

General description of the site:

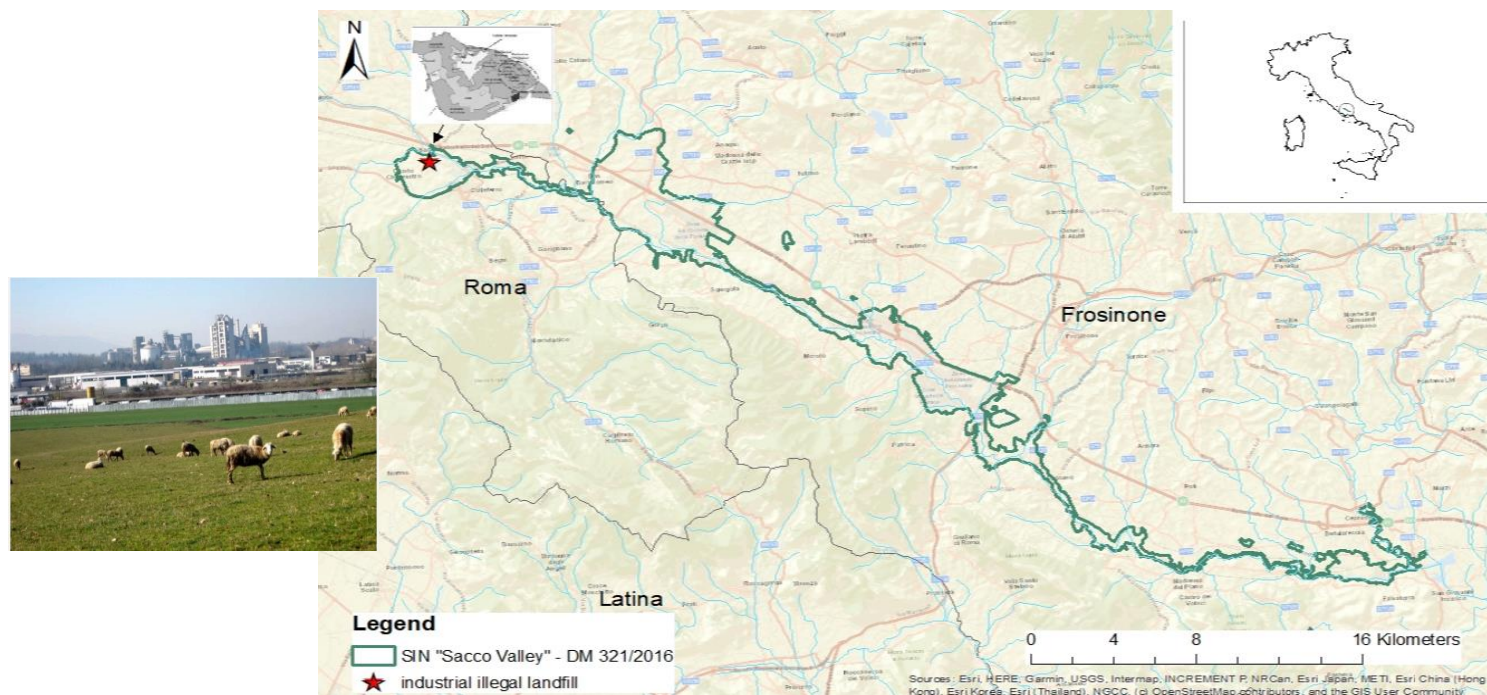
Partner: IZSLT
Region: Lazio (Italy)

SIN «Bacino Fiume Sacco»: LOCATION

In Italy a territory affected by hexachlorocyclohexane pollution is present in Lazio region (central Italy)

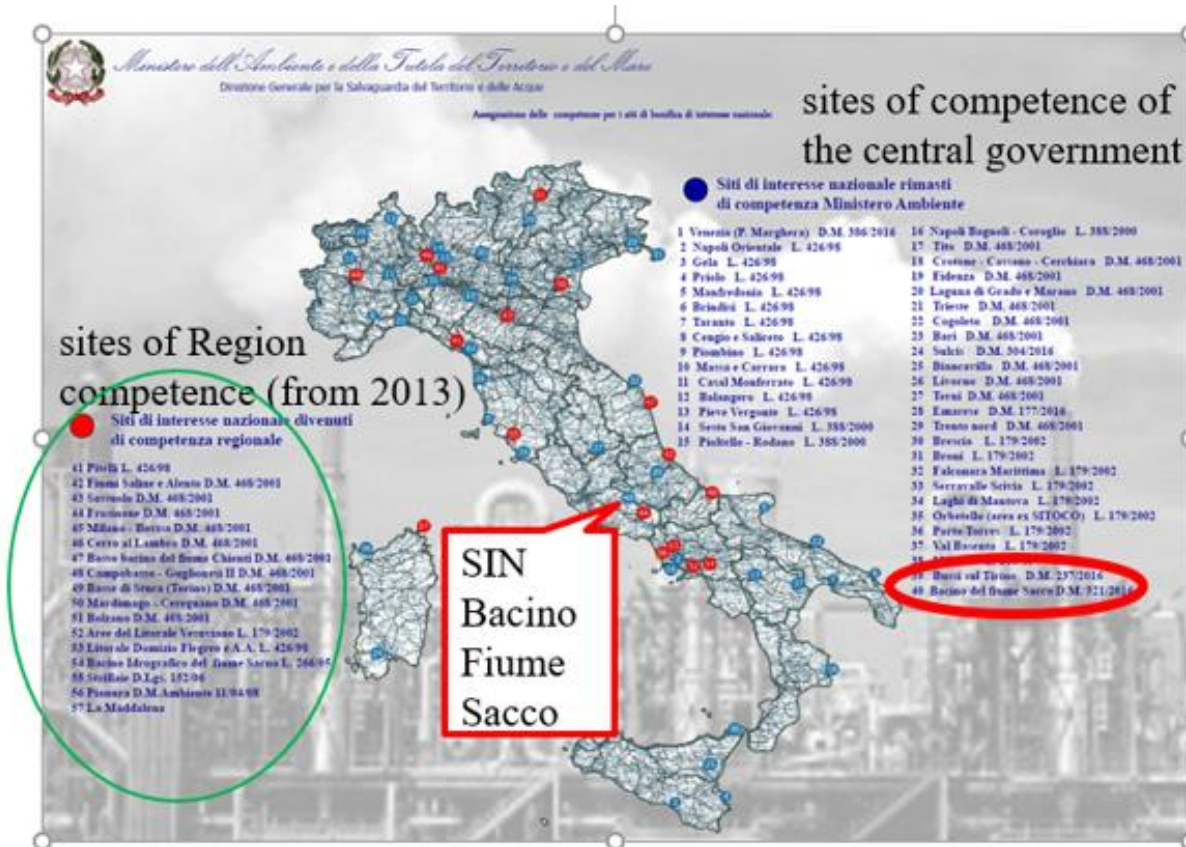


The territory was declared Site of National Interest in 2005



Site of National Interest (SNI) "Sacco River Basin" (Italy)

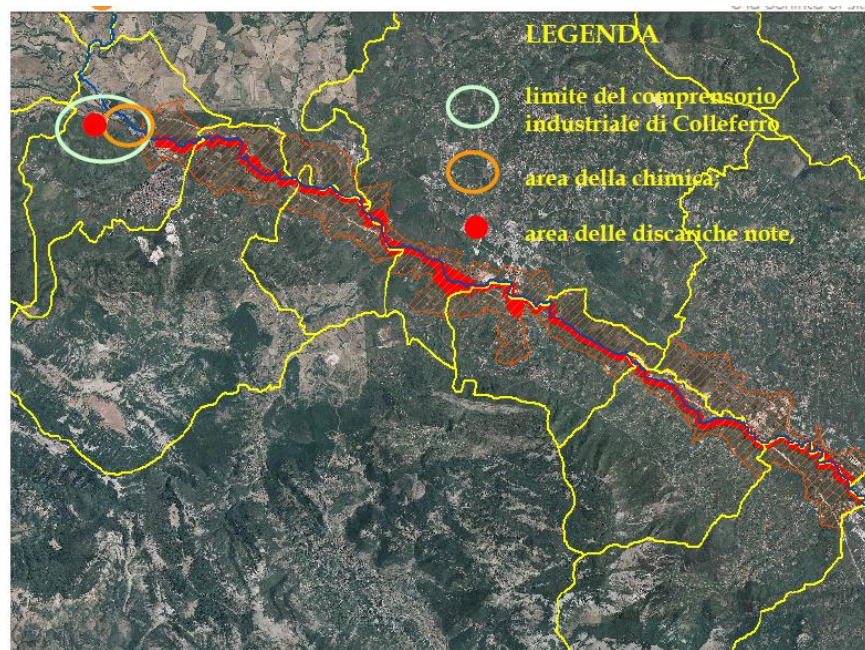
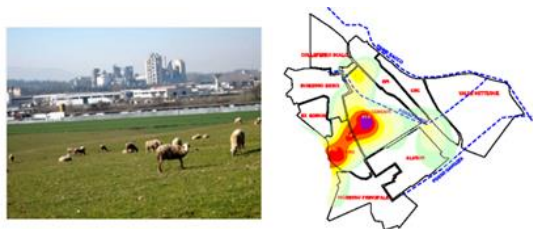
SIN «Bacino Fiume Sacco»: LOCATION



The «Sacco River Basin» is one of the 57 Site of National Interest in Italy

SIN definition (D.Lgs. 152/2006): area where a dangerous chemical alteration of soils, surface and underground waters has been ascertained and a remediation is required

The primary source of HCH contamination was an industrial area (8 km² wide) on the right side of the Sacco River in the municipality of Colleferro (60 km south from Rome) that produced lindane between 1950 and 1980 and buried waste in different landfills inside its borders.



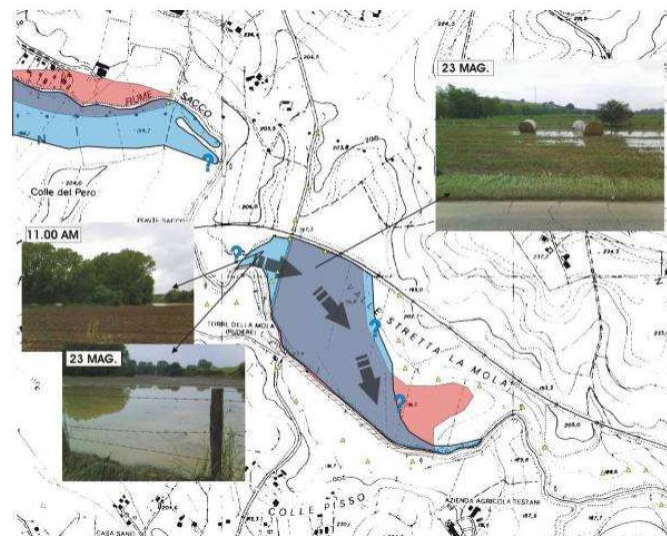
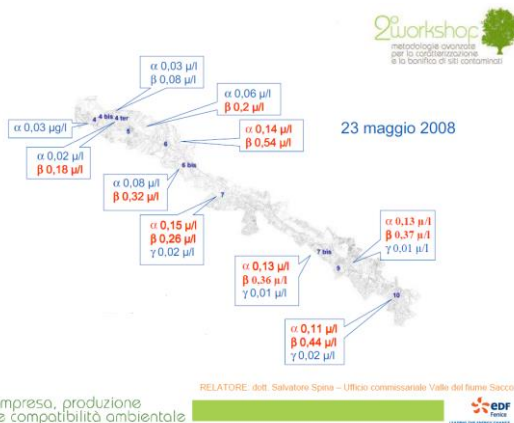
Hundreds of drums containing wastes deriving from Lindane production were buried between the 50's and 90's in a chemical industry area (former SNIA-BDP). Further wastes were found in the same area deriving from the war and railway production since 1920.

No data are available on the amount of HCH waste dumped but we roughly estimate of 30.000-60.000 tons of HCH waste (the estimation was obtained considering that approximately 220,000 m³ of soils are contaminated by HCH isomers for a variable percentage between 0.4 and 51 in dry weight - data obtained by Commissarial Office studies during the period 2005-2012).

SIN «Bacino Fiume Sacco»: CAUSES

The **Sacco river** acts as a secondary source of contamination as it receives, accumulates and spreads contaminants in the riparian areas along the river valley

Floods and irrigation have contributed to contamination of agricultural areas near the Sacco river



Contamination reached animals and food chain. Milk contamination allowed to show a widespread environmental pollution in 2005.

8% of analysed dairy farms (244 farms in the period 2005-2006) resulted not compliant with maximum residue level of Reg. EU 2017/978 (MRL in milk=0.01 mg/kg fat)

SIN «Bacino Fiume Sacco»: GEOGRAPHY

Over time the SIN perimeter has been revised several times

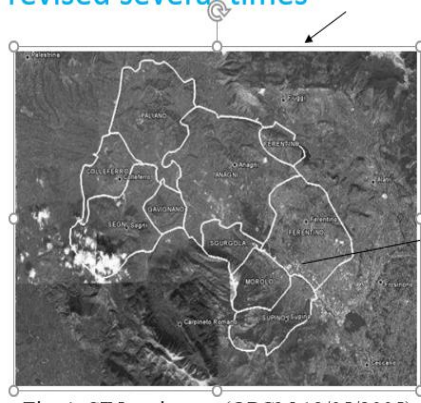


Fig. 1. SIN perimeter (OPCM 19/05/2005)

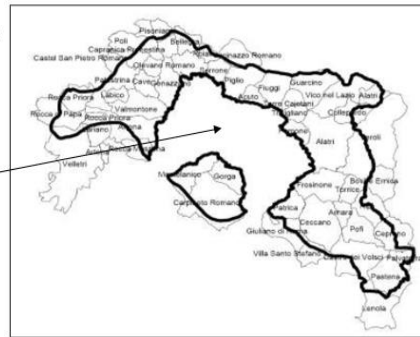
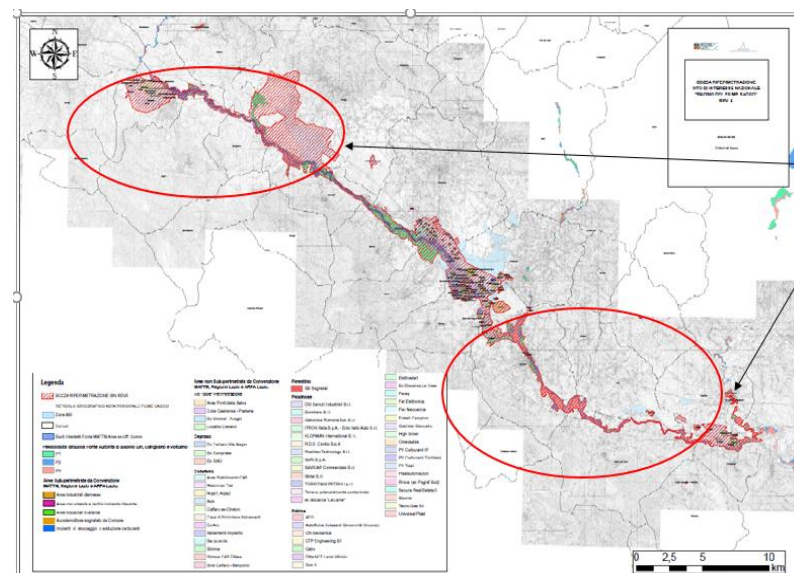


Fig. 2. Perimeter integration: SIN «Sacco River» (DM 31/01/2008)

Municipalities interested by the first characterization after the evidence of pollution (2005)

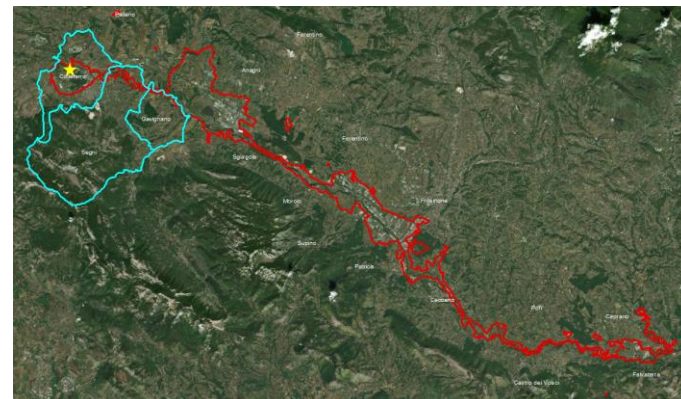
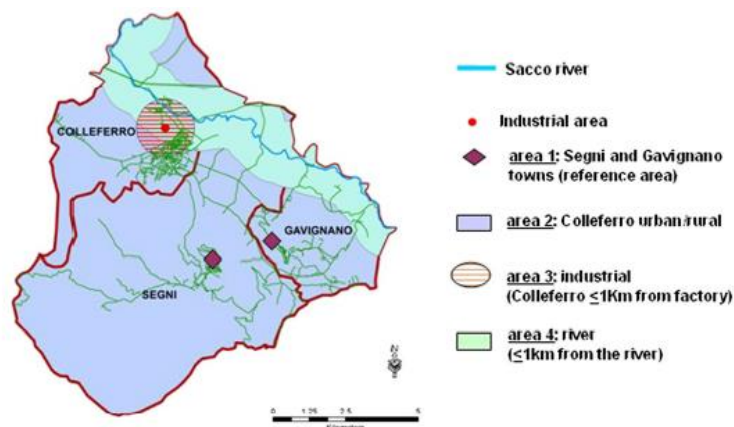
Although the river Sacco is affected by the presence of numerous industrial sites, it is estimated that 20 % of population (about 6,700 residents) is still employed in the agricultural sector.

The current perimeter has been drafted by the Lazio Region and ARPA and approved by Ministerial Decree n. 321/2016.

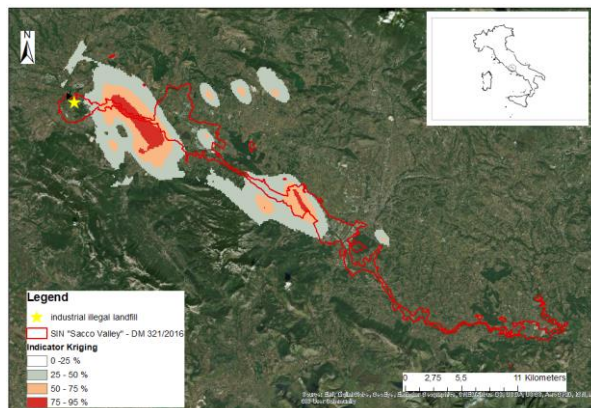


Within the current perimeter there are two main industrial areas producing different pollutants

SIN «Bacino Fiume Sacco»: GEOGRAPHY



Main municipalities interested by the beta-HCH human blood contamination were Colleferro, Segni, Gavignano. In a human biomonitoring (2012) the beta-HCH blood concentration in urban areas was on average 99.05 ng/g fat and 150 ng/g along the river, higher than those found in general population of European countries (about 50 ng/g fat - period 1996-2006)

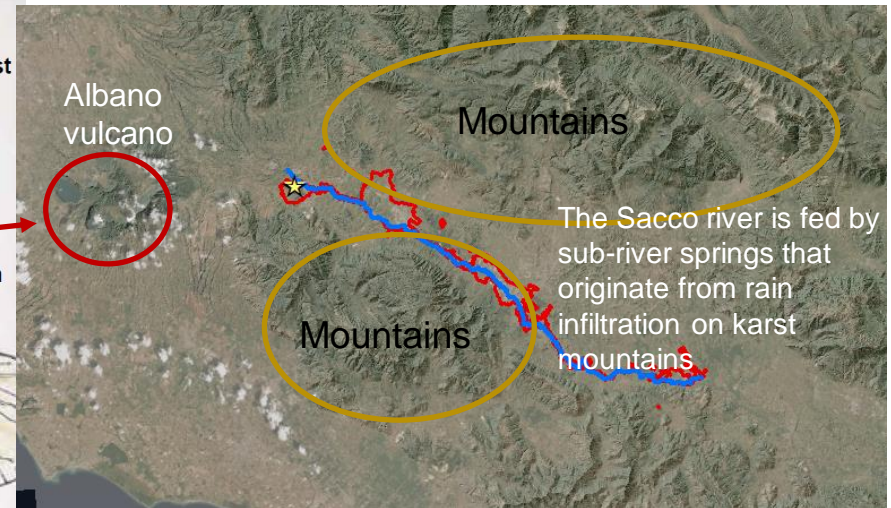
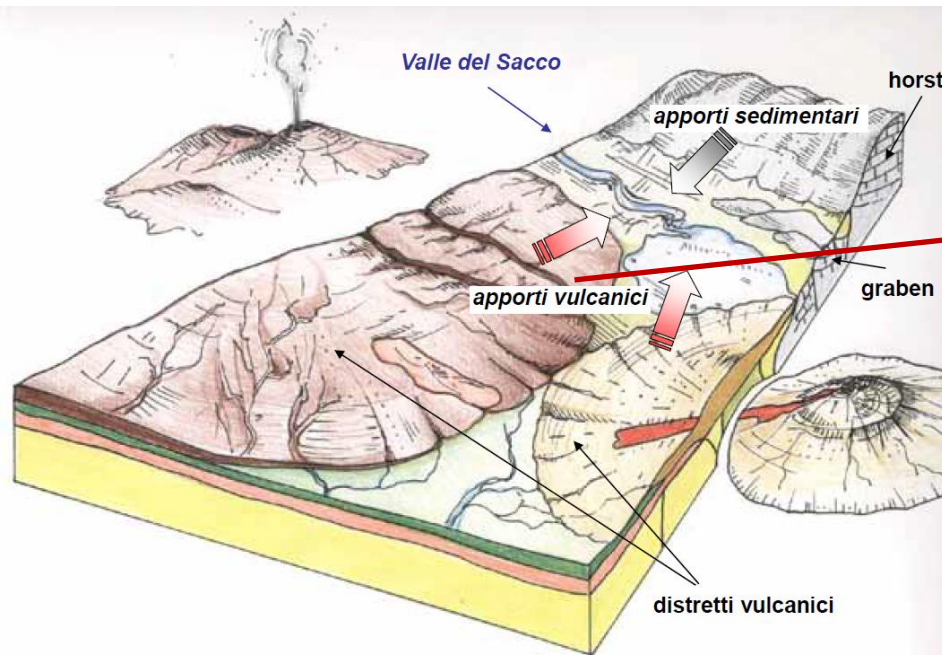


Agricultural contamination in the riparian areas decreases over 26 Km from the industrial primary source.



Not Natural areas (ZPS, SIC, ZSC of Natura 2000) are present inside the SIN but only around

SIN «Bacino Fiume Sacco» - GEOLOGY



The Sacco river Valley, is located among the northern Simbruini-Ernici and the southern Lepini-Ausoni- Aurunci karst limestone mountains.

Sacco River flows in the first stretch on Pleistocene tuffs of **Alban volcano** characterized by very low permeability. Waste landfills are on these poorly permeable soils but this has not avoid the transfer of contaminants in the environment

On the remaining stretch of the Sacco Valley, alluvial clay-sandy-gravelly deposits (Pliocene-Pleistocene-Holocene) are present with medium permeability which have favoured pollution infiltration in the subsoil during river flood or irrigation

Groundwater surface is at depth of 5-15 meters, its nearness to the top soil has favoured aquifer and water wells pollution

SIN «Bacino Fiume Sacco» - CURRENT SITUATION

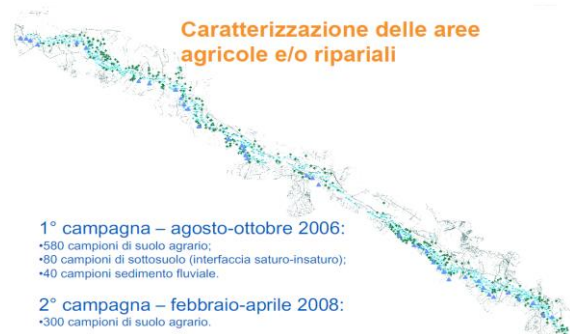
HCH waste:

- About 220,000 m³ (60,000 m³ already put in security) of highly HCH contaminated soils, distributed on 1,5 hectares inside the industrial area are releasing pollutant in the remaining valley through the Sacco River transportation. Only 20% of the soils has been reclaimed until now.

Affected matrixes:

- Agricultural soils, surface river water, river sediments
- Fodder, dairy milk, some plants on the Sacco river riparian. Contamination decreases after 100 meters from the banks. Milk is one of the food most sensitive to beta-HCH contamination and for this reason used for biomonitoring
- Human blood especially in people living near the river consuming local food and water of wells.

Distribution of isomers inside matrices: β -HCH and ϵ -HCH in groundwater; β -HCH, α -HCH and γ -HCH in agricultural soil; β -HCH, α -HCH and γ -HCH in Sacco river water and sediments; β -HCH and α -HCH in vegetables close to river; β -HCH in milk produced by cattle, sheep and goat dairy farms; β -HCH, γ -HCH and α -HCH in human blood of residents



Characterization:

An important characterization was made by Commissarial Office to which the management of emergency and reclamation was exceptionally entrusted from 2005 to 2012. Agricultural soil, groundwater, river sediments, and surface waters were investigated (more than 1000 samples).

SIN «Bacino Fiume Sacco» - CURRENT SITUATION

Additional characterization and reclamation:

- After the activities of Commissarial Office a further characterization and reclamation in the area is planned by Deliberation of the Lazio Region n. 119 of 06/03/2019 "Agreement Program between the MATTM and the Lazio Region was approved for the implementation of safety interventions and reclamation of the SIN "Bacino del Fiume Sacco"

Existing monitoring network:

- Since 2005 a milk monitoring plan was adopted (PNR) to ensure compliance with the restrictive requirements imposed on the area (prohibition of using local forage) and food safety. All animal samples and fodder were analyzed by IZSLT
- Since 2009 the Lazio Region, started a program of "Health and epidemiological surveillance of the resident population near the river Sacco " and a periodic human biomonitoring (Det. B0244 / 2009)

Existing restrictive actions

Since 2005 it was forbidden the cultivation of plant species for human and animal nutrition, the pasture and earth moving in the following agricultural areas :

- floodable areas with a return period of less than 30 years
- portions of territory within 100 m from the banks

SIN «Bacino Fiume Sacco» - REMEDIATION

Containment and confinement measures:

- Reclamation conducted between 2005 and 2012 by Commissarial Office involved the following activities: displacement in a safe site (61.500 m³ of contaminated soils, 60 tons of river sediments), construction of hydraulic barrier (wells, gutters, trenches), confinement in authorized plants.
- Another 157.000 m³ of highly contaminated soils inside industrial area will be secured from 2019 under the supervision of Lazio Region and MATTM (DGR 119/2019)

Bioremediation:

- Under the governance of the Official Commissioner, the Institute of Agro-environmental and Forest Biology and the Research Council (IBAF-CNR) conducted an experiment over 100 hectares of agricultural land in the perimeter area to analyze the purifying capacity of poplar plants in the area and the agricultural transformation of the area. A significant degradation of HCH isomers (equal to 30%) was obtained in soils planted with two poplar strains (Monviso and I-214) with the combination of inoculation of two *Arthrobacter* bacterial strains. After this experiment, poplars cultivation has not taken off in the Valley probably due to the low economic revenues.

Situation on Governance

<IZSLT>

<Lazio (Italy)>

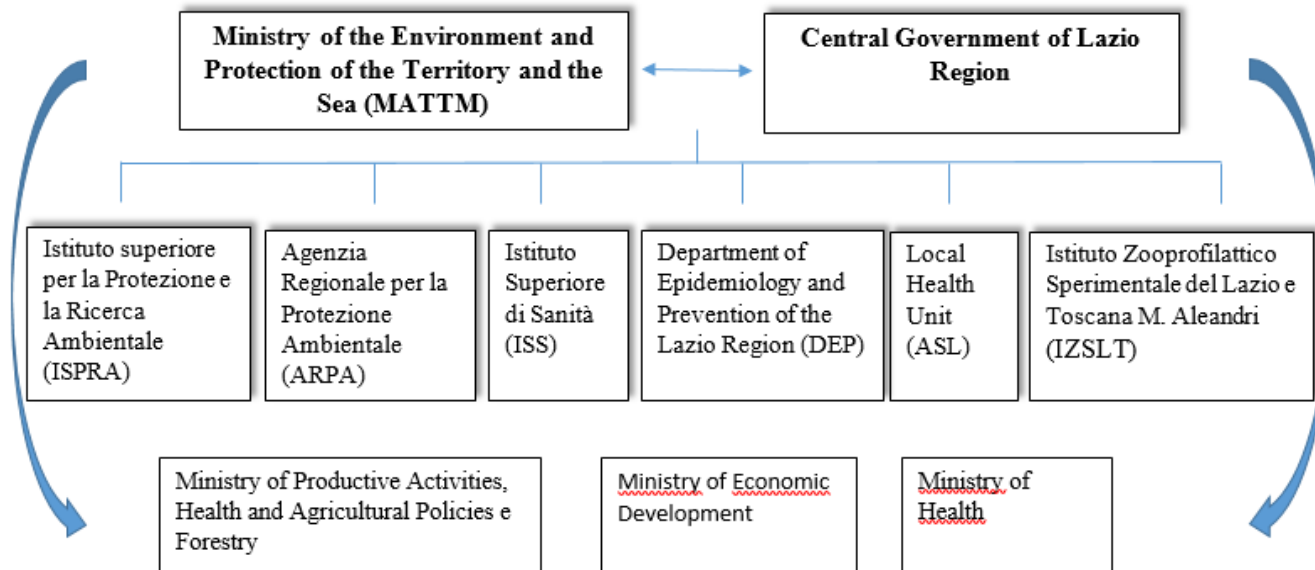
IZSLT - governance structure

In Italy, the responsibility of the SIN remediation procedure is attributed to the competence of the Ministry of the Environment and Protection of the Territory and the Sea (MATTM), which can make use of the activities of ISPRA, ARPA, Istituto Superiore di Sanità and other qualified public or private subjects.

Form 2005 to 2013 the management of the environmental emergency was entrusted to a Commissioner Office which dealt with the characterization and remediation of industrial and agricultural-riparian areas.

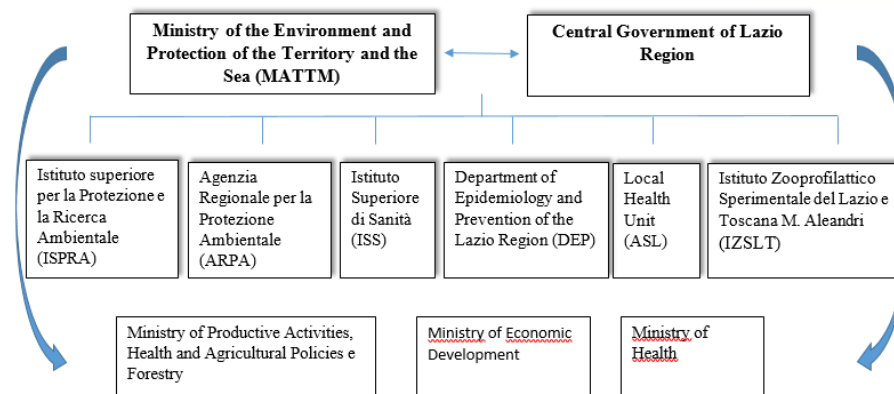
In **2013** the SIN administration was transferred from the Central Government to the Lazio Region (DM 11/01/2013) but in **2014**, the regional administrative court (TAR Lazio) cancelled this provision and reassigned the governance of the SIN to the MATTM

In 2019 an [Agreement Program between the MATTM and the Lazio Region](#) was approved for or a further reclamation project of the SIN “Bacino del Fiume Sacco” (DGR 119/2019)



IZSLT - related bodies

Public bodies involved in the HCH waste management:



Mechanisms of communication/coordination:

The Lazio region must periodically (DGR 119/2019):

- ISS is in charge for monitoring sampling design,
 - ARPA for chemical analysis of agricultural soils and management of the Regional Registry of the Contaminated Sites (A.S.P.BON Lazio),
 - IZSLT and ASL for animal chemical biomonitoring and sampling,
 - Lazio Region of supervising and mapping the results of characterization and reporting to the MATTM.
 - MATTM of approving the characterization study framework presented by Lazio Region.
 - ISPRA (together with ARPA) makes available data on other sources of contamination within the SIN.
 - DEP and ASL will make available the data on human biomonitoring and health indicators in the SIN.
 - private companies can be engaged by the Lazio Region to carry out further characterization
 - a Committee composed by one member of MATTM, Lazio Region, ISPRA and ARPA Lazio performs coