Block 8

HCH IN THE EUROPEAN UNION

In stead of full documentation of each report we have included the summarized article EUROPEAN COOPERATION TO TACKLE THE LEGACIES OF HEXACHLOROCYCLOHEXANE (HCH) AND LINDANE that includes all the in and outs of the project. This article is also available at https://www.sciencedirect.com/science/article/pii/S2405665022000038

EUROPEAN COOPERATION TO TACKLE THE LEGACIES OF HEXACHLOROCYCLOHEXANE (HCH) AND LINDANE

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Summary

Hexachlorocyclohexane (HCH) waste isomers from lindane production are the largest single POPs legacy, with an estimated 4.8 to 7.4 million tonnes of disposed waste. A large part of this waste – 1.8 to 3 million tonnes – was disposed in Europe, where many lindane producers were located. This short paper provides an overview of the project supported by the European Union (EU) to address this waste legacy and to implement the Stockholm Convention for the POP group of HCH (lindane/gamma-HCH, alpha-HCH and beta-HCH) with associated protection of soil, ecosystems and human health. We summarise the results of this EU financed project called the "HCH in EU project", which aimed to develop a systematic inventory of sites where HCH was handled and potentially resulted in contamination. The compiled information provides guidance for competent authorities to further develop their national inventory of potentially HCH contaminated site and to further develop a strategy to address this large POP legacy in future. The systematic inventory revealed that there were at least 299 sites where HCH was handled. These sites include 54 former production sites, 76 pesticide processing plants that used lindane, 59 uncontrolled HCH waste isomer deposits, 29 landfills with HCH waste, 34 former or current storage sites for stocks of obsolete pesticides including technical HCH and/or lindane, and 16 HCH sites with a POP treatment or disposal facility. Additionally, at 31 of these sites lindane/technical HCH was used in applications with significant risk of soil pollution, such as wood treatment. The number of sites in this latter category is likely higher and will need further assessment. In addition to this inventory, the "HCH in EU project" produced detailed country inventory reports, a guidance document for how to find potentially HCH-impacted sites, and a strategy document for implementing the sustainable management of these sites EU-wide, with proposed actions at the EU, country, and site level. Furthermore, the project has facilitated information exchange and – together with other related EU projects – has led to sharing information and best practices among member states. The project also enhanced the formation of an informal network of authorities and other stakeholders working on the lindane/HCH waste legacy. This collaboration will facilitate a more systematic and better coordinated process to further assess, secure, and remediate the large HCH waste legacy and reduce and control lindane/HCH releases in the EU and possibly beyond. Such a coordinated effort and exchange of information for inventorying and managing contaminated sites might also be useful for other POPs such as PFOS/PFOA or dioxins.

Introduction

Hexachlorocyclohexane (HCH) was one of the most extensively produced pesticide, industrially manufactured mainly after the Second World War (Vijgen et al. 2011). HCH was available in two formulations: technical HCH and lindane. Technical HCH contains the following percentages of HCH isomers: 55-80% alpha (α), 5-14% beta (β), 8-15% gamma (γ), 2-16% delta (δ), and 3-5% epsilon (ε) (Willet et al. 1998). Of these HCH isomers only the γ -isomer has specific insecticidal properties (Ulmann 1972; UNEP 2006). Lindane contains more than 90% γ-HCH and is produced by separation of the γ-isomer from the technical HCH mixture (UNEP 2006; Vijgen et al 2011).

The production and application of lindane and technical HCH during 1940s to 2010 have resulted in environmental contamination of global proportions (Li 1999; Vijgen, 2006 a, b; Vijgen et al., 2011). For each tonne of lindane, 8-12 tonnes of

other HCH isomers were produced as unwanted by-products (Vijgen et al. 2011). Therefore, the production of the approximately 600,000 tonnes of lindane has generated 4.8 to 7.2 million tonnes of HCH waste isomers (Vijgen et al. 2011). This HCH POP-waste was mostly dumped uncontrolled at many sites in the former producing countries around the world (Vijgen 2006; Vijgen et al. 2011). Therefore for HCH, the major contaminated site load and risk is at and around former lindane production sites (Vijgen et al. 2011).

In May 2009, α-HCH, β-HCH, and lindane (industrial γ-HCH) were listed in the Stockholm Convention as persistent organic pollutants (POPs) due to their persistence, toxicity and long-range transport. Thus, as listed POPs these HCH isomers need to be addressed globally, including the obsolete stockpiles and large waste volumes remaining as a legacy from the historical production, use and disposal of HCH (Vijgen et al. 2011, 2019).

Most of the production and use of lindane took place from the 1950s to the 1990s in Europe. This resulted in HCH pollution and an estimated 1.8 to 3 million tonnes of deposited HCH waste isomers from the production of 290,000 tonnes of lindane (Vijgen 2006a,b; Vijgen et al. 2011, 2019). In a recent study Vijgen et al. documented for three of the European HCH-contaminated production/disposal sites that the footprint of pollution can increase over time (Vijgen et al. 2019). The study also highlighted the lack of activities on the part of former HCH producing countries to manage their large HCH waste deposits and fulfil their obligations as Parties to the Stockholm Convention (Vijgen et al. 2019).

Legacy POP pollution, especially in soils and sediments, is a contemporary issue and human health risk since these POPs can accumulate in free range cattle and chicken, which can lead to human exposure (Weber et al. 2018, 2019). For example, the surroundings of an HCH production site in a rural area along the Sacco river (Sacco Valley, Central Italy) were found to be contaminated with HCH (in particular the more persistent waste isomer β-HCH), which has resulted in HCH-contamination of cows and cow's milk above regulatory limits (European Commission Regulation No 149/2008) as well as human blood in the area (Porta et al. 2013; Fantini et al. 2012;). Additionally, HCH released from such waste deposits can leach into ground water and surface water (Wycisk et al. 2013a,b; Fernandez et al. 2013) and result in contamination of fish. The release of POPs from landfills and other deposits can strongly increase due to flooding events (Crawford et al. 2022; Weber et al. 2011), resulting in increased HCH (or other POPs) levels in surface water and in fish, as observed in the Elbe river after a flooding event in 2002 downstream of the former HCH production sites in Bitterfeld and Hamburg (Wycisk et al. 2013a,b).

The European Union and its Member States are Parties to the Stockholm Convention, which was first implemented in the EU law by Regulation (EC) No 850/2004 to assess, manage, and eliminate POPs (European Parliament and Council of the EU 2004). That regulation was recently replaced by the recast Regulation (EU) 2019/1021 on POPs (European Parliament and Council of the EU 2019). The EU developed a first 'Community Implementation Plan' (CIP) in 2007 (SEC (2007) 341). The CIP was first updated with a 'Union Implementation Plan' (UIP) in 2014 (COM (2014) 306 final), and further updated in early 2019 (COM(2018)848 final). Within the UIP, the European Union has financed several projects to assess and address the HCH POP legacy in Europe. An inventory of POPs waste and contaminated sites is a prerequisite for the proper management. Furthermore, the responsible authorities need support for managing, regulating, securing, and remediating large contaminated sites and waste deposits. Therefore, the EU financed this project aiming to develop an inventory of HCH production sites, waste deposits, landfills, and treatment centres in the EU, and to assist local, regional, or national public authorities confronted with lindane and HCH-related issues by providing them with support, expertise, advice, and consultancy. Our paper summarizes the major outcomes of this project published in a recent full paper (Vijgen et al. 2022).

Results and discussion

Intro "HCH in EU project" reviewing the presence of lindane and HCH sites in the EU

The project consortium consisted of TAUW, CDM Smith Europe GmbH from Germany, and Sociedad Aragonesa de Gestión Agroambiental (SARGA) S.L.U from Spain. Because the project spans various international parties and locations, good cooperation and sharing of information was/is essential. To facilitate this, the project uses tailor-made digital environments including a Geographic Information Model (GIM) to collect, organise, store, interpret, assess, and report all inventory data from the different locations. The GIM Viewer is available to the project team members, the European Commission, and project stakeholders, and will be made available to the public.

The project consortium conducted the "HCH in EU project" to evaluate and address the presence of lindane and HCH in the EU. This pilot project included the following objectives (Vijgen et al. 2022):

1. Provide an overview of the legacy of the lindane and technical HCH production in Europe;
2. Assist EU activities currently developing best practices for the sustainable management of HCH

contaminate sites at six HCH contaminated pilot test sites;

3. Provide a report on the use and legacy of HCH in the EU, as a guide to help identify further potentially HCH-impacted sites in addition to the ones already in the inventory;
4. Provided a guidance to develop an EU-wide strategy to sustainably manage HCH-impacted sites, to address the legacy of HCH and lindane in the EU.

Webinars including a final workshop were conducted within the project to inform policy makers and other stakeholders as well as the interested public (https://lnkd.in/dzbJ_hD).

Inventory of HCH sites in EU

As mentioned above, a major goal of the "HCH in EU project" was the development of an inventory of sites where HCH/lindane was handled and disposed of in the past. The inventory of a POP is the basis for managing that specific POP and prioritizing action. In our earlier review of the lindane production and HCH legacy, we already compiled the major countries that had HCH/lindane production and their estimated amounts of disposed waste isomers (Vijgen et al. 2011).

One of the tasks of the "HCH in EU project" was to make an inventory of potentially HCH-impacted sites in Europe. By this project now all inventory data for the discovered sites where HCH was handled or disposed in all the EU member states are stored in the Geographic Information Model (GIM). This enables now countries to localize sites where it is confirmed that HCH was handled and therefore could be potentially impacted by contamination (see Figure 1). For each EU country a report providing a country specific list of such sites was developed (number of sites in Table 2).

The "HCH in EU project" found a total of 299 sites where HCH and lindane have been handled (Table 1 and 2). These sites were subdivided into 7 categories (see Table 2 and description in section 3.3): Of these, 54 were former production sites which were estimated to be high-risk sites, with potentially significant impact on people and the natural environment. Many of the high-risk sites are mega-sites with large amounts of deposited HCH waste and extensive contamination of soil and groundwater, which is still spreading into the environment. Furthermore, there are 59 uncontrolled HCH waste deposits, 29 landfills with HCH, 76 pesticide formulation plants that used lindane, 34 current or former storage sites for stocks of obsolete pesticides including HCH or lindane, 16 HCH and lindane treatment or disposal sites, and 31 other sites where lindane or technical HCH was used or handled. Lindane was used in a wide variety of formulations, including: wettable powders; emulsion concentrates; suspensions; solutions; dusts and powders; granules and coarse dusts; baits; preparations for fumigations, aerosols, and special formulations such as powder, solutions, and creams for the use in the fields of human and veterinary medicine, wood treatment or use as plastic additive in addition to the major use in agriculture (Ulmann, 1972).

Because of these diverse uses and formulations of lindane and considering the lindane life cycle (see Figure 2), it is important to further investigate the category of 'other' sites which is certainly much larger than the 31 sites compiled in this first inventory also including the application sites. This to alert authorities and owners of such sites where the onsite use of lindane might have resulted in soil contamination.

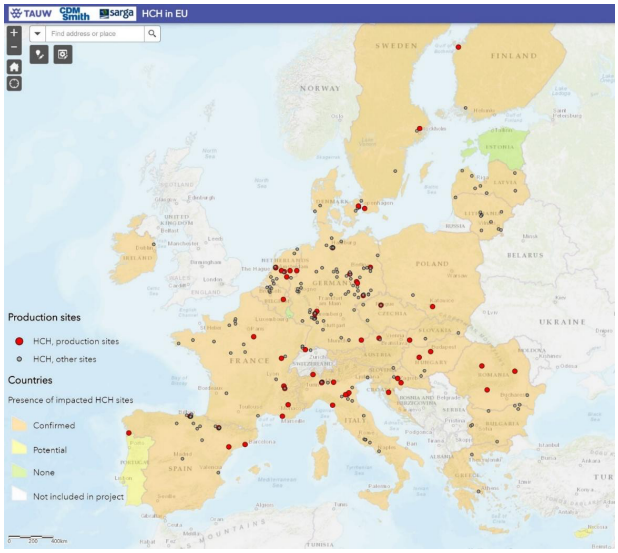

FIGURE 1: EU OVERVIEW MAP WITH 299 IDENTIFIED SITES WHERE HCHS WERE HANDLED, INCLUDING 54 HIGH-RISK SITES (VIJGEN ET AL. 2022).

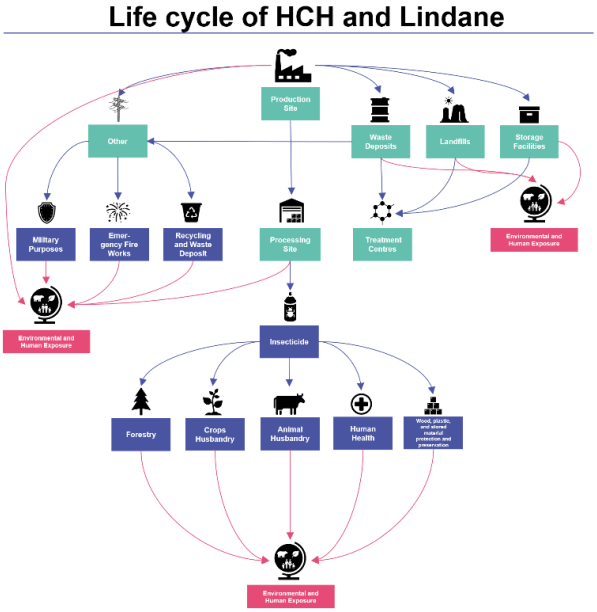

FIGURE 2: LIFECYCLE OF FORMER HCH PRODUCTION AND USE AND CONTEMPORARY IMPACT ON THE ENVIRONMENT AND HUMANS (VIJGEN ET AL. 2022)

In the first phase of the project, the different categories of sites were HCH was handled were defined to develop a systematic approach for

inventory development for the pilot countries. This provides a methodology for other countries to develop HCH inventories through a systematic assessment of the different site types.
Tables 1 provides an overview of the site types and Table 2 gives the number of sites where HCH is/ was handled for each of the 27 EU countries. As mentioned, a total of 299 sites have been identified in the EU where lindane and/or HCH were handled. Many other sites are suspected to have handled HCH/lindane in particular the application sites other than agricultural use (e.g. wood treatment sites, military uses or cable production), however the evidence uncovered as part of this project was insufficient to confirm more of these sites, therefore they were not added to the inventory.

Assisting site owners with best practice (Task 2 of the "HCH in EU project")

Task 2 of the "HCH in EU project" was to assist site-owners with best practices on sustainable contaminant site management at seven HCH-contaminated pilot sites. The resources provided to these pilot sites are available as reference to those involved in the remediation of similar sites. The consultancy included (1) developing a site road map depicting how to manage the site in a sustain manner,(2) an action plan of consultancy work that could be carried within the scope of the "HCH in EU project" and (3) selected consultancy services from these action plans focused on technical and organisational support. These activities included the development of 3D conceptual site models, remediation planning, cost estimates, set-up of stakeholder support groups and, analysis of HCH biodegradation in groundwater. All activities were reported, and these reports are available for consultation. The subjected HCH contaminated sites from Task 2 were: 1) Wintzenheim in France, 2) Mulde River in Germany, 3) Sardas Inquinosa Sabiñanigo in Spain, 4) Valle del Sacco Colleferro in Italy, 5) Hajek in Czech Republic, and 6) O Porriño in Spain) and Vrakuňa site in Slovakia.

TABLE 1: SUMMARY OF THE EU-WIDE INVENTORY OF SITES WHERE LINDANE AND HCH HANDLING WAS CONFIRMED DEVELOPED AND COMPILED WITHIN THE "HCH IN THE EU PROJECT" (VIJGEN ET AL. 2022)

Category	Description	Number	Remarks
Production sites	Sites where technical HCH and/or lindane were produced	54	When not remediated, these are mostly high-risk sites close to urban settlements, often with HCH-waste deposits.
Processing sites	Sites where technical HCH and/or lindane were processed or formulated into market-ready pesticides	76	This is only the tip of the iceberg, as most pesticide producers between 1950 and 1980 used lindane.
Waste deposits	Sites where lindane production wastes (HCH) were dumped without proper containment	59	Often in the direct vicinity of production sites; when not remediated, these are mostly high-risk sites.
Landfills	Sites where lindane production wastes (HCH) were disposed of with some containment measures	29	These sites are usually connected to large production facilities. The distinction between landfills and waste deposits is vague.
Storage facilities	Storage facilities for obsolete stocks of POP-pesticides, including lindane and HCH	34	Present in former socialist countries, these sites are often large collection points of obsolete pesticides where lindane is only a minor component.
Treatment centres	Incineration facilities, soil treatment centres, and recycling centres	16	These facilities are state of the art and operate in controlled environments. Environmental impacts of HCH released from these locations are unlikely.
Use sites other than agricultural use	Sites that do not fall under the above categories, but lindane/technical HCH was used there for other purposes. Examples include wood treatment/preservation facilities.	31	Alternative uses of lindane in products were found during the inventory project. These are described in a separate project report to help further expand the country specific site inventories.

