)

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THE ADAPTATION OF FORESTS TO CLIMATE CHANGE AND THE ROLE OF LOCAL AUTHORITIES

St. Celoni – 16/05/2018

Forests and adaptation to climate change – Jordi Vayreda (CREAF)

1- The role of land systems in the carbon cycle

Forests store almost 900 billion tons of carbon (C), 60% of which is stored in the ground or dead wood, the other 40% in the aerial and underground part of trees. As for C flows, although as a result of photosynthesis forests capture 120 billion tons of C per year, the final balance - as a result of emissions from the respiration of forests and decomposing organisms and disturbances (fires, wood and firewood use, etc.) - is only 1 billion tons. This net abduction of C from the atmosphere has been maintained and even increased in recent decades so that forests worldwide are responsible for capturing 30% of the CO₂ emitted annually as a result of human activities: burning fossil fuels and changing land uses. In Catalonia, forests also sequester more C than they do not emit, making the net balance of 1.3 million tonnes of C captured annually, despite this they only sequester 10% of the total emissions of greenhouse gases from Catalans. , in other words it would take 10 times the forest area we currently have to offset all our emissions..

2- Impact of Climate Change on forests, mitigation tools and future forecasts

As a result of the continued rise in CO₂ in the atmosphere (the psychological barrier of 400 ppm was exceeded in 2015) the global temperature of the planet has continued rising and climatic phenomena are becoming more extreme and frequent. These changes are leading to a weakening of the forests with an

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St. Celoni – 16/05/2018

increase in mortality episodes and a reduction in growth. At the moment it affects species located in areas of alpine or Atlantic climate and to a lesser extent in Mediterranean forests such as holm oak groves or Aleppo pine forests. Several studies suggest that forest management, by reducing competition for resources such as water, can help mitigate the effects of climate change, at least in the short term. Other studies suggest that increasing the richness with management favoring mixed forests can serve to reduce their vulnerability, while increasing their productivity and adaptability.

Climate change projections suggest that by the end of the 21st century, the increase in annual temperature could be between 3 and 4 ° C and the reduction in precipitation in summer of up to 50%. Simulation models, taking into account these projections, predict a reduction in climate suitability for most wooded species in our country, with the exception of the more Mediterranean species that would increase their geographical distribution area. Forestry simulation models predict a general reduction of the sink capacity and for many species, and even in the medium term (decades) they will no longer have this capacity and will be net emitters of CO₂.

Forest management is urgent to adapt our forests to climate change to make them less vulnerable if we want to continue enjoying the invaluable services they offer us.

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ADAPTATION OF FORESTS TO CLIMATE CHANGE AND THE ROLE OF LOCAL AUTHORITIES

St. Celoni – 16/05/2018

Initiatives on forests and health in the framework of municipal land stewardship

Carles Castell (Diputació de Barcelona)

The Barcelona provincial council has been pursuing an active policy of protection and management of natural spaces for more than 40 years in a territory - the province of Barcelona - where more than five and a half million people currently live benefiting from these spaces. Numerous programs and activities aimed at visitors, from environmental education and communication, related to biodiversity and natural heritage and the tangible and intangible elements of cultural heritage, to name just a few examples, have contributed decisively to bringing natural parks closer to society, as evidenced by the high number of users of spaces and facilities, and the good assessment they make of them.

During the last years, from the Management of Natural Spaces of the Diputació de Barcelona numerous actions have been developed with the aim of facilitating the universal access to the Network of Natural Parks, improving the accessibility to the spaces, developing inclusive itineraries and making environmental communication and education materials for people with special needs, among others. At present, this offer - innovative and pioneer in the whole of Europe, and developed to a large extent thanks to the Agreement with Obra Social la Caixa - is centralized on the accessible website of the Network of Parks, and constitutes a reference for people and groups who want to carry out activities in the natural environment, regardless of their needs.

