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European Union | European Regional Development Fund



LINDANET

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Action Plan | Galicia



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Part I – General Information

Project: LINDANET.

Partner organisation: Dirección Xeral de Calidade Ambiental, Sostenibilidade e Cambio Climático; Consellería de Medio Ambiente, Territorio e Vivenda (Xunta de Galicia).

Country: Spain.

NUTS2 region: Galicia (ES11).

Contact person: Juan Manuel Camiño Soto.

Part II – Policy context

The Action Plan aims to impact:

- ☒ Investment for Growth and Jobs programme
- ☐ European Territorial Cooperation programme
- ☐ Other regional development policy instrument

Name of the policy instrument addressed: Galicia ERDF 2014-2020 Operational Programme, Priority Axis 6: Preserving and Protecting the Environment and Promoting Resource Efficiency.

Priority of Investment 6a: Investing in the waste sector to meet the requirements of the Union's environmental acquis and to address needs (if identified by Member States) for investment that goes beyond those requirements.

The actions that are **programmed** in this axis clearly respond to the importance that the environment, the nature, the landscape have in relation with economic and social activity in Galicia, aimed to achieve a sustainable development from an economic and social perspective, as included in the "Diagnosis of socioeconomic and territorial situation".

The interventions programmed in this axis are part of a global strategy based on the cross-cutting principle of sustainable growth, in accordance with the 2020 European strategy, **which will seek to achieve the following results**, with impact on sustainable growth and employment:

- Reduction of waste generation, and progress in prevention and reuse, promoting separation, and promoting selective collection, separation, recycling, and waste treatment.
- Fulfil the water cycle, with the completion of the sanitation network to achieve the environmental objectives of the Water Framework Directive, the reform and optimization of the sanitation systems of the Galician estuaries, working to achieve or maintain their good ecological status, as well as a good ecological status of the rest of water bodies.
- To value the natural, cultural, and patrimonial resources of the region and preserve the material and immaterial of Galicia.
- To Ensure the conservation of the biodiversity of the region.

According to Galicia ERDF Operational Programme 2014-2020, in those actions to be financed within **priority of investment 6a**, measures aimed to the prevention and the reduction of waste, the development of separation at source, selective collection and domestic and industrial waste recycling will be prioritised, together with the industrial prevention, control and monitoring, aimed to the reduction of soil pollution. Within the framework of this priority of investment, actions related to the **prevention of soil contamination**, as well as the **management of potentially contaminated sites** will be promoted.

Currently, Xunta de Galicia is implementing actions for the remediation of soils in natural spaces, by means of restoration, and cleaning of non-controlled dumping spots.

This policy instrument could be improved with new measures related to HCH decontamination.

On the other hand, LINDANET is an ambitious project that aims to join efforts among European regions to work together towards the improvement of the HCH (Lindane) contaminated sites.

Lindane was a pesticide widely produced during second half of the 20th century around Europe and the world. Lindane production generated huge amounts of high pollutant organochlorinated compounds (HCH isomers and others) which present high persistence, high toxicity, and carcinogenic, bioaccumulative and endocrine disrupting properties. For example, several isomers of HCH are included in the list of the Persistent Organic Pollutants (POPs) of the Stockholm Convention.

Lindane production and use has been prohibited in EU regulation from 2007, but Lindane pollution still represents a very important risk for human health and the European environment, and it is still a quite unknown problem for the population and political representatives.

Therefore, the aim of LINDANET is to advance in the direction of improving the knowledge and solution to this problem, starting from a regional point of view and reaching a European level.

The project has set the following **general objectives**:

- To create a network of European regions affected by the contamination derived from the lindane production wastes (HCH and others).
- To establish an Action Plan focused to the problem solution in each region.
- To interchange experiences and knowledge that contribute to the solution of the contamination derived from the lindane and lindane production wastes.
- To involve the stakeholder groups in the knowledge and the solution to the problem.
- To contribute to the Policy Learning Platform of the Interreg Europe programme.
- To raise public awareness about the HCH pollution and other related contamination problems derived from POPs and Obsolete Pesticides.

How is this Action Plan going to contribute to improve the Galicia ERDF OP 2014-2020 OP?

This policy instrument will be improved with new measures related to HCH decontamination.

Within the framework of this **priority of investment 6a** (*Investing in the waste sector to meet the requirements of the Union's environmental acquis and to address needs (if identified by Member States) for investment that goes beyond those requirements*), actions related to the prevention of soil contamination, as well as the management of potentially contaminated sites will be promoted.

Taking Lindanet goals into account and having in mind the Priority of Investment that Lindanet try to influence in Galicia (PI 6a. ERDF Operational Programme 2014-2020), **the following actions fit the requirements of the Priority of Investment 6a and may have a significant impact on the protection of the remediation of soils contaminated from Lindane waste.**

In section "Improving policy instruments" of each action is described in detail how each action is going to improve the priority of investment 6a. However, we can anticipate that it will improve the management of the policy instrument by means of refining the management of potentially contaminated sites.

Part III – Action 1: “An Improved governance Structure for Lindane Management in Galicia”

Background

Soil contamination resulting from Persistent Organic Pollutants (POPs) is a worldwide problem, with negative impacts on soil quality and functions, water quality, biodiversity, food security or human health. POPs are resistant to degradation, and many are banned obsolete pesticides which persist in the environment. Hexachlorocyclohexane (HCH), including the γ -isomer or lindane, was used extensively as a broad-spectrum insecticide and is considered a major POP (Stockholm Convention).

In Spain, hotspots of lindane and HCH waste are found in the Basque Country, Aragon, and Galicia. In Galicia, pollution caused by lindane residues dates back to the 40's due to the production of the insecticide in O Porriño (Pontevedra).

