

# LAYMAN REPORT

## “CHANGING THE CHANGE. THE GALICIAN AGRICULTURE AND FORESTRY SECTOR FACING CLIMATE CHANGE”

LIFE 07/INF/ES/000852

Results and conclusions report



## INTRODUCTION

### Background

Climate change is, without any doubt, one of the greatest challenges that we are currently facing. Scientific evidence shows that the Earth climate is changing as a consequence of the change in the concentrations of greenhouse gases in the atmosphere, especially CO<sub>2</sub>. The latter is responsible for the main part of the global warming recorded in the planet, which was 0.74 °C during the past century, while it is foreseen that warming is to increase from 1.4 to 5.8 °C during the XXI century.

Galicia is not unaware of climate change, and forecasts anticipate that it is going to be a conditioning factor for the sustainability of the development of our country.

In order to face this phenomenon, different strategies are needed, firstly, it is necessary to confront the cause of the phenomenon, by trying to reduce greenhouse gases emissions. Secondly, we need to promote research about climate change. Thirdly, we must foster education, information and cooperation within the field of climate change. Finally, we have to favour the adaptation of our society to the foreseeable changes in the natural, economic and social systems potentially affected in our country, with the aim of reducing the negative impacts that have been identified and also trying to take advantage of the opportunities that climate change itself might provide. In order to reach this last objective, we need to evaluate the evidences of climate change, as well as its foreseeable impacts on both natural as well as exploited ecosystems. That is why this project was based around compiling, analyzing and disseminating all the information related to the evidences and impacts of Climate Change in Galicia and also to its effects on the Agriculture and Forestry sector.

### Climate Change and the Galician Agriculture and Forestry sector

The Agriculture and Forestry sector contributes to the emissions of greenhouse gases mainly by the conversion of forests, wetlands and grazing land into crop land, the emissions of gases from crop land and livestock, energy consumption from farms, the use of mineral fertilizers, pesticides and other processes that require energy, and finally, by biomass production for energy purposes.

The main explanation for this failure to keep emissions low, is the lack of information of farmers, who are not aware of the impacts of their activities, neither of the mitigation strategies or the way to adapt to the changes that they are facing.

On the other side, The Agriculture and Forestry sector can contribute to climate protection not only by keeping the existing carbon reserve in the soil, but also by increasing it through the systematic formation of humus, with the resulting reduction in energy consumption and the production of biomass in an ecological and sustainable way for energetic purposes.

Additionally, Galicia is in a vulnerable situation at facing the effects of climate change, mainly because of two reasons: firstly, the most important strategic sectors are agriculture and fishing, both are closely linked to climate, and so both are sensitive to any change. Secondly, we have to take into account the geographic situation, since Galicia is under the influence of several air masses with very different thermodynamic characteristics, because of its location at a transition area.

Therefore, the Galician agricultural sector should adapt in an efficient and quick way to the transformations and climate variations, since the continuity of the agricultural activity in Galicia will depend on the success or the failure of these actions.

## OBJETIVES

The main objective of the Campaign was to inform professionals of the Galician agricultural and forestry sector, schoolchildren and society in general about the problematic of climate change,

as well as to promote the participation of professionals in the mitigation and adaptation of their activities to climate change, without involving a reduction in productivity. Another objective was to promote a change in attitudes as well as changes in the management system of farms towards a sustainable model.

We seek to promote mitigation and adaptation strategies to Climate Change within the sector, by encouraging the use of renewable energies (solar, thermal photovoltaic, biofuels, energy crops and manure use), to promote energy saving and the efficiency of energy use, to offer alternatives in the management of agricultural and forestry waste, to promote ways of farming in which soil conservation prevails such as conservation and organic agriculture, and to promote measures that increase carbon storage in farming and forest soils.

## ACTIONS AND RESULTS OBTAINED

### A. PREPARATORY ACTIONS

#### 1. Meetings with external consultants

Participation structures were established for the coordination and transfer of information, through collaboration agreements with:

- University of Santiago de Compostela (USC): experts panel from the Departments of "Soil Science and Agricultural chemistry", "Environmental Engineering", "Biology" and "Chemical Engineering".