Also, a few years ago a study was commissioned to the Department of Tourism of the Autonomous University of Barcelona, on the perception and demands of visitors to natural parks as health spaces. Through a complete battery of surveys, it was possible to get a good picture of what people are looking for in terms of health and their assessment of the offer they receive. The results show that more than 90% of visitors travel to the parks for reasons related to physical and / or mental health, and this same figure shows that, after the visit, they perceive an improvement in these aspects. The surveys also include the point of view of visitors, who point out shortcomings and propose improvements in this regard. For this reason, the Provincial Council is making progress on a comprehensive proposal that covers the following points:

- Guarantee the conservation of the natural and cultural heritage, as a basis for the benefits that nature offers to society.
- Incorporate in an integral and transversal way in the planning and management of natural spaces all the aspects related to people's health, especially in the proposals for public use.

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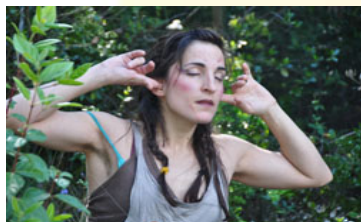
Opportunities and challenges of the local economy and society to adapt to climate change.

ADAPTATION OF FORESTS TO CLIMATE CHANGE AND THE ROLE OF LOCAL AUTHORITIES

St. Celoni – 16/05/2018

- To work together with health professionals to position natural parks as key elements of public health policies.
- Incorporate as a priority the concepts and proposals related to human health in the planning and management processes of the whole green infrastructure.
- To favor the socio-economic benefits for the local population that can generate this greater contact of the society with the parks.
- To communicate to society as a whole, and especially to the most sensitive groups, the vision of natural spaces as spaces of health.

In this new stage, the role of the municipalities, as well as other agents involved, such as the owners and the forestry sector as a whole, is crucial. To this end, municipal land stewardship can be a tool of great flexibility and efficiency in order to establish the framework agreement that allows to combine the many aspects to be taken into account - ownership, forest conservation, management model, financing - in order to make public benefits compatible with private ones.



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ADAPTING FORESTS TO CLIMATE CHANGE AND THE ROLE OF LOCAL AUTHORITIES

St. Celoni – 16/05/2018

Using forest biomass – Josep Verdaguer (Diputació de Barcelona)

- The "Study and inventory of the potential demand for biomass in the province of Barcelona in centers or public administrations" is presented. Results: 1,690 buildings, 1,234.46 GWh / year, where biomass is viable. Education centers represent 281.86 GWh / year, sports facilities 211.45 GWh and care 158.13 GWh (total 720.11 GWh / year)
- The potential for the municipalities of Montseny is Energy potential: 6.3 GWh / year. , Tons of wood chips: 1,800 Tn
- School and sports uses have the greatest potential; Some of them are currently being implemented: La Garriga, Aiguafreda
- Existing inventory: 15 installations ..., 1,800 kW of installed power, Consumption of 435 tons per year, Example: Osona covers 10% of its thermal needs with biomass: 5.4 GWh / year
- Logistics centers: We are well covered. Logistics centers of forest chip in Balenyà, Arbúcies, Dosrius, Osona, .. Manufacturers of pellets in Prats de Lluçanès, Sta. Coloma de Farners, Granollers ...

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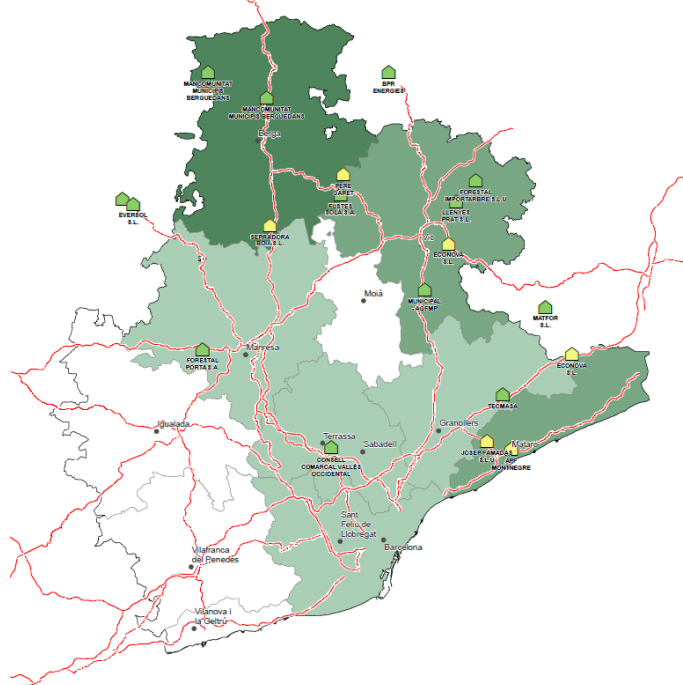
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Opportunities and challenges for the economy and local society in adapting to climate change

A MORE SUSTAINABLE FISHING MODEL

Sant Carles de la Ràpita, 24 January 2019

The European fishing industry is the fourth largest in the world, with 82,860 vessels and more than 350,000 direct and indirect jobs.

Spain is the largest European power, with more than 9000 vessels and a storage capacity of 340,000 tonnes, far ahead of the United Kingdom, France or Italy. Catalonia is the third largest community in terms of fishing fleets, with 727 vessels for the different kinds of fishing.

In Catalonia, there approximately 25,000 direct jobs on the vessels. Added to this are the guild workers, transport workers, sellers, etc.

Climate change is having an impact on small pelagic fish, for example, altering the life cycle of anchovies, which are now smaller at maturity. The changes in water temperature in different strata is allowing for the proliferation of non-commercial species such as round sardinella, while other, more commercial species, such as sardines, are in decline. This is also happening with demersal and benthic species.

The sea floor is changing. Neptune grass is disappearing and the species that depend on it are migrating. As a result, invasive species are taking hold. This negative effect needs to be studied to obtain benefit from it in the fishing industry. It is therefore necessary to train maritime professionals beyond fishing for hake, monkfish and gilt-head bream. It is now necessary to inform end consumers about the advantages of the new catches available. For example, conger eel is much more highly valued in other places than in Catalonia. The idea is to do the same as with the mantid shrimp, which was once ignored and is now highly valued.

It is very important to involve the public authorities in terms of regulating the price of the catch to prevent speculation by intermediaries. A kilo of anchovies costs a minimum of €4 in the market, while those who catch it are lucky to get 20 or 25 cents for the kilo.

From the perspective of mitigating climate change, fishing can reduce greenhouse gas emissions by reducing or stopping the use of diesel. There are new technical options to consider, although they have different degrees of affordability. There is also the problem of retrofitting existing vessels. These innovations include circle fishing with LED lights, use of rigid sails (with fuel savings of 20%) or the use of double nets.

With regard to adaptation, fishing must, first and foremost, be economically sustainable to also be environmentally sustainable. Otherwise, the challenges of climate change are unlikely to be addressed and we may reach a tipping point where it is too late to react to this problem.

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THE ADAPTATION OF FISHERIES TO CLIMATE CHANGE: HOW CAN IT BE PROMOTED BY LOCAL ADMINISTRATIONS? Sitges – 4/12/2018

Effects of climate change on populations of species of fishing interest: examples, trends and possible predictions

Marc Farré (Institut de Ciències del Mar)

Climate change and overfishing have a direct impact on the loss of biodiversity in marine ecosystems, as well as on the distribution, structure and population dynamics of their species, which are fundamental to the sustainability of fisheries. It is for this reason that it is essential to study and evaluate the effects of these biotic and anthropogenic factors in order to determine their impacts on marine ecosystems and thus be able to act with the aim of preserving their integrity and ensuring the sustainability of the fisheries on our shores.

The CLIFISH project, coordinated jointly by the Spanish Institute of Oceanography (IEO), the University of the Balearic Islands (UIB) and the Institute of Marine Sciences of Barcelona (ICM-CSIC), has as its main objective to determine and model the impact of environmental variability and fishing exploitation on the populations and communities of species and resources of fishing interest along the entire coast of Spain (western Mediterranean and northeastern Atlantic), as well as to make predictions and projections of its future evolution from different scenarios of global change and time horizons. The aim is to raise awareness, sensitize and promote the dissemination of research on climate in fisheries and its effects globally.