Guidance for countries to identify sites potentially impacted by HCH

In addition to the two above-mentioned project tasks, the "HCH in EU project" team produced a report with guidance for identifying other sites potentially impacted by HCH contamination (Fokke and Bensaïah 2021). This document provides insight for authorities regarding sites where HCH might be a (co)contaminant of concern, in addition to other contaminants of concern at such sites. The document aims to direct stakeholders tasked with the management of contaminated sites to identify other sites potentially contaminated with HCH, in addition to the sites already identified in the "HCH in EU project", which will be listed on the EU website.
The following activities were taken to provide information on the former use of lindane in this report.

1. Review the Legacy of Lindane HCH Isomer Production published on January 2006, and update the existing information.
2. Study literature on potential HCH-contaminated sites other than production sites, waste deposits, landfills, treatment centres, storage facility,

processing facilities from the "HCH in EU project" inventory.
3. Select and present several examples from the current inventory
4. Compile a comprehensive report discussing the whole spectrum of lindane production and use in the EU
5. Guidance to develop an EU-wide strategy to sustainably manage HCH-impacted sites

TABLE 2: OVERVIEW OF IDENTIFIED SITES WHERE HCH/LINDANE HANDLING WAS CONFIRMED DEVELOPED AND COMPILED WITHIN THE "HCH IN THE EU PROJECT" (VIJGEN ET AL. 2022)

Country	Total Sites	Production sites	Processing sites	Waste deposits	Landfills	Treatment centres	Storage facilities	Other
Austria (AT)	2	1	0	1	0	0	0	0
Belgium (BE)	6	1	3	1	0	1	0	0
Bulgaria (BG)	7	0	0	0	0	0	7	0
Croatia (HR)	2	1	1	0	0	0	0	0
Cyprus (CY)	0	0	0	0	0	0	0	0
Czech Republic	4	1	1	0	1	0	0	1
Denmark (DK)	8	1	5	2	0	0	0	0
Estonia (EE)	0	0	0	0	0	0	0	0
Finland (FI)	3	1	1	1	0	0	0	0
France (FR)	38	6	7	13	2	2	0	8
Germany (DE)	98	12	32	20	13	11	6	4
Greece (EL)	2	0	2	0	0	0	0	0
Hungary (HU)	5	1	3	1	0	0	0	0
Ireland (IE)	1	0	0	0	0	0	0	1
Italy (IT)	38	8	8	6	0	0	0	16
Latvia (LV)	7	0	0	0	0	0	7	0
Lithuania (LT)	10	0	0	1	0	0	9	0
Luxembourg (LU)	0	0	0	0	0	0	0	0
Malta (MT)	0	0	0	0	0	0	0	0
Netherlands (NL)	18	7	6	0	2	2	1	0
Poland (PL)	3	1	0	0	1	0	1	0
Portugal (PT)	0	0	0	0	0	0	0	0
Romania (RO)	12	3	1	7	0	0	1	0
Slovakia (SK)	5	1	1	0	1	0	2	0
Slovenia (SL)	2	1	0	0	1	0	0	0
Spain (ES)	22	6	2	6	8	0	0	0
Sweden (SE)	6	2	3	0	0	0	0	1
Total	299	54	76	59	29	16	34	31

The "HCH in EU project" provided added value by delivering guidance to develop an EU-wide strategy to sustainably manage HCH-impacted sites and provide a permanent solution to the legacy of HCH and lindane in the EU. This guidance document (Vijgen 2021) proposes an outline for a strategy to finally address the legacy of lindane production in the EU (Annex 1). This guidance is meant to inform the development of an EU-wide strategy to manage the 299 or more sites potentially impacted by HCH and lindane. The main target audience are policy makers, who can continue supporting the sustainable management of these POPs contaminated sites. Several steps are recommended to be taken at the country, regional, and site level to, once and for all, solve the problems around the legacy of past lindane production in the entire EU.

The strategy highlights that in order to solve these environmental problems, decision makers on the different levels must realize that this is an environmental legacy that needs to be solved and

that the installation of one or more financial instruments (supplementing the Member States' own investments) to pay for the long-term, expensive, and complex EU-wide clean-up campaign is crucial. If this legacy receives the political priority it deserves and financial instruments are set in place, the EU soil remediation community is resourceful enough to solve the technical issues around the identification, the characterization, and finally the remediation of these sites.

An EU-wide strategy for managing HCH-contaminated site sustainably provides several advantages:

1. Leverage the successes in assessing and managing sites in Member States to prevent each country from trying to reinvent the wheel and make the same mistakes;
2. Facilitate and stimulate countries learning from each other;
3. Provide financial instruments for countries with fewer resources available to deal with this environmental legacy;
4. Guide and support parties that have taken the initiative to sustainably manage these sites.

Conclusion

A range of projects to address the HCH legacy have been conducted in the EU. "The HCH in EU project" developed the first comprehensive and structured inventory of sites where lindane/HCH was handled in Europe along the life cycle of production, use, and disposal. The 299 locations identified included 54 priority sites from lindane production and HCH disposal. These should be further assessed and addressed, as they may have the highest HCH release and exposure risk. Climate change and related flooding risks should be considered when assessing future risks of contaminant release.

A report detailing the assessment was developed to help local and regional authorities further refine the inventories and generate more information to best secure and remediate high-risk sites (Fokke and Bensaiah (2021)). The network of authorities responsible for large HCH sites should further be strengthened. A strategy report with needed tasks and actions was also developed to support competent authorities, including the EU institutions, to further address the HCH legacy in Europe.

The first complete excavation and destruction of a large HCH deposit was completed in France in 2019 by the owner of the site and has demonstrated that this is feasible. In particular, for priority sites with high risk of contaminant release and exposure, site remediation is a sustainable solution since it does not pass on this pollution legacy to the next generation. While the cost of such excavation might be high, it is comparable to or even lower than the long-term cost of containment, which frequently involves pumping, monitoring, and other containment measures with costs that add up over decades and centuries. The indirect costs of human health impact on a global scale are impossible to assess but are likely significant and provide a reason to manage these sites in a sustainable manner.

Cooperative assessments of POPs contaminated sites can facilitate information exchange among affected member states. Similar HCH production, formulation, use, and disposal sites exist in Africa, Asia, and South America. Experiences gained in Europe could possibly be transferred to developing countries, taking their circumstances into account. Alternatively, developing countries with large HCH legacies from production could possibly be included in the EU network for sharing experiences and lessons learned.

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ANNEX 1: MATRIX OF PROPOSALS FOR AN EU-WIDE STRATEGY TO ELIMINATE THE LINDANE PRODUCTION LEGACY

LEVEL	Identify the magnitude of the problem	Explain the need to act & Raise awareness	Develop legislation	Create HCH ownership	Build capacity	Risk-based prioriti-sation	Connect with funding program-mes	Establish covenants between stake-holders & authorities	Construct regional develop-ment asso-ciations	Add value to the remedi-ation site	Mitigate/ control/ contain environme ntal risks	Know why sustainabl e manage-ment is obstructed
EU-institu-tions	EU-wide inventory (Present) EU funded projects (Ongoing)	Publish paper: Need to eliminate Lindane production legacy	Develop legislation	Convince national authorities of the impor-tance	Organize and finance R&D projects		Facilitate & stimulate	Stimulate	Stimulate			
EU Parlia-ment	Respond & act on concerned stakeholder petitions		Establish EU legal frame-work for soil protection (Soil Strategy proposed) & prioritize HCH contami-nated sites									
Stake-holders*	Demonstrate the problem & Submit petitions	Promote, Participate & create public pressure	Partici-pate in public consultati on	Monitor & report progress			Promote					
LINDA-NET	Support	Support & promote	Support based on needs of members	Extent and expand LINDA-NET after 2025	Establish EU community of practise, set up & extend knowledge centre	Support	Facilitate & initiate	Support & promote	Support & promote	Support & promote	Support	Support
Autho-rities	Detail the country specific inventory (To be completed)	Inform citizens & stake-holders	Support the Soil Strategy introducti on and its implemen tation, develop, adapt & enforce legislation (Varies per EU member state)	Support	Facilitate pilot projects &educate	Assess preliminar y sites & risks (Use standards and guidance)	Reserve national / regional funding & apply for EU funding to co-finance	Contract stake-holders to co-finance	Contract stake-holders to co-finance	Develop urban & regional develop-ment plans & make cost benefit analysis	Facilitate, co-fund & Enforce (legis-lation)	Communi cate with local authorities
Stake-holders*	Participate & demonstrate the problem	Participate, support create public pressure	Partici-pate in public consul-tation	Set up regional/ national stake-holder organi-sation (like in Spain)	Participate	Participate	Apply national / regional funding & EU funding to co-finance	Participate	Participate	Participate & contribute	Participate	Participate
LINDA-NET	Support & encourage national authorities to complete inventory	Support & promote	Support	Set up LINDA-NET chapter in each country with potential HCH impacted sites	Establish National commu-nities of practise, set up & extend knowledge centres	Support	Apply for national / regional funding & EU funding to co-finance	Participate	Participate	Support	Support	Support
Site autho-rities	Permit, supervise evaluate (legislation)	Inform site owner & stake-holders	Apply & enforce	Develop-ment sustainable long-term town plans including HCH-sites together with site owners	Participate in R&D projects & facilitate pilot projects	Communic ate, Support & advice owner	Reserve municipal budget & apply for national / reginal funding & EU funding to co-finance	Participate	Participate	Develop urban developme nt plans & make cost benefit analysis & create project teams	Permit, supervise & Evaluate (legis-lation)	Communi cate with owner
Site owner	Detailed site assessment (guidance)	Participate & request for assistance when needed from Site authorities		Approach authorities for participati ons in town plans	Partiicipate in R&D & Pilot projects	Assess sites & risks in detail (Use standard & guidance)	Apply for municipal & national / regional funding & EU funding to co-finance	Participate	Participate	Contract stakeholde rs to co-finance	Survey, design, tender, contract & implement (Guidance)	Identify bottleneck s (Know current site status)
Site Stake-holders*	Participate	Participate		Set up site-specific stake-holder organi-sation & participate	Participate in pilot projects	Participate	Support	Participate	Participate	Participate	Participate	Participate

***ENSURING STAKEHOLDERS ARE REPRESENTED AT SITE-, COUNTRY- AND EU-LEVEL**

INTRODUCTION HCH IN EU PROJECT

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Abstract

The two objectives of the HCH in EU project were (1)obtain an overview of the legacy of Lindane and Technical HCH production in Europe (2) assist six site authorities to sustainably manage HCH-contaminated sites. The main project deliverables are an EU-wide inventory of sites that may be contaminated with HCH and Lindane, as well as consultancy services for authorities in relation to six HCH contaminated sites. Other deliverables are a report about the use and legacy of HCH in the EU, support in developing an EU-wide strategy for sustainably managing HCH-impacted sites and feedback on the selected remedial approach of the Vrakuňa site in Slovakia.

INVENTORY RESULTS FOR GERMANY

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Abstract

The inventory demonstrates that Germany has 80 sites for which handling of HCH/Lindane could be confirmed or where sufficient evidence existed for such actions. Another 23 sites were identified, where handling of HCH/Lindane could be confirmed or sufficient evidence existed, but which could not be located due to different reasons (e.g., lack of data). For 81 sites it was not possible to clarify whether these sites were relevant for this inventory (e.g., distinction between formulator and supplier). It can be assumed that the available results of the site research in Germany are not complete. Sites, for which certain data use restrictions apply, were not considered. Also, the main focus was on the use of HCH/Lindane as a pesticide. Due to the wide range of possible uses for this substance, focusing on a different area of application (e.g., wood preservatives, hygiene) may result in additional relevant sites and sub-sites (e.g., various waste deposit sites associated with a production site).