The municipality of O Porriño has a population of 19,600 inhabitants (320/km²) with an average rural property size of 0.13ha (compared to 1.21ha for Spain). Wetlands (Gándaras de Budiño) coexists with a dynamic industrial sector, and two large business parks hosting automotive industries, construction, and granite production companies. A third industrial park, Torneiros, combines pharmaceutical activity, R&D centres, and a neighbourhood of 4,000 people (20.4% of the population). Elevated concentrations of lindane residues, averaging 26.4mg/kg, were detected in Torneiros during the 90's (the intervention limit established, at that time, by Regional Government was 2mg/kg).

Urgent actions carried out by the Regional Government included excavation, sealing or encapsulation of principal pollution sources (32,056m²), restricting the use of land for agricultural purposes and closing wells for human water consumption/irrigation. However, the problem of soil contamination and its dispersion continues, because lindane residues were used over the years in the foundations of construction and road works during urban development and were spread across hundreds of small land plots by the local population. Recent water quality analyses carried out by the hydrogeological authority revealed the presence of HCH isomers in surface waters (0.020 µg/L to 1µg/L) and in groundwater (0.010 µg/L to 20µg/L).

These results highlighted the need for mapping the presence on lindane residues in the municipality (a task that has recently finished), but also the need for implementing sustainable soil remediation measures.

Additionally, the lindane and HCH contamination it is a matter of social significance and that raises high interest in actors such as neighbour associations, environmental associations, local politicians, business, and all the public Administrations holding responsibilities on the environment, mainly:

- The Regional Government (Xunta de Galicia), which has a full legal and administrative responsibility in environmental protection.
- The Miño-Sil River Basin Authority (Confederación Hidrográfica del Miño-Sil), which holds responsibilities in monitoring and preserving surface and ground water quality. As such, it is responsible for monitoring and preserving the Louro river water quality -a subsidiary river of Miño river-, which cross the municipality of O Porriño.
- Deputación de Pontevedra, which coordinates the provision of the waste collection and treatment service, and also have responsibilities on local roads.
- The Local City Council of O Porriño holds the responsibility on many of the streets, local roads or rural ways where contaminating traces of Lindane have been found over the last 10 years.

So far, coordination among different stakeholders in Galicia has not been efficient, regular, neither problem-solving oriented. Beyond the contributions of a Scientific Committee, interactions among stakeholders were characterized as scarce and driven by crisis, rather than built upon solid and sound institutional arrangements.

Therefore, the aim of this first action is to create an **Institutional Committee** to agree on a strategic plan for the comprehensive fight against the contamination of residues from the manufacture of lindane in Galicia, and to implement and monitor it.

This action arises from the need to involve the different administrative levels and areas of knowledge that help and contribute with different areas of responsibility and expertise stemming from several areas of competence in a multilevel governance system, to coordinate and develop actions as efficiently as possible.

Our source of inspiration

Our source of inspiration is the good practice "*Committees for the monitoring of the lindane waste management*", from the Government of Aragon. As stated below (in the following section), Galicia will transfer the idea of the creation of an Institutional and a Social Committee, considering that the Scientific Committee has already exists.

This good practice was shared with all involved parties during the First Interregional Thematic Workshop, organised by the Government of Aragon the 26th and 27th of November 2019. It is therefore considered a transferable practice, as well as practice of interest for all participant Member States, because the lindane and HCH contamination is a matter of social significance and raises high interest in actors such as social, politics, business and public bodies.

Regarding to the background of our source of inspiration, a factory was producing lindane in Aragon from 1975 to 1989. An estimate of more than 150,000 tons of solid waste with high content of HCH and other organochlorine compounds was produced, and dumped, together with liquid wastes in two landfills. This caused the most severe contamination problem in Aragon. Since 1994, the Government of Aragon implements measures for the control and containment of the contamination.

This has been a matter of concern for Aragon region and the municipalities of the Gallego river basin for years, being not only a technical an economic challenge, but also a social challenge.

Consequently, from November 2015 to April 2016, the Government of Aragon created three committees where all the involved stakeholders were represented. These Committees are:

- Scientific Committee: its main purpose is to advise the Government of Aragon from a scientific point of view about the decisions to be taken regarding the lindane production waste. They meet whenever is necessary.
- Institutional Monitoring Committee: its main purpose is to facilitate the coordination among the different jurisdictional scopes regarding the lindane-related waste management and its consequences. Meetings are held once a year.
- Social Committee for the support of the HCH waste management: its main purpose is to create a communication flow and the transparency exercise, in an organized way, regarding the lindane production waste. Meetings are held once a year.

The Committees were successful. Indeed, they were selected as "Best Practice" (*Committees for the monitoring of the lindane waste management*) in the Study for the PETI Committee "Lindane in EU" and they have been taken as an example and implemented in other regions:

- The Scientific Committee participated in the elaboration of the Aragon's "Lindane Strategic Action Plan".

- The "Protocol for the water quality monitoring of river Gallego" is an output linked to the Institutional Committee.
- The transparency labour was explicitly recognised in written by the Social Committee.

Therefore, the creation of the Scientific, Institutional and Social Committees allowed all the involved parties to participate in the knowledge and management of the lindane waste contamination.

Description of the action

This policy instrument could be improved with new measures related to HCH decontamination that need to be based upon an improved governance structure for the Management of Lindane-polluted sites in Galicia, by means of setting up and implementing a structure of governance for Lindane Management in Galicia, based upon 3 pillars:

- A Scientific Committee.
- **An Institutional Committee.**
- A Social Committee.

Regarding to the Scientific Committee, it already exists in Galicia. Its main objective is advising Xunta de Galicia on scientific solutions to deal with Lindane and HCH pollution.

A Social Committee will bring citizens, environmental groups, and other stakeholders into the decision-making process. It is important to outline that the creation of a Social Committee will not have costs because it is part of the HCHinEU project.

As per this Action Plan, the Institutional Committee will act as a coordination mechanism among Administrations, which ensures coordination between the different areas of competence related to the challenge and its solution.

Step 1. Identification of Administrations (End of 2021- January 2022)

We will identify which Administrations are involved in the management of Lindane pollution and remediation of polluted soils; as well as the extent to which they are involved in decision-making process and /or management of actions. Initially, we estimate that the following parts will be involved:

- 1) Xunta de Galicia:
 - i) Regional Ministry of the Environment.
 - ii) Regional Ministry of Public Health (SERGAS).

- 2) Central Government:
 - i) Miño-Sil River Basin Authority (CHMS).
 - ii) Regional Ministry of Transportes, Movilidad y Agenda Urbana. (antiguo FOMENTO)
- 3) City Councils of O Porriño and Mos.
- 4) Deputación de Pontevedra.

Once the administrations involved have been identified, this general management will contact each of them to find out the degree of involvement with this problem.

Step 2. Formal Constitution of the Institutional Committee (April 2022)

When the members of the committee are identified, the formal constitution of the committee will take place, and the periodicity of the meetings and the communication channels will be established.

Step 3. Regular Meetings

The institutional committee is expected to act as a monitoring body for all the regular initiatives taken to fight against Lindane pollution but also to coordinate actions in scenarios of crisis such as discoveries of Lindane dumping spots.

Expected results:

- 1 Institutional committee created.
- 1 meeting every 3/6 months.
- 15 people (high level bureaucrats and /or representatives) involved.

Players involved

The following players will be involved:

- Dirección Xeral de Calidade Ambiental, Sostenibilidade e Cambio Climático; Consellería de Medio Ambiente, Territorio e Vivenda (Xunta de Galicia). This institution holds the necessary competencies and abilities, in accordance with article 10 of the *"Decreto 42/2019, de 28 de marzo, polo que se establece a estrutura orgánica da Consellería de Medio Ambiente, Territorio e Vivenda"* and in accordance with article 12.4 of the *"Ley 22/2011, de 28 de julio, de residuos y suelos contaminados"*. This "Dirección Xeral" will exercise the competencies and functions in matters of evaluation and control of the incidence that human activity causes on the environment, the promotion of correction systems and strategies of said incidence, the evaluation of the effects of certain plans and programs on the environment, the management of the

environmental observation and meteorological prediction systems of Galicia and the promotion of environmental research and technological development for the achievement of adequate environmental protection.

- City councils of O Porriño and Mos. There are some councils that could support the activities regarding articles 25 and following of the *"Ley 7/1985, de 2 de abril, Reguladora de las Bases del Régimen Local"*.

In accordance with this law, the council will exercise in any case as its own powers, in the terms of the legislation of the State and of the Autonomous Communities, in the following matters: Urban environment: in particular, parks and public gardens, management of urban solid waste and protection against noise, light and atmospheric pollution in urban areas (article 25).

Depending on the number of inhabitants, the Municipality has more competencies (article 26), including waste management.

Finally, is important to highlight that to avoid administrative duplication, improve the transparency of public services and the service to citizens and, in general, contribute to administrative rationalization processes, generating a net saving of resources, the State Administration and those of the Communities Autonomous may delegate powers such as surveillance and control of environmental pollution or protection of the natural environment (article 27.3).

Furthermore, in accordance with article 12.5 of the *"Ley 22/2011, de 28 de julio, de residuos y suelos contaminados"*, councils could prepare programs for the prevention and management of waste within its competence.

- Other institutional actors such as FEGAMP, Deputación de Pontevedra, Consorcio do Louro, Central Government, River basin authority (Confederación Hidrográfica Miño-Sil). There are some other regional governmental departments that would support this activity and could be involved in the process of decision-making.

For example, Consorcio do Louro, which oversees supply drinking water of the highest quality to the towns that belong to the councils of Mos, O Porriño, Salceda de Caselas and Tui and return it in optimal conditions to the environment; or the River basin authorities (Confederación Hidrográfica Miño-Sil), which are fundamentally responsible for the Hydraulic Administration of the intercommunity basins regarding articles 19 and following of the *"Real Decreto Legislativo 1/2001, de 20 de julio, por el que se aprueba el texto refundido de la Ley de Aguas"*.

On the other hand, Deputación de Pontevedra must coordinate the provision of the waste collection and treatment service, in accordance with article 26.2 of the *"Ley 7/1985, de 2 de abril, Reguladora de las Bases del Régimen Local"*.

- Neighbour associations and environmental groups. These are the real "keepers" of the evaluation system and a main actor in the process of decision making through the Social Committee.

Improving policy instruments

In terms of results, cooperation can influence our policy instrument (ERDF Operational Programme 2014-2020), in those actions to be financed within priority of investment 6a. In this case, this action will **improve the management of the policy instrument** thanks to a new methodology for monitoring soil contamination and/or ex-ante evaluating management measures of soil contamination.

Galicia has a Scientific Committee, which advises Xunta de Galicia on scientific solutions to deal with Lindane and HCH pollution. However, governance structure for the Management of Lindane-polluted sites requires the participation of other main actors.

Therefore, it is necessary a Social Committee, which could bring citizens, environmental groups, and other stakeholders into the decision-making process. And finally, it is required to create an Institutional Committee which could act as a coordination mechanism among Administrations and could ensure coordination in an intertwined policy area with shared responsibilities.

This Institutional Committee would be the cornerstone for channelling the initiatives in the fight against Lindane pollution, but also to coordinate policy actions stemming from different administrations in cases of discovering new Lindane dumping spots.