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THE ADAPTATION OF FISHERIES TO CLIMATE CHANGE: HOW CAN IT BE PROMOTED BY LOCAL ADMINISTRATIONS? Sitges – 4/12/2018

The project proposal is based on the analysis of historical time series of data and existing biological, oceanographic and fishery climate models. Different cross-sectional case studies have been defined that include key species or communities, both in terms of their role in the structure of benthopelagic ecosystems and their fishing interest. The main tasks are to study the influence of environmental variables and fisheries on target species and communities, to develop models based on physical-chemical and oceanographic variables that affect these resources in order to create different scenarios of climate change that make possible to develop forecasts and predictions, in the short and medium term, of the evolution of both the environmental variables and the populations and communities studied and their associated fisheries. Preliminary results from some project case studies will be presented during the talk.

It should be noted that the different case studies are defined and considered at the regional level. This allows us to process the data and address the objectives more accurately and successfully and thus ensure the reliability, credibility and usefulness of the results so that they can achieve scientific transfer and can be applied in areas related to the management of living resources, the recovery and conservation of marine ecosystems and sustainable fisheries management.

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THE ADAPTATION OF FISHERIES TO CLIMATE CHANGE: HOW CAN IT BE PROMOTED BY LOCAL ADMINISTRATIONS? Sitges – 4/12/2018

The Catalan model of participatory fisheries management

Jordi Rodon (Direcció General de Pesca i Afers Marítims. DARPA)

Regarding the implementation of technical measures in fishery, the European Union started a serious action in the Mediterranean in January 2007 with the entry into force of Council Regulation (EC) No 1967/2006 of 21 December 2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea. This Regulation imposes on the member countries of the Mediterranean the need to establish multi-annual management plans as tools to achieve Maximum Sustainable Yield (RMS) in Fisheries.

The application of the Regulation meant that for some traditional fisheries very specific management plans had to be approved to allow the concession, by the European Commission (EC) and its Scientific, Technical and Economic Committee for the Fisheries (CCTEP), of certain exceptions to its articles. These exceptions were generally related to the minimum size of the authorized nets of the specific fishing gear, or to the depths and the distance to the coast where these fisheries affected by the new regulation are practiced.

The first case of a Management Plan approved with the granting of exceptions was that of fishing with 'sonsera', a modality of fishing gear with a vessel dedicated to catch small fish species: Mediterranean sand eel and gobies (Transparent goby).

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THE ADAPTATION OF FISHERIES TO CLIMATE CHANGE: HOW CAN IT BE PROMOTED BY LOCAL ADMINISTRATIONS? Sitges – 4/12/2018

The need to maintain the activity of up to 26 boats that based their fishing on the use of a very specific and not very selective gear, the 'sonera' and to convince the EC of the commitment in the application of a correct and sustainable management, led to the birth in Catalonia of a new model for monitoring fisheries called "co-management".

With the experience acquired with the application of the model of the 'sonera' and of other similar experiences such as the management plan of the prawn of Palamós or the self-management of the protected zones of the fishing grounds of Girona, the decree on the model of governance of professional fishing in Catalonia was born: "DECRET 118/2018, de 19 de juny, sobre el model de governança de la pesca professional a Catalunya".

The new governance model is based on the assignment by the administration of rights and responsibilities in favor of the other agents involved in fisheries management: the fisheries sector, the scientific community and environmental organizations. Together, within the framework of the Co-Management Committee, they have the task of approving the corresponding Management Plan, controlling its scientific monitoring (always associated with a Plan), drawing up a socio-economic program linked to the Plan, and in general, to make an adaptive management in real time that guarantees a sustainable fishing exploitation at all times and revalues the price of the product.

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Best practices for a sustainable tourism

Vilafranca del Penedès, Santa Maria de Palautordera, Amposta. 2018.

There are several vectors in which we can influence to perform good environmental practices in bars and restaurants. In a first phase, we can work on: water, energy and waste.



Water: there are many saving practices to save this scarce good. They can be related to our clients as well as to processes.

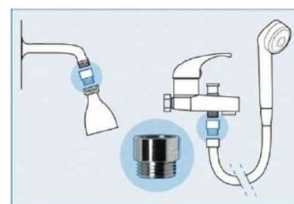
Customers: signs to promote a proper use of water consumption can be enough to communicate our water saving policy.

Processes: There are on the market efficiency systems such as flow reducers.



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Low cost and easy to install. They mix air with water and can save up to 25% of consumption.

Fostering resilience. Opportunities and challenges of the local economy and society to adapt to climate change

Best practices for a sustainable tourism

Vilafranca del Penedès, Santa Maria de Palautordera, Amposta. 2018.



Energy: There are different ways of saving. First, we need a good diagnosis to identify uses with the highest consumptions. These are usually hot sanitary water, air conditioning and heating.



Lights: Although they must comply with lower consumption by law, choosing LED lights (light emitting diode) allows reaching high savings, between 50% and 80% of consumption reduction.

Using motion sensors in elevators, corridors, toilets and in other places that have a low use.



Classe energètica	Consum energètic
A++	< 30%
A+	30 - 42%
A	42 - 55%
B	55 - 75%
C	75 - 90%
D	90 - 100%
E	100 - 110%
F	110 - 125%
G	> 125%

Acquire low consumption appliances within the wide range of products offered by the market.

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Waste: First, we must implement the 4R waste management hierarchy (reduce, reuse, recycle, recover).

Reduce: in the purchasing policies, we can choose products that have the least packaging (e.g. if possible large cans and boxes)



Reuse: we could convert the organic waste (conveniently separated) in compost for the garden or the planters with a composter.

Recycle and recover: All waste generated must be properly managed, with a suitable final destination (e.g. specific container, waste drop-off facility). Products should be recovered whenever possible for a new use (e.g. In the hospitality sector, we can recover the oils used to make soaps or, recover the glass bottles to use them again.

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Diputació
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Oficina Catalana
del Canvi Climàtic



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Promoting resilience

Opportunities and challenges for the economy and local society in adapting to climate change

Communication, certification and labels for sustainable tourism

Vilafranca del Penedès, Santa Maria de Palautordera, Amposta. 2019.

Environmental communication, green, sustainable or eco-friendly marketing began in the 1990s, coinciding with global concern for the environment. It is now widespread and consumers are able to clearly see that what they are being offered is not "environmental cosmetics"



Sustainability in environmental communication has to be in the entire marketing-mix process:

- . Product policy
- . Distribution policy
- . Pricing policy
- Communication policy

PRODUCT POLICY:

The promotion of our product as environmentally friendly, organic or sustainable must be true. Society has ample environmental information.



PRICING POLICY:

Prices must be in line with the market and should not overvalue the product just because it is sustainable.

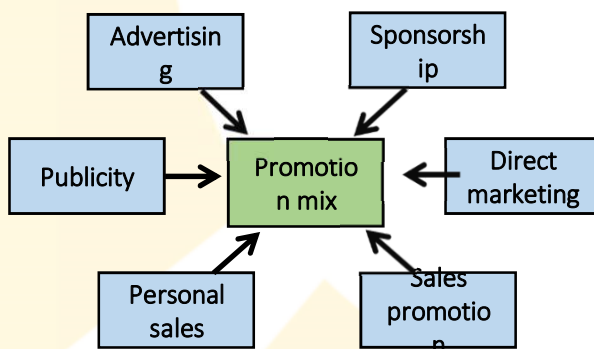
At the same time, the relationship between costs, profit margin and competitor prices must be taken into account.

DISTRIBUTION POLICY:

The principles of sustainability must be applied throughout the process of distributing our product. All processes must be reviewed from start to finish (analysis of life cycle).



COMMUNICATION POLICY:



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Advertising

Transmission of information on our products through the media (attention to social media).

Publicity

Create a favourable image of the product through the media (unpaid: favourable press releases and news in the media).

Sponsorship

Support for activities and events on themes appropriate for the products we offer.