Picture1: Soil Science department meeting



Picture2: Environmental Engineering department meeting

- Public administrations related to the agricultural and forestry sector and climate change: Ministry of Environment, Climate Change Spanish Office, Galician Ministry for Sustainable Development and Environment, Galician Ministry for Education and University organization, Galician Ministry for Rural affairs.



Picture3: Meeting with the Galician Ministry for Environment



Picture4: Meeting with the Climate Change Spanish Office

With these types of meetings, we have compiled information about studies, new technologies and innovations about Climate Change and the Agricultural and Forestry sector.

All this information was used as the base to analyze and make a diagnosis of the documents "Mitigation strategies and adaptation strategies of the agricultural and forestry sector to Climate Change".

## 2. Diagnosis surveys of the agricultural and forestry sector facing climate change

In order to obtain starting information to determine the real impacts in the agricultural and forestry sector, a questionnaire was prepared for the 4 most important production subsectors of the Galician rural environment, of which 2000 issues were edited and used in farms all around Galicia (results shown in the following table):

Question	Answer	SUBSECTOR				TOTAL	% FINAL
		FORESTRY	LIVESTOCK	WINE	HORTICULTURE		
Amount of rain	Increase	156	26	59	70	311	16
	Decrease	117	40	45	98	300	15
	No change	377	594	176	242	1389	69
Number of days of rain	Increase	91	26	48	53	218	11
	Decrease	137	40	36	70	283	14
	No change	422	594	196	287	1499	75
Extreme rain phenomenons	Increase	186	185	168	145	684	34,2
	Decrease	26	21	26	15	88	4,4
	No change	438	454	86	250	1228	61,4
Drought	Increase	201	178	155	216	750	37,5
	Decrease	33	28	32	37	130	6,5
	No change	416	454	93	157	1120	56
Number of days of snow	Increase	7	7	3	5	22	1,1
	Decrease	252	255	108	158	773	38,7
	No change	391	398	169	247	1205	60,2
Average temperature	Increase	52	33	22	37	144	7
	Decrease	58	33	23	20	134	7
	No change	540	594	235	353	1722	86
Extreme temperature	Increase	185	162	92	101	540	27
	Decrease	31	23	9	17	80	4
	No change	451	449	197	283	1380	69
Number of cold days	Increase	33	33	25	37	128	6
	Decrease	32	33	14	20	99	5
	No change	585	594	241	353	1773	89
Number of hot days	Increase	135	120	52	73	380	19
	Decrease	37	34	18	31	120	6
	No change	495	494	203	308	1500	75
Date of first frost	Advanced	13	13	6	8	40	2
	Delay	58	53	36	33	180	9
	No change	579	594	238	369	1780	89
Date of last frost	Early	87	102	38	53	280	14
	Delay	11	20	6	3	40	2
	No change	535	565	241	339	1680	84
Frost-free period	Increase	95	104	49	72	320	16
	Decrease	23	27	4	6	60	3
	No change	531	533	219	337	1620	81
Disease and plague incidence	Increase	201	229	83	127	640	32
	Decrease	23	35	9	13	80	4
	No change	421	425	183	251	1280	64
Phenological states/ reproductive cycles	Early	153	146	72	89	460	23
	Delay	26	26	11	17	80	4
	No change	481	485	209	285	1460	73
Final production	Increase	51	46	25	38	160	8
	Decrease	179	171	77	113	540	27
	No change	421	426	185	268	1300	65
Do you know what Climate Change is?	YES	292	313	143	172	920	46
	NO	358	347	137	238	1080	54
Are you aware of the contribution of farming activities to Climate Change?	YES	78	65	20	37	200	10
	NO	572	595	260	373	1800	90
Do you know any mitigation and adaptation strategies?	YES	45	66	20	29	160	8
	NO	605	594	260	381	1840	92
Do you apply mitigation and adaptation measures?	YES	45	66	20	29	160	8
	NO	605	594	260	381	1840	92
Will you modify the production system due to Climate Change?	YES	111	107	45	57	320	16
	NO	539	553	235	353	1680	84
TOTAL SURVEYED		650	660	280	410	2000	100%

The information retrieved was compared with the information received from the panel of external collaborators and experts, and by examining the most important points, we concluded that some scientific forecasts can be obtained, and also that the population does not perceive some of the studied changes.