Overall, this action will improve our current PI6a (our policy instrument) by means of refining the management of potentially contaminated sites: measures that will be adopted will have reached a consensus among scientific, social and institutional actors. Therefore, the actions' implementation will be smoother (in social terms), they will benefit from scientific knowledge of the epistemic community and will eventually optimize public resources.

The problem of soil contamination and its dispersion continues in Galicia, because lindane residues were used over the years in the foundations of

construction and road works during urban development and were spread across hundreds of small land plots by the local population.

For all the above, this action must be carried out since it will allow the adoption of the necessary measures as soon as possible to avoid the spread and other problems related with contamination and human health.

Estimated costs

The following **estimated** costs will be paid by own Xunta funds (1 year):

Type of cost	Amount
Direct personnel costs: 10% of gross salary cost	45,000 €
Travel costs (to attend the three committees)	1,800 €
External assistance (minor costs)	2,250 €
TOTAL COSTS	49,050 €

*Travel costs include: three committees, three meetings during the year, 2 people from each committee and a 100 € cost of each travel.

*External assistance (minor costs) costs include: three committees, three meetings during the year and 250 € as external assistance costs for the organization of each meeting.

Time frame

The action will last from December 2021 to January 2022. After that date, it is expected that the Institutional Committee will maintain regular meetings, during Phase 2 of this Interreg project and after completion.

Action 2: "A transparency policy on the communication (top-down and bottom-up) of Lindane polluted spots and their risks)"

Background

As stated lines above, the lindane and HCH contamination it is a matter of social significance and that raises high interest in actors such as neighbour associations, environmental associations, local politicians, business, and all the public Administrations holding responsibilities on the environment.

The difficulty in identifying the causes of contamination by Lindane, together with the lack of continuity in the treatment of the problem, has aroused all kinds of suspicions among some environmental associations and some neighbourhood associations. This distrust has been transferred to part of the neighbours.

To fight against misinformation, the Government of Galicia has self-imposed a compromise of maximum transparency. Transparency is the cornerstone for succeeding in the identification of Lindane dumping spots that are spread across the Municipality of O Porriño: only a population that trusts and believes in Lindane initiatives against Lindane pollution will be willing to collaborate and warn about Lindane pollution. And the cornerstone for this collaboration is transparency.

Our source of inspiration

Due to a strong commitment with the political fight against Lindane pollution, back in 2016 the Government of Aragon made its Strategic Plan and any policy initiative available to the general public and /or any interested party at [Descontaminación integral del lindano. Gobierno de Aragón \(aragon.es\)](http://aragon.es).

This section of its website allows any citizen to have general information about policies already implemented or being unfolded; and it also gives information about water quality of Gallego river, and the status of water treatment facilities.

This source of inspiration is a transferable practice, and it is also related to the good practice in Action 1: **Committees for the monitoring of the lindane waste management**. The creation of a Social Committee has the purpose to create a communication flow and the transparency exercise, in an organized way, regarding the lindane production waste. This way, Galicia will increase their transparency and communication with citizens, involving them into decision-making process.

Moreover, this action is also inspired in another recognized good practice, the *Strategic Environmental Action Plan against lindane waste contamination in Aragon*. This Plan was elaborated as a tool for information to the general public and a guidance on the actions towards the complete lindane remediation and it is evidence of success and a potential tool to inform al stakeholders about the problem, to make the undertaken action visible and to inform about de actions under development and planes and the resources needed.

As stated below (in the following section), Galicia will transfer the idea of launching a website to summarize all the information and to serve as a bottom-up channel.

Both good practices were shared with all involved parties during the First Interregional Thematic Workshop, organised by the Government of Aragon the 26th and 27th of November 2019.

Description of the action

The Regional Government of Galicia plans to develop its transparency strategy on Lindane decontamination policies based upon two pillars:

Pillar I.- Transparency website (January-June 2022)

The main goal of this transparency website is to have a one-shot site that summarizes all the information managed by Public Authorities on the Strategies to fight against Lindade pollution:

- Policies already implemented and being implemented:
- Decontamination
- Follow –up
- EU projects.
- Pilot projects
- Other policy initiatives

Once the Governance Structures are settled (mainly, the Institutional Committee), we also plan to include information and contacts of competent public authorities.

As this is a quite straight initiative, no middle steps are need. We expect to finish this website by the end of June 2022.

Pillar 2. Communication Improvement. (January-December 2022)

The aim of this sub-action is to build up an effective environmental communication strategy to inform about Lindane pollutions and policies to fight against Lindane pollution.

In a solid commitment with transparency, the Regional Ministry of Environment plans to regularly meet with the Social Committee, which is meant to play a twofold role:

- a. To serve as a bottom-up channel to receive and capture non-formal local knowledge about Lindane pollution (i.e. Location of spots, perceived effects...): meetings with the Social Committee must allow to capture non formal information about Lindane dumps, but especially to give information to the Regional administration about the perceived effects of policies under way.

Therefore, a communication strategy, which currently does not exist, should serve to: 1) receive inputs that allow feedback on policies to combat Lindane, 2) provide simple and effective information to interested parties on the initiatives that are being implemented.

- b. The Communication Strategy is aimed to play a role in effectively communicate scientific information in an “easygoing” way. For doing so, we plan to select experts (scientist) who have experience and credibility and can formulate messages for a general (and reluctant) audience.

Players involved

Besides the Regional Ministry of the Environment (the sponsor of this Action), the action’s success has a critical point: the performance of the Social Committee.

Currently, the communication strategy must face a reluctant audience, conditioned by a confirmation bias (“the lack of information is a symptom of lack of collaboration and poor expectations about the outcomes of policies to fight against lindane pollution”). Therefore, a transparent communication strategy must have the Social Committee has its main bottom-up communication channel.

Improving policy instruments

In a similar vein, this action could **change the management of the policy instrument** (ERDF Operational Programme 2014-2020, priority of investment 6a), specially changing the management (and the evaluation of management measures) of potentially contaminates sites. In fact, this action implies the adoption of a communication strategy that currently does not exist and is aimed to overcome resistance against the implementation of decontamination policies, mostly due to lack of transparency and lack of knowledge.

The launch of a website will make all the necessary information available for citizens, presenting information in a sound but friendly format. This way, this action will play a significant role to gain reluctant audiences and to raise awareness about Lindane pollution.

Therefore, this action will improve the effectiveness of the selected policy instrument: transparency in any of the actions developed under the PI will help to overcome the frequent reluctant reactions of local population (mostly attributable to a lack of information about the PI).

On the other hand, the communication strategy exposed would be a mechanism of transparency which could pave the way for receiving inputs and feedback on policies against Lindane pollution. It could also provide simple and effective information to interested parties on the initiatives launched by the regional government. After all, authorities will be closer to local population and will get feedback in case of disappointment or disagreement with the adopted measures.

Estimated costs:

The website and communication strategy will have an **estimated** cost of **9,000 €**, as external assistance, which will be paid in phase 2 of the project.

Time frame

We expect that the design and implementation of the Transparency strategy will last from January to December 2022.

Action 3: "Early warning and action protocol in cases of lindane residue detection"

Background

One of the main problems of Lindane pollution in Galicia is the spreading of Lindane spots across a wide territory (the Municipalities of O Porriño and Ponteareas), and the misuse given to Lindane in the past: back in the 60's, population considered Lindane as an "efficient" construction material. Therefore, Lindane remains are scattered throughout the municipal territory, and in many cases, they are on private lands. The population does not know through which channels it must communicate the appearance of lindane residues in a land, what they must do, who they must notify, and what are the inherent dangers in the treatment of this highly polluting waste.

The rationale under this action is to provide a reliable channel of communication between the population and the competent administrations (Xunta and municipalities), through the **design and implementation of an early warning protocol in cases of the appearance of Lindane residues**.

Our source of inspiration

A factory was producing lindane in Aragon from 1975 to 1989. An estimate of more than 150,000 tons of solid waste with high content of HCH and other organochlorine compounds was produced, and dumped, together with liquid wastes in two landfills. This caused the most severe contamination problem in Aragon. Since 1994, the Government of Aragon implements actions for the control and containment of the contamination.

One of the main actions that is being carried out is to ensure the supply of drinking water and the quality of the irrigation water. The "Gállego river monitoring protocol to face of possible lindane pollution", coordinates several public administrations and **establishes an early alert system**.

Within this protocol, samples are taken and analysed in a daily basis in different points of the river Gallego. Results of the analysis are published daily on the website that the Government of Aragon has specifically created for providing information on the lindane waste contamination www.stoplindano.es.

Samples are taken by a set of automatic samplers installed in different points of the river. These samplers are integrated, being representative of 24 hours, being one sub-sample collected every 30 minutes. The integrated sample is

analysed, and results are published on the website the day of the sample collection.

It is important to highlight stakeholders of this good practice are 2,000 inhabitants that take water for drinking purposes downstream the affected sites.

Moreover, it is also important to outline that this **good practice**, named *"Publication of daily water analytics of the river Gallego in www.stoplindano.es"*, is an effective measure that ensures the public Health protection (working as an informative, safety and public health measure). This practice was shared with all involved parties during the First Interregional Thematic Workshop, organised by the Government of Aragon the 26th and 27th of November 2019.

Galicia has inspired in this good practice, and a similar protocol will be implemented, once a mapping of the affected areas has been carried out.

Following with our source of inspiration, we must add that for implementing this action in Aragon, several resources were needed to:

- Five automatic samplers
- Reactive and laboratory consumables for the analysis
- Human resources: laboratory staff to perform the analysis and workers to collect samples
- Transport: car rental and petrol
- Website creation and maintenance

The *"Gállego river monitoring protocol to face of possible lindane pollution"* contribute to the provision of the sufficient supply of good quality surface water. For this reason, the transfer of this practice is of interest to all Member States.

Its implementation is feasible in all Member States, nevertheless, economic resources needed are high since, in the case of Aragon, more than 1,500 samples are analysed every year for this purpose.

Additionally, an important effort has been made in the dissemination of this data for information and educational purposes.

This specific point is our source of inspiration: information and environmental education is a cornerstone to ensure the implementation of an environmental initiative when neighbours and population is directly affected.

Once environmental information about Lindane pollution will be made transparent, we will be in a position to unfold a reliable early warning protocol in cases of appearance of Lindane residues.

Transparency in the diffusion of data has been a successful strategy in Aragon. In the case of Aragon, the early warning system and its information stem from an automatic system of monitorization about the presence on Lindane resources.

In Galicia, however, the challenge is to design an early warning system based in the collaboration of neighbours, aimed to arise as the monitoring tool to find out where lindane is spread out.

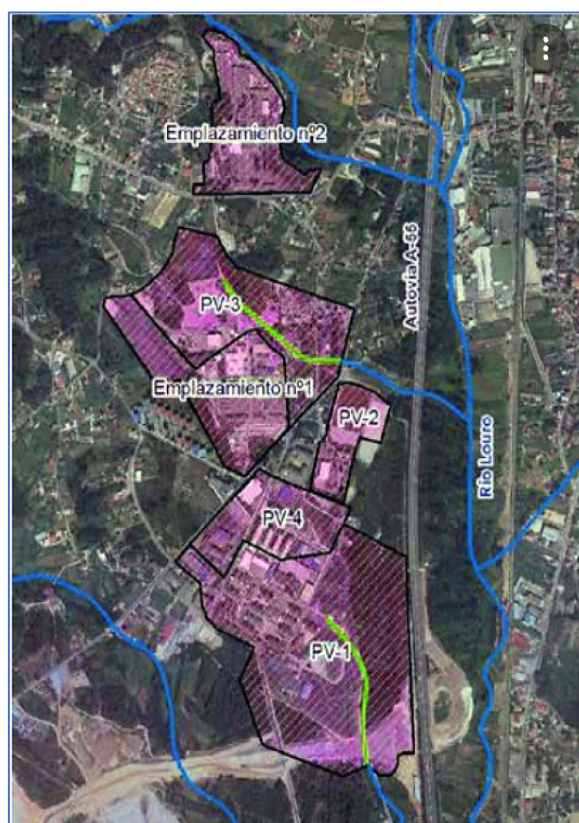
Description of the action

Any early warning system must be divided into 3 steps:

Step 1. Risk analysis (January 2021)

As mentioned before, Xunta de Galicia has already carried out a mapping in the city councils of O Porriño and its surrounding areas, which makes it possible to indirectly estimate the presence of lindane residues on both public and private lands.

Therefore, the competent regional authority on environmental matters, and promoter of this action plan, has already assessed the risk of the appearance of lindane residues, and is able to define an area in which to focus awareness-raising efforts to the implementation of this early warning plan.



Step 2. Monitoring and Warning (January -March 2022)

There are two possible ways of finding out Lindane residues in the area:

1) As in the case of Gállego river, Lindane residues can affect sediment, runoff, surface water and groundwater. The Miño-Sil River Basin Authority is already conducting periodical water analyses that may early alert about a pollution event. This is especially important, considering that there is an old HCH landfill in Torneiros that may affect water quality. However, its water analysis plays a crucial role as a hint for the presence of Lindane pollution in locations other than those already identified by the Regional Government.

2) However, the real challenge is to involve the local population the detection of Lindane pollution spots. The local population are the closest observers of Lindane pollution, as really tiny and widely spread Lindane residues can be found both in public lands (roads, pedestrian ways, rural roads), and also in private lands.

Therefore, the cornerstone of this action will be to identify the roadmap that any neighbour must follow if he/she finds Lindane residues whether in his/her property or in a public land.

All the players involved (Local Council, Regional Government and the River Basin Authority) will work together in the definition and dissemination of an early warning protocol that, following a “roadmap” philosophy, will show that citizens what to do and how to act in presence of Lindane residues.

As a first draft, this protocol might have the following steps:

1) Any citizen may firstly alert the Local Police, which holds responsibilities in environmental monitoring of soil waste and hazardous waste. We might consider the possibility of simplifying this procedure by means of implementing an inbox that anonymize any warning message. This can help to circumvent the barriers or fears that citizens may feel regarding this warning process.

2) The local police must alert the Regional Department of the Environment and the Miño-Sil River Authorities, which may have to conduct specific samples in the field.

3) Remediation action will be implemented, if possible, to clean the spot.

Step 3. Design, testing and full implementation (March-December 2022)

Therefore, the **design** of this action will evolve as follows (March-May 2022):

1) The Institutional Committee will work on defining the specific responsibilities of Local Authorities (Local Police), Regional Department of the Environment

(land samples, characterization of soil and, when possible, remediation actions) and River Basin Authority (sediments and surface water /ground water sampling).

2) The administrations involved will identify economic and material resources to implement remediation actions, mainly, cleaning the spots and mobilizing resources to ensure an ongoing monitorization of the spot and surrounding area and means (water and air).

3) The Regional Government will design a draft dissemination campaign. This campaign will be tested in areas already identifies as those with higher concentrations of diffuse Lindane residues.

The **implementation of the action** will be conducted as follows (May-September 2022):

1. Xunta de Galicia will prepare a draft early warning protocol, following a bottom-up policy style, i.e: it will ask and work together with all the administrations holding responsibilities in soil contamination. Local authorities and the River basin authorities will reveal their willingness and availability to make human resources available to the Protocol (Local Police), as well as material (equipment) and financial resources. Through work meetings, the responsibilities of each of the parties will also be bounded, in order to avoid competence gaps or overlaps in actions on the ground.

2. The dissemination campaign will be subjected to a pre-test among a small part of the population of O Porriño. The aim of the pre-test is to determine the penetration capacity of the campaign, but also to observe the willingness to collaborate (or resistance against collaboration) among the population.

The dissemination campaign and the protocol will be previously presented to the Social Committee, so that they are aware of it, and give their feedback.

Response capability by neighbours

It is worthy to point out that there is a major obstacle to ensure the population cooperation. Most of the time, neighbours hide the appearance of Lindane residues on their properties. This is due to the legal obligations derived from this finding, which obliges the owner to pay individually for the cleaning of the land. On many occasions, the owner of the land (where there are also usually houses) was unaware of the source of contamination. The obligation to clean it, in addition to the possibility of declaring the land as contaminated soil, represent an unaffordable burden for the owner. That is the reason why in O Porriño area there is a pact of silence around the presence of Lindane on private lands.

To minimize this obstacle, the Regional Ministry of Environment is analyzing the possibility of establishing a temporary regulatory framework that allows the

Administration to partially pay for the cleaning of these lands through subsidies charged to ERDF 2021-2027. The existence of an economic incentive could be the most effective means to ensure the success of the early warning protocol, since the most effective means of detecting diffuse lindane contamination is undoubtedly the collaboration of the neighbours.

Once the above-mentioned actions are finished, the Early warning Protocol will be reviewed and fully implemented in O Porriño (September -December 2022).

The main expected outputs for each phase are:

Phase | Step 1:

- Identification of areas where the Early warning protocol will be implemented

Phase | Step 2:

- Draft of a "roadmap" on the steps to be followed by any person finding Lindane residues.

Phase | Step 3:

- Differentiation of responsibilities to be assumed by each Administration.
- Mobilization of human, material and economic resources.
- 1 draft and pre-testing of the Early Warning protocol.
- At least 2 consultations with the Institutional and Scientific Committee.
- At least 1 consultation with the Social Committee.
- 1 draft of a dissemination Plan of the Early Warning protocol.
- Full Implementation of the Early warning and action protocol in cases of lindane residue detection.
- 5,000 people served (O Contrasto & Torneiros neighborhoods at O Porriño).

Players involved

The main stakeholders involved are:

O Porriño City Council	Xunta de Galicia, Regional Ministry of the Environment	Neighbours
<ul style="list-style-type: none"> •It holds responsibilities on environmental surveillance, handled through its Local Police. •It has responsibilities on many of the public lands (local roads, streets) where Lindane residues might be found. 	<ul style="list-style-type: none"> •It has the legal administrative responsibilities in environmental policy, and specifically on soil pollution. •It handles Regional ERDF funds. •It directs and coordinates the scientific committee. 	<ul style="list-style-type: none"> •The success of the Early Warning Protocol strongly relies on their willingness to cooperate. As already pointed out, their willingness to cooperate depends on the ability of the Administration to alleviate its responsibility in the cleaning of their properties.

Improving policy instruments

Galicia has the challenge to design an early-warning system based in the collaboration of neighbours, aimed to become the monitoring tool to find out where lindane is spread out.

This action may involve a **change in the management of the policy instrument** but could also favour the creation of new projects.

On the one hand, an Early warning protocol could enable the identification of affected areas and clarify the responsibilities of each administration in order to clean it. So that, it will be **an improvement in the management of potentially contaminated sites, regarding to ERDF Operational Programme 2014-2020** and it will be such a huge improvement in the current way of evaluating management measures of soil contamination, because this action will allow the implementation of new measures of decontamination under the PI, in cases of lindane residue detection, involving all competent authorities.

On the other hand, this protocol could be **useful for new projects**, because this action is the cornerstone to decide how to act in case detection of Lindane pollution and for controlling and monitoring affected areas. For example, for the installation of automatic samplers in different points of the Louro river to have a more periodic and real sampling; or for the identification and mapping of other contaminated areas near to O Porriño mapped area; or for the implementation of cleaning actions based on new techniques; or to mobilize people to take part in different actions to combat lindane contamination.

It could also be the source of inspiration of other protocols such as a health surveillance protocol.

Last, but not least, this action may be the **source of inspiration for the change in the strategic focus of ERDF 2021-2027 in Galicia**. As stated lines above, the Regional Ministry of Environment is analyzing the possibility of establishing a temporary regulatory framework that allows the Administration to partially pay for the cleaning of these lands through subsidies charged to ERDF 2021-2027. The existence of an economic incentive could be the most effective means to ensure the success of the early warning protocol, since the most effective means of detecting diffuse lindane contamination is undoubtedly the collaboration of the neighbours.

Time frame

From January 2022 to December 2022.

However, we expect that the full implementation of this action will take longer than the project period.

Costs (if relevant)

The following **estimated** costs will be paid by own Xunta funds:

Type of cost	Amount
External assistance to prepare a draft "roadmap" on the steps to be followed by any person finding lindane residues	2,500 €
External assistance to prepare a draft early warning protocol	8,000 €
External assistance to prepare a dissemination campaign	7,000 €
TOTAL COSTS	17,500 €

Funding sources (if relevant)

The Regional Ministry of the Environment is considering the possibility of investing ERDF funds stemming from the Regional Operational ERDF plan 2021-2027 for this issue. ERDF is actually being drafted. However, this action applies to **ERDF Operational Programme 2014-2020**, and will suppose an improvement in the management of the policy instrument thanks to a new methodology for monitoring soil contamination and/or ex-ante evaluating management measures of soil contamination.

Action 4: "Periodic monitoring of the Security Cell of Torneiros"

Background

As we say above, elevated concentrations of lindane residues, averaging 26.4mg/kg, were detected in Torneiros during the 90's.

The Security Cell built, in approximate UTM 530650/4666480 H29, between the year 2000 to 2001, is in the southern area of several industrial estates, in which it has identified the presence of manufacturing residues of the pesticide Lindane (isomer γ -HCH).

This area was initially used as a quarry for the extraction of aggregates. It was later filled with rubble and industrial waste that included the manufacturing remains of Lindane (HCH isomers and manufacturing remains), among others.

In the specific area there are fillings with variable thicknesses (minimum of one meter) and averages up to 5 meters, with a maximum of 10 meters. In addition, the presence of groundwater associated with natural sedimentary materials (sands, gravels and river clays) has been identified in the plot and that are also identified in the thickness of the waste.





The area has a high rainfall regime (> 1000 mm per year) and drains an extensive area towards the base level and main artery, which is the Louro River, located just 250 meters from the HCH waste cell. In addition, there are inventoried wells and underground water for private use.

Due to the above, the HCH waste cell can be considered a source of affection towards the Louro river, being necessary to include surveillance actions that can assess the impacts.

According to the article 57 of the "*Ley 6/2021, de 17 de febrero, de residuos y suelos contaminados de Galicia*", the surveillance and control plans of the soil and associated groundwater are intended to monitor the possible effect that the quality of the soil and groundwater may cause the development of a potentially polluting activity.

For this reason, it is necessary to have an Environmental Monitoring Plan that allows to verify the tightness and safety, to incorporate the exclusive actions necessary for continuous and systematic surveillance of the HCH waste cell built, and to being able to assess and anticipate the possible or foreseeable impacts on the Louro River.

In this image we can have a vision of the affected area.



Our source of inspiration

Our source of inspiration is the same as in Action 3: *"Gállego river monitoring protocol to face of possible lindane pollution"*. As we said before, within this protocol, samples are taken and analysed in a daily basis in different points of the river Gallego. These samples are taken by a set of automatic samplers installed in different points of the river.

An action like this is necessary for continuous and systematic surveillance of the HCH waste cell built, and for being able to assess and anticipate possible or foreseeable impacts on the Louro River.

Our source of inspiration (*Publication of daily water analytics of the river Gallego in www.stoplindano.es*) is also a recognized good practice, with evidence of success, considering that this practice allows citizens of all the municipalities downstream the contaminated sites to be informed in real time about the quality of their water supply. Not only it is an informative measure, but also a safety and a public Health measure.

As stated lines above, this measure was shared with all involved parties during the First Interregional Thematic Workshop, organised by the Government of Aragon the 26th and 27th of November 2019. Finally, Galicia will transfer the idea of monitoring an affected area and taking and analysing samples in a period of frequency, as we will see below.

Description of the action

The aim of this action is to monitor the possible effect that the quality of the soil and groundwater may cause the development of a potentially polluting activity in the Security Cell of Torneiros.

This monitoring will last for one year, with six-monthly controls. A visual inspection of the state of maintenance of the infrastructure and the presentation of a biannual report is also included in this activity of monitoring.

Expected results:

There will be different control points and parameters, that appear in the following table.

Kind of control	Control point	Coordinates (ETRS89 H29)		Period	Parameters
		X	Y		
Groundwater	P1	530713	4666408	Biannual	Phreatic level, ph., conductivity, temperature, alfa-HCH, beta-HCH, gamma-HCH, delta-HCH, epsilon-HCH
	P2	530649	4666400		
	P3	530642	4666418		
	P4	530716	4666337		
	P5	530559	4666403		
	P6	530699	4666596		
	P7	530678	4666483		
Surface waters	Louro1	530990	4665901	Biannual	Ph., conductivity, temperature, alfa-HCH, beta-HCH, gamma-HCH, delta-HCH, epsilon-HCH
	Louro2	531029	4667216		
Sediments	Louro1S	530990	4665901	Biannual	Ph., conductivity, temperature, alfa-HCH, beta-HCH, gamma-HCH, delta-HCH, epsilon-HCH
	Louro2S	531029	4667216		
Rainwaters	AP2	530680	4666594	Biannual	Ph., conductivity, temperature, alfa-HCH, beta-HCH, gamma-HCH, delta-HCH, epsilon-HCH
	AP3	530687	4666426		
	AP4	530619	4666389		
	AP6	530568	4666390		

As we can see, different control points will be spread around the Security Cell of Torneiros. The purpose is to have several kinds of control points to monitor different aspects and to have an overview of the entire area.

The final and sole objective of this Monitoring Plan is assessing the status and evolution of the main pollutants and matrices affected, anticipating risk situations and being able to quantify the impacts before, during and after any intervention in the area.

In the following picture, we can see where the piezometers will be located. The installation of piezometers will be useful to control the quality of groundwater.



Players involved

The following players will be involved:

- Dirección Xeral de Calidade Ambiental, Sostenibilidade e Cambio Climático; Consellería de Medio Ambiente, Territorio e Vivenda (Xunta de Galicia). This institution holds the necessary competencies and abilities, in accordance with article 10 of the *"Decreto 42/2019, de 28 de marzo, polo que se establece a estrutura orgánica da Consellería de Medio Ambiente, Territorio e Vivenda"* and in accordance with article 12.4 of the *"Ley 22/2011, de 28 de julio, de residuos y suelos contaminados"*.

This “Dirección Xeral” will exercise the competencies and functions in matters of evaluation and control of the incidence that human activity causes on the environment, the promotion of correction systems and strategies of said incidence, the evaluation of the effects of certain plans and programs on the environment, the management of the environmental observation and meteorological prediction systems of Galicia and the promotion of environmental research and technological development for the achievement of adequate environmental protection.

In addition, article 10 of the “*Ley 6/2021, de 17 de febrero, de residuos y suelos contaminados de Galicia*” determines the competence in matters of surveillance, inspection and preparation of monitoring plans.

- River basin authority (Confederación Hidrográfica Miño-Sil), which is fundamentally responsible for the Hydraulic Administration of the intercommunity basins regarding articles 19 and following of the “*Real Decreto Legislativo 1/2001, de 20 de julio, por el que se aprueba el texto refundido de la Ley de Aguas*”. They hold the competence for monitoring water quality in the river basin, and it will be responsible for this Action 3.
- Neighbour associations and environmental groups. These are the real “keepers” because water analysis will allow citizens to be informed, in a real time basis, about the water quality conditions. This measure has an informative part and a safety and public Health part.

Improving policy instruments

The aim of this action is to monitor the possible effect of the Security Cell of Torneiros as a diffuse source of pollution affecting the quality of the soil and groundwater. However, this action could enable the expansion of the monitored area or even increase the period and types of control.

Taking into account that neighbours use groundwater to irrigate their gardens, this action could be useful too for a **future project** related with sampling of consumer homegrown products (i.e. vegetables) and their impact on human health. Furthermore, it could be the basis for a study about food from animal local origin. For example, about dairy or meat from animals that graze near to the contaminated areas.

Finally, this action will **improve our policy instrument (ERDF Operational Programme 2014-2020)**, thanks to a new methodology for monitoring soil contamination and managing measures of soil contamination: installing

piezometers which will enable to control the quality of groundwater in the Security Cell of Torneiros.

Time frame

From January 2022 to December 2022.

However, we expect that the full implementation of this action will take longer than the project period.

Costs (if relevant)

The following **estimated** costs will be paid in phase 2 of the project.

Type of cost	Amount
External assistance for sampling	2,000 €
External assistance for sampling	2,000 €
TOTAL COSTS	4,000 €

*Two samplings will be necessary to implement this action (six-monthly controls).