Direct marketing

Use of direct-to-consumer media (mail, telephone, e-mail, etc.)

Personal sales

Own sales personnel available to promote and sell our product (sales force).

Sales promotion

Activities not channelled through the media, with the aim of stimulating short-term sales (2X1 strategies, intermediaries, discounts for sales personnel).

Advertising

SOCIAL MEDIA: DO WE NEED TO BE IN ALL OF THEM? WHAT ARE THE TRENDS?
It is more important to be in the most widely used media at all times and, above all, remain updated.

Valoración de Redes Sociales | Satisfacción

iab
#IABESTUDIORSS

- WhatsApp se posiciona como la Red mejor valorada entre sus usuarios, seguido de Youtube, Instagram y Spotify.
- Mejora la valoración de Snapchat y disminuye la de Facebook y Spotify.



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ENVIRONMENTAL CERTIFICATION AND LABELS

Environmental labels or certification are voluntary tools that designate environmentally-friendly products or services. They are accreditations that certify that our product (establishment, activity, service, etc.) complies with a series of environmental requirements throughout its life. There are different levels: regional, national and international. They include codes of behaviour, programmes of best practices and commitments to improving the environment. The certification systems in tourism apply particularly to accommodation and destinations in general, although the range is quite broad.

CERTIFICATION:

ISO 14001

This is an environmental-management system (EMS). It has become the most widely known and used certification. To implement it, it is necessary to make a public environmental declaration verified by independent bodies.



Initially, an environmental audit or ecoaudit is required, with the purpose of assessing the environmental health and ecological functioning of the organization. An environmental policy must then be designed, together with a schedule of actions based on a set of objectives. Finally, it requires monitoring and periodic examinations.

EMAS

EU Eco-Management and Audit Scheme, promoted by the European Union in 1993. It is also an EMS.



Advantages of EMAS

Improved relationship public authorities.

Improved environmental quality of the product/service/process.

Improved management.

Reduced costs/risks.

Corporate social responsibility.

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ECO-LABELS

Eco-labels, like certification, may be local, regional, national, European or international.

LOCAL: *Distintiu Ecoturístic d'Alcúdia* (Alcúdia Ecotourism Label), an initiative of the Majorcan municipality, which created the ecotourism sticker in 1994 for hotels that met a series of environmental requirements.



REGIONAL: *Distintiu de Garantia de Qualitat Ambiental* (Environmental Quality Guarantee Label), awarded by the Catalan Government since 1994 to products and services. In 1998, it was extended to tourist services (campsites), in 2000, to hotels, and in 2001, to rural establishments. It is valid for 3 years.



NATIONAL: *Sistema de Calidad Turística Medioambiental*, Q verde (Green Q Environmental Tourism Quality System), issued by the Spanish Institute for Quality Tourism. It is an initiative of the hotel sector to create a specific environmental-management system for the tourism



INTERNATIONAL:

Green Globe 21: Initiative promoted by the WTTC and implemented in 1994. It is a system of certification by stages. It proposes environmental improvements in different areas: greenhouse gas emissions, energy efficiency, resource management, management and conservation of ecosystems, management of cultural and social aspects, air quality and noise abatement, and implementation of recycling technology.

BIOSPHERE Created by the Responsible Tourism Institute (RTI) in 1998. Certification guaranteed by UNESCO and the UNWTO. The goal is to integrate the principles of sustainability, responsibility and quality. It includes social aspects as well as environmental aspects.



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Climate change adaptation in the tourism sector

David Saurí (Departament de Geografia, UAB)

This presentation provides a general introduction to the concept of climate change adaptation in the tourism sector. First, it provides details on the concepts of mitigation and adaptation, the latter is defined by the IPCC as "adjustments in natural or human systems in response to current and future climate stimuli and their effects. Next, the work focuses on the tourism sector and the impacts that climate change can generate. With regard to snow tourism and especially the practice of skiing, the Catalan case indicates how the ski areas of certain mountainous areas of the Pyrenees, especially those at low altitudes and / or oriented to the South, can become the first negative manifestations of climate change in this area. The production of so-called "artificial snow" is the most common adaptive measure, but under certain scenarios of increasing temperature it may be insufficient, so it is recommended to develop other activities that involve the transformation of ski resorts into mountain resorts, in order to deseasonalize the activity. In relation to sun and beach tourism, the expected increase in temperatures doesn't seem to represent a significant impact on Catalan destinations. However, other impacts of climate change such as the increase in coastal storms (with destruction of beaches) or the increase in drought episodes can be very negative for these destinations, so it is also necessary to promote adaptive measures such as coastal protection or desalination to ensure the continuity of destinations.

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The European Charter for Sustainable Tourism and its implementation in natural spaces. The process in Park of Garraf, Olèrdola and Foix.

Sofia Aparicio (Diputació de Barcelona)

This session will present the process that has led the territory of the Park of Garraf, Olèrdola and Foix, their municipalities and the protected natural spaces in the area to obtain the European Charter for Sustainable Tourism.

It will explain what the European Charter for Sustainable Tourism consists of and the process of the last 4 years, from the diagnosis, to the audit, to the certification of Europarc.

And all the work of consolidating the working group and forum of the Charter where we are working on the 32 actions of our first Action Plan from 2017 to 2021.

To explain the second phase of the European Charter, which invites companies in the territory to be certified, we will have David Cano, who manages the rural tourism house La Morera in the Montseny Natural Park and he will explain us his experience with this project.

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ADAPTATION OF TOURISM TO CLIMATE CHANGE: HOW CAN IT BE PROMOTED BY LOCAL AUTHORITIES? Vilafranca del Penedès – 12/06/2018

Sustainable tourism and Biosphere project - Diputació de Barcelona

The Barcelona Provincial Council, through the Tourism Services Management, began in 2015 the first steps to achieve the Biosphere Responsible Tourism certification in the province of Barcelona, in the three tourism brands it manages (Costa Barcelona, Paisatges Barcelona and Pirineus Barcelona), by signing the Charter for Responsible Tourism with the Institute of Responsible Tourism (ITR) and the Global Sustainable Tourism Council.

The Biosphere certification is awarded by the Instituto de Turismo Responsable (a private non-profit organization associated with the UNWTO and linked to UNESCO), and accredited by the Global Sustainable Tourism Council. The Biosphere badge is based on standards based on the 17 UN Sustainable Development Goals (SDGs) included in the 2030 Agenda. The certification process culminated in May 2017.

The Commitment to Sustainability program aims to extend the culture of sustainability tourism to tourism companies and services in the counties of Barcelona. Adherence to the sustainability of the destination through the Commitment to Sustainability is a program developed by the Diputació de Barcelona, under the approval of the Institut de Turisme Responsable (ITR), whose main purpose is to implement more sustainable management among all agents of a Tourist Destination.

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The Commitment to Sustainability is a program that includes implementing good practice handbooks in sustainability for companies aligned with the Biosphere certification of the destination, complemented by intersectoral training and destination workshops coordinated by the county entities on tourist management and promotion.

The deployment and territorial implementation of the program is articulated with the Official Chamber of Commerce, Industry, Services and Navigation of Barcelona (COCINB), given that this entity is representative of the business sector of the counties of Barcelona and has a large territorial presence, and the 11 county tourism management bodies with which the Diputació de Barcelona has signed a program contract.

It is worth mentioning that the program represents the continuity of the work developed jointly since 2003 between the companies, the county managing bodies and the COCINB in the implementation of the Integral System (SICTED) to improve the destination through collective work, incorporating new criteria in the improvement of the competitiveness.

In addition to these programs, the Diputació de Barcelona participates in other European initiatives to promote sustainable tourism such as the deployment of the European System of Tourism Indicators (ETIS), the indicator group of the NECSTour network and the management of a project to create a Sustainable Tourism Community in the Mediterranean, through the European Interreg MED program.

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Involving society in climate change adaptation in the Tordera Delta - Annelies Broekman (CREAF)

ISACC TorDelta, Involving society in climate change adaptation in the Tordera Delta, is a project supported by the Ministry of Agriculture and Fisheries, Food and the Environment through the Fundación Biodiversidad, and is coordinated by CREAL. For nine months, between October 1, 2017 and June 30, 2018, it will support the **Table of the Delta and low Tordera**, driven by local administrations and scientists, creating a space for debate to improve the integrated management of the deltaic territory.

What happens to the Tordera Delta?

The Delta de la Tordera is an area of great geo-strategic importance for the development of the area, which hosts important economic activities (such as tourism, agriculture, industries, transport infrastructure and services, the supply of water, gas and electricity) and, at the same time, constitutes a key place for the conservation of the environment (i.e. wetlands, habitat of protected species, hydrological connectivity). Both in the past and today, this situation entails incompatibilities between the private interests of different sectors of the economy, the interests of public administration and the protection of the environment at the local and regional level.

Looking specifically at the tourism sector, the subject of today, we can indicate that in the Delta de la Tordera this sector is considered key by the local socio-economy. At the same time, the most urgent challenges induced by global change also affect this sector in a very important way: beach erosion affects the quality of the "sun and beach" supply, floods and torrential rains endanger life of people and affect infrastructure, the degradation of ecosystems affect the quality of the landscape

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and activities in nature, and the degradation of water bodies, among others, seriously affects the guarantee of supply of tourist facilities.

How we approached it?

To address these important and complex challenges, the project developed a participatory process with different phases, including a) a diagnosis of the economic, environmental and social context; b) interactive seminars and c) specific workshops. The results of all the sessions were formulated in an interactive way through the use of a blog, where there is also a reference archive to ensure accessibility to information for everyone and at all times. The process resulted in a roadmap and objectives for the Table, including 7 strategic objectives and two cross-cutting axes.

Conclusions

As far as the tourism sector is concerned, the conclusions of the project indicate that there is an opportunity to reduce overcrowding and opt for a more sustainable model that is balanced with other uses in the territory, with the aim of improving the quality of the offer and communicating Delta values to customers.

The project worked hard to establish a space for permanent dialogue, where the most difficult issues can be addressed and to encourage the creation of synergies and collaborations between economic sectors, public administrations, the scientific world and the general public.

The project aims to be another example of how improving governance can have tangible and concrete effects on vulnerable territories. However, the experiences that the project gave rise to are highly transferable.

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Leader natura

Sustainable development in natural areas of Catalonia

Jordi Vilalta

The Leader natura project is carried out by local LEADER action groups in Catalonia, which develop tasks to diversify and revitalize the economy in rural areas of Catalonia. The project is developed within the framework of cooperation projects, which allow to work on topics of interest to territorial agents.

Under the umbrella of resilient territory, we work to revalue the natural and cultural heritage, manage it properly and in a sustainably way to ensure its preservation and redefine it as a resource in the current framework of energy crisis and decline of primary activities in a globalized economy. For this reason Leader natura works on aspects related with the natural heritage of the territories.

The project has been developed since 2014, first working in protected areas, then extending it to areas of natural interest, then on the subject of wildlife tourism and most recently with actions on natural areas in the western territories. The aim of the project is to promote the socio-economic development of rural areas, in particular natural spaces and their areas of influence in coordination with local agents and companies taking into account the compatibility of conservation and sustainability of the environment, along with the activities that take place there.

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The main actions and results to date (May 2018) have been:

- Identification of 62 rural and nature experiences, with translation into Spanish, English and French
- Creation, design and edition of proposals for eco-tourist itineraries through the newly created natural park 'capçaleres del Ter i del Freser'.
- Creation of territorial agreement tables
- Technical seminars on capacity building and environmental knowledge
- Analysis of the situation of wildlife tourism in Catalonia
- Census of key strategic agents
- Technical conferences "wildlife as a resource for local development"
- Guide to wildlife and rural accommodation
- Program of activities 'viu els espais naturals de ponent' (enjoy the western natural spaces).

More information about the projects:

www.leaderpirineuoccidental.cat

www.lcc.cat

www.espaisnaturalsdeponent.cat

Information on leader groups and their activities:

www.desenvolupamentrural.cat



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