## B. AWARENESS ACTIONS

### 3.General symposiums (awareness days): “Changing the change. The agricultural and forestry sector facing climate change”

This type of symposiums are addressed to any kind of audience that is interested in the problematic of climate change:

Location	Date	Attendees	Evaluation (*)
Guitiriz	03/04/2009	95	4,47
Irixoa	05/06/2009	95	4,56
Sarria	14/10/2009	90	4,41
Becerreá	28/05/2010	100	4,63
Teo	27/10/2010	97	4,57

(\*): Average evaluation mark of the satisfaction questionnaires, over a maximum mark of 5.



Picture 5: Symposium at Guitiriz

Picture 6: Symposium at Teo

### 4.Specific symposiums for the agricultural and forestry sectors: “The livestock/forestry/horticultural/wine farmer facing climate change”

Addressed to the four most important production sectors within the Galician rural environment: livestock, horticulture, forestry and wine sector.

	Location	Date	Attendees	Evaluation (*)
Forestry subsector	Lugo	25/09/2009	52	4,37
	Castro Caldelas	07/10/2009	60	4,5
	Chantada	21/10/2009	50	4,63
	Santiago de Compostela	30/10/2009	50	4,63
Livestock subsector	Viana do Bolo	08/01/2010	47	4,64
	Lalín	15/01/2010	48	4,54
	Arzúa	20/01/2010	49	4,7

	Becerreá	22/01/2010	50	4,45
Horticultural subsector	Santa Comba	05/03/2010	43	4,42
	Carballo	12/03/2010	48	4,64
	Xinzo da Limia	26/03/2010	50	4,74
	Vilalba	09/04/2010	53	4,74
	Cambados	04/12/2009	76	4,56
Wine subsector	Monforte	16/04/2010	37	4,65
	Ourense	23/04/2010	53	4,61
	Verín	30/04/2010	50	4,46

(\*): Average evaluation mark of the satisfaction questionnaires, over a maximum mark of 5.



Picture 7: Symposium at Cambados

Picture 8: Symposium at Ourense

### 5. Awareness days in schools: "The Galician farmer facing climate change"

During the campaign, we took the subject of the project to schoolchildren all around Galicia, both from primary and secondary school.

Level	Date	Center	Location	Attendees	Evaluation(*)
Primary	04/06/2009	CEIP San Vicente	Vimianzo-A Coruña	34	4,58
Primary	10/06/2009	CEP Antonio Magariños Pastoriza	Cambados-Pontevedra	33	4,45
Secondary	17/06/2009	IES Carlos Casares	Viana do Bolo-Ourense	30	4,00
Secondary	04/11/2009	IES Val do Asma	Chantada-Lugo	30	4,08
Secondary	11/11/2009	CPI de Rodeiro	Rodeiro-Pontevedra	30	4,18
Primary	18/11/2009	CEIP Víctor Sáenz	Mazaricos-A Coruña	24	4,72
Secondary	02/12/2009	CPI de San Vicente	A Baña-A Coruña	29	3,97
Primary	24/03/2010	CEIP José María Lage	Ortigueira-A Coruña	30	4,18
Secondary	15/04/2010	Cardenal Cisneros	Ourense	27	4,50
Secondary	22/04/2010	IES Nº1	Ordes-A Coruña	25	4,35
Primary	27/04/2010	CEIP Ana Mª Dieguez	Rianxo-A Coruña	29	4,63
Secondary	28/04/2010	IES Valle-Inclán	Pontevedra	63	3,54
Primary	11/05/2010	CEIP De Casas	Lugo	79	4,43
Primary	03/06/2010	CEIP San Martiño	Vilariño de Conso-Ourense	17	4,70
Primary	03/06/2010	CEIP Augusto Assia	A Mezquita-Ourense	24	4,52
Secondary	09/06/2010	Colegio Vivas	Vigo-Pontevedra	33	4,07

(\*): Average evaluation mark of the satisfaction questionnaires, over a maximum mark of 5.



Picture 9: School day at Lugo

Picture 10: School day at Vilariño de Conso

In the three types of Awareness Days, we have shown the evidences and uncertainties of climate change in Galicia to each of the target groups mentioned above. Additionally, the technicians of the project were advised at all times by the experts from the University and Public Administrations in order to adapt this information to the particularities of each of the target groups.

The environmental awareness programs, as it is the case of the campaign CHANGING THE CHANGE, seek to achieve changes in individual behaviours in order to achieve collective profits. One of the difficulties that arises in this case is the feeling that the problem is so general and involves a change in the behaviour of such a great number of people, that a particular individual may think that its specific behaviour actually has very little impact in the overall process. Thus, if a personal behaviour will not significantly contribute in a change of situation, then changing it might not worth the effort. This kind of thinking is difficult to overcome in many cases. Thus, in this project we tried to perform a practical speech that is useful for the addressees, so that confrontation with habits and values that are deeply interiorized is as less shocking as possible. In these changes of attitudes that could be assessed during the campaign, it is worth considering that amongst school children, those from schools located at rural areas have shown a greater interest and involvement in the awareness days, since they perceive the problem as something essential that directly involves them.

Additionally, we have carried out impact questionnaires, both from the general and specific symposiums/days, in which we determined that the project had a good reception amongst the addressees, and, apart from awakening the interest in the subject of the project, we informed those that were practically unaware of it.

## 6. Stand LIFE+ “CHANGING THE CHANGE”

This Stand was present at the International Fair of Silleda (Pontevedra), in June 2009, and in Expoordes in Ordes (A Coruña), in April 2010, with 80.000 and 60.000 visits respectively, mainly from professionals from the agricultural and forestry sector. With this stand, we informed about the effects of climate change on natural resources, as well as about new techniques on waste management and renewable energy within the sector. Additionally, we handed out the “Ecoguides”, prepared specifically for the project, about the impacts of climate change on each of the four subsectors. Also, with each of the editions, a technical symposium was held, which was addressed to the professionals within the sector in order to inform and debate about the latest published data about climate change.



Picture 11: Stand at the International Fair of Silleda

Picture 12: Expoordes Multisectorial Fair

### 7. Travelling exhibition "CHANGING THE CHANGE"

Consisting of 25 panels with pictures and explanatory texts about the habitats linked to the agricultural and forestry sector.



Picture 13: Exhibition at Viveiro

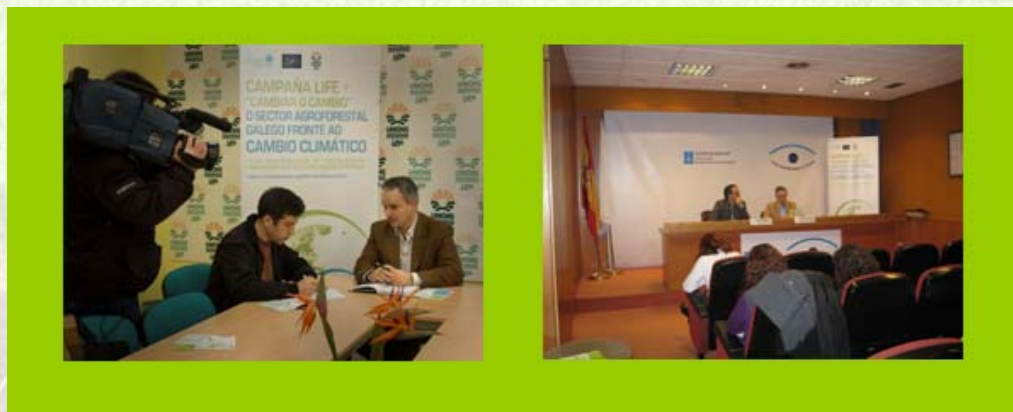
Picture 14: Exhibition at A Coruña

## C. DISSEMINATION AND COMMUNICATION ACTIONS

### 8. Dissemination and communication

- Press conferences

The interest awoken from the presentation of the project in an initial press conference was very positive; very often our officers/technicians appeared in different media talking about the problematic that was the subject of the project, as well as about the progress of the project.



Picture 15: Interview for Television of Galicia

Picture 16: Initial press conference

- Website

During the whole execution period of the project, the Website: [www.unionsagrarias.org/life+cambiarocambio](http://www.unionsagrarias.org/life+cambiarocambio), was used for the diffusion of the project with periodic updates and follow-up of each of the actions and the documents and reports prepared.

- Instant information service

A massive sending of mobile text messages was done (4000 texts sent every 15 days) for farmers, livestock farmers, students from Galician rural areas, technical consultants and general audience.

This tool allowed us to disseminate information about the updates and links of interest about issues related to climate change and the agricultural and forestry sector. It also allowed us to call for the events within the project.

- Publications in specialized press

The readers of the specialized magazines "A terra do gandeiro e do agricultor" and "La tierra del agricultor y ganadero", with a circulation of 67.000 issues, could read articles with information and updated news related to the project, as well as learning about the upcoming events and activities.

## 9. Dissemination materials " environmental equipment"

Consisting of:

- *Conference materials (hand outs, leaflets, etc)*
- *Eco-guides: from the livestock, wine, horticultural and forestry subsectors.*
- *Educational material: for the Awareness Days at schools.*

All this material is available for downloading from the website of the project.

## 10. Networking

National and transnational networks were established in order to transmit and to receive information about this problematic to and from other regions within Spain and Europe, as well as about the measures that are being adopted in order to mitigate the effects of climate change.

These meetings were also useful in order to start contacts for future collaborations in new projects.

- Networking with National LIFE+ projects as well as with other environmental projects of the same subject matter.



Picture 17: Networking with Cantabria



Picture 18: Networking with Murcia



- Networking with Transnational LIFE+: Poland, Italy and Portugal.

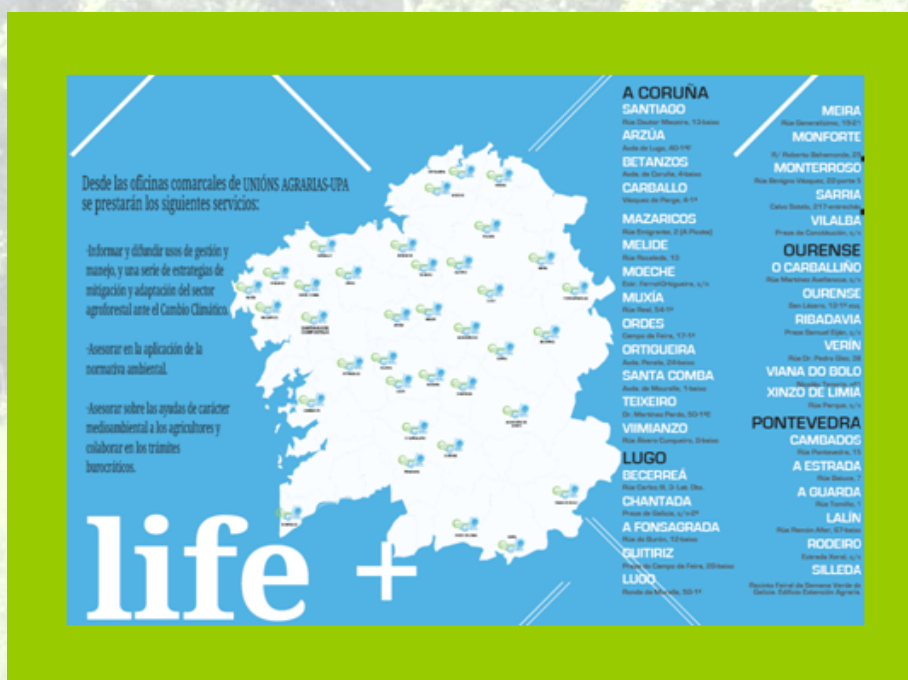


Picture 19: Networking with Portugal

Picture 20: Networking with Poland

### 11. Environmental consultancy LIFE+ and office for the management of environmental subsidies/grants

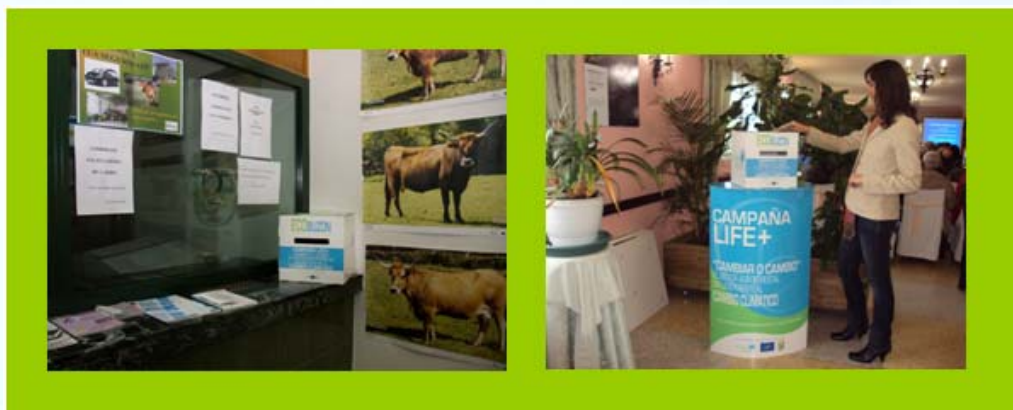
Through the local offices that Unions Agrarias has distributed all along the Galician rural environmental (see the map), we could advise 7000 professionals from the agricultural and forestry sector in a number of issues: at implementing the environmental regulations, at looking for environmental subsidies, and at helping with all the administration procedures.



### 12. Suggestions box “Ecobox”

Through a number of eco-boxes called “Ecobox” distributed throughout the offices of the organization as well as in each of the seminars/symposiums that were organized, we learned about the opinions, views and needs of the sector as well as about the impact of the project amongst professionals.

In general, the results were satisfactory and, in many cases, they reflected the main worries of people from the Galician rural areas as well as their concerns about the future of their farms as the effects of climate change are increasing.



Picture 21: Ecobox at local office

Picture 22: Ecobox at one of the symposiums

## D. MANAGEMENT AND CONTROL

### 13. Environmental indicators survey

Throughout the three semesters (June 09/December 09 and June 10), we collected data for environmental indicators in 2000 collaborating farms that volunteered to give these data to the technicians of the project.

The improvement in the management of the farms was evident, since the reduction in the production of waste in each of the subsectors increased and also since the decrease in energy consumption was significant, even though each of the subsectors is characterized by the production of a different type of waste or by the use of more or less energy.

The results obtained in the last semester are:

#### Livestock subsector:

Electricity consumption decreases thanks to the use of low-consumption light bulbs and to the efficient use of the milking times (in case of dairy farms)

Decrease in the purchase of mineral fertilizers (80%): improvement in the use of organic fertilizers.

Decrease in the purchase of phytosanitary products and in the production of manure and slurries.

#### Horticultural subsector:

The horticultural subsector stands out at consumption of phytosanitary products, from 3 to more than 15 containers/litre.

Plastics represent the other type of outstanding waste, since their consumption was clearly reduced.

Consumption of chemical fertilizers decreased due to a better use of organic fertilizers (in some of the studied cases, this fertilizer was provided by neighbouring dairy farms through the technician that was carrying out the survey)

#### Wine subsector:

The wine sector consumes phytosanitary products, and we could see that consumption did not decrease; as indicated by farmers, one of the possible reasons for this is the increase of certain plagues such as the grapevine [downy mildew](#) caused by *Plasmopara viticola*, which results in a higher consumption of phytosanitary products.

#### Forestry subsector:

Galician forestry sector is starting the introduction of photovoltaic solar energy in order to sell electricity to the electric network.

Neither phytosanitary nor zoosanitary products are used, and no plastic waste, slurries or corpses are produced.

The only type of waste that is produced is oil waste from the machines used at pruning, felling and cleaning of forests and it is at these phases when stubble or cuttings are produced. However, the exact amount is unknown since these wastes are either burnt in the forest, used for livestock beds or abandoned where the cutting takes place. Therefore, this sector is the one with the smallest impact and consumption.

### 14. Training workshops for technicians

In order to improve the professional qualification of our technicians at mitigation and adaptation strategies of the agricultural and forestry sector to climate change, 4 workshops were held, in which we informed technicians about the latest news and updates related.



Picture 23: Training workshop 15/05/2009

Picture 24: Training workshop 9/07/2010

## CONCLUSIONS

The contribution of the actions carried out throughout the execution period of the project were mainly the information and awareness about such an important and significant issue.

In some cases, the technical team found people that were totally unaware of Climate Change, even though the evaluation of the initial diagnosis surveys showed that farmers from the four subsectors had noticed the evidences of climate change, with results showing that farmers noticed changes in the rainfall pattern and in early frosts, for instance. Additionally, it is worth noting that the majority of the surveyed farmers had detected the presence of plagues and diseases in crops and livestock, apart from a recent increase in the frequency of forest fires. In many cases, farmers do not attribute these evidences to climate change, even though they are aware that these trends have been increasing in the last years.

From this point of view and with this base, extracted from the diagnosis surveys, it was noticeable that the real impacts of Climate Change in the Galician agricultural and forestry sector match the evidences that the experts panel and collaborators have described in relation to this phenomenon.

Therefore, it is evident that the panel organized during the last two years is essential, in the first place, for the information and awareness of people, both professionals from the agricultural and forestry sectors, and from society in general, in order for them to be aware of the impacts that Climate Change has and will have globally, and in the second place, for bringing closer many of the objectives proposed by the EU in relation to a quick transition towards a global economy of low carbon emissions.

Currently, there are no public studies in Galicia about the social-economical impact of the effects of Climate Change in the production subsectors. The campaign CHANGING THE CHANGE, sought to inform professionals from these subsectors, in the first place, in order for them to increase their ability to take action in advance and therefore to reduce the impact of climate change, by promoting changes in the production systems towards more sustainable systems without reducing productivity. On the other side, the campaign sought to economically quantify the losses that are occurring due to the effects of this phenomenon, in order to create compensation lines in the future.

The concern about the environmental problems is the most obvious symbol of an increasing demand that is pressuring towards the appearance of a new social logic. In general, at first, when we hear about the problems caused by the effects of climate change, there is an alarming trend that disseminates to society through distorted information. Even though it is true that we have a problem that we must face, it is also true that we have some clues as to how to mitigate its effects and even to tackle them in advance. Thanks to this campaign, we could state that the common believe within farmers is that the rules and environmental requirements that they must adopt, provides nothing but obstacles and also increases costs, without offering a compensation through a fairer price of the product (an improved and environmentally friendly product), and even without customers that are willing to pay more for these products.

Bearing this problem in mind, in this campaign we tried to transmit positive information about the adaptation and mitigation measures, both individual and collective, in order to integrate them towards an environmental logic as the new reference pattern.

With all of this, the new wine/livestock/forestry/horticultural farmer understands that, apart from the likely risk that implies to offer products that are more environmentally friendly, this new "green horizon" offers the opportunity to create values and to improve the quality of goods and services.



LIFE + is the financial instrument for the environment that the European Commission counts on. Its objective is to contribute to the implementation, the update and the development of European policies and laws related to the environment, including the integration of the environment in other policies, and contributing to a sustainable development.

The campaign CHANGING THE CHANGE is within the "Information and Communication" LIFE+ component, whose objectives are to disseminate information, to promote the awareness about environmental issues, and to support the accompanying measures such as information, communication activities and campaigns, conferences and training.

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