THE GEOGRAPHIC INFORMATION MODEL

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Abstract

One of the tasks of the HCH in EU project was to compile an inventory for sites that may have been potentially affected by HCH. The sites in this inventory include Lindane and HCH production and processing sites, waste deposits and landfills, storage facilities, and waste treatment plants. The inventory has been incorporated into a custom-made Geographic Information Model (GIM), which identifies sites that are known to have handled HCH and may thus have been impacted. For each EU member state, a report featuring a country-specific list of such sites was prepared. The 'HCH in EU' project has identified a total of 299 sites where HCH and Lindane were handled. 54 of these sites are expected to be high-risk sites, with significant potential impact on people and the environment. All consultancy deliverables are supplied on the EU website, together with the Geographic Information Model (GIM).

ROAD MAP TO SUSTAINABLY MANAGE HCH CONTAMINATED SITES

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Abstract

Based on the needs assessment an overview of what is needed to come to a complete sustainably managed (HCH-impacted) site is presented in a road map for the Sardas Landfill site and a road map for the O Porriño site in Spain. The activities of the Road Map are discussed through the four main aspects as discussed in the needs assessment and included actions that will be included in the Action Plan of the HCH in EU project and actions that could not be covered by this project:

1. What is needed to complete the CSM / to fully understand the contamination situation
2. When and how much funds are needed to enhance the sustainable management
3. What is needed to make decision makers aware of the situation and the necessity to act

Sardas Landfill

This site is a waste deposit in a ravine next to the Gállego river. The waste includes industrial waste of lindane production and other chemical industries; such as solid and liquid waste of HCH, mercury, caustic soda, hypochlorite, dichromates, dithiocarbamates, solid urban waste, construction and demolition wastes, etc. The estimated quantities are 50,000 to 80,000 m^3 of solid waste of HCH isomers in the form of dust, and 3,000 m^3 in liquid form (DNAPL). In the 1980's, the Sardas landfill reached maximum capacity, with a waste volume above 400,000 m^3. Between 1985 and 1988 a road was built and its trajectory cut off the front of the landfill. Because of these works, approximately 50,000 m^3 of waste from the landfill was moved to the bottom of the site.

O Porriño site

The O Porriño site concerns an extensive distribution of solid waste buried and disseminated throughout the Municipality of O Porriño. The buried solid waste has impacted the surface water and the groundwater. Through the surface and groundwater, the pollutants have spread throughout the entire basin of the Louro.

GUIDELINES SC POP CONTAMINATED SITE MANAGEMENT

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Abstract

The BAT & BEP Guidance for Management of POPs Contaminated Sites has been developed by the Expert Group on BAT & BEP under the Stockholm Convention, for use by parties and others seeking to implement sustainable and environmentally sound management of POPs contaminated sites. The guidance is structured into 10 Modules in a stepwise manner to allow the reader to build on their understanding of the approaches required to address POPs contaminated sites. Module 1 provides the background to POP contaminated sites. Module 2 is on the site assessment and the use of a Conceptual Site Model. Module 3 explains the rationale behind risk-informed decision making at contaminated sites and introduces the reader to the Tier 1, Tier 2 and Tier 3 risk assessment. Module 4 gives the principles and approaches for POPs Contaminated site Management and Remediation. Module 5 presents remediation technologies and techniques compiles information on technologies and techniques that are available to destroy POPs waste, treat contaminated soils, sediments, and solids and groundwater. Module 6 explains the technology Selection Tool for Remedial Options. Module 7 elaborates on the Stakeholder Engagement, Public and Worker Safety and Health. Module 8 is on how to get started providing information on the necessary Legislation, Policy, Inventory Development and Financing Remediation. Module 9 is a case study of a DDT remediation in Lâm Hoá site, Viet Nam.

EU WIDE STRATEGY TO MANAGE HCH CONTAMINATED SITES

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Abstract

An outline for a strategy to resolve the legacy of Lindane production in the EU is made. This outline is meant to serve as input for developing an EU-wide strategy to manage the 299 sites that are potentially impacted by HCH and Lindane. The outline sketches the steps that must be taken at EU, country and/or regional as well as site level to, once and for all, resolve problems concerning the legacy of historical Lindane production in the whole of the European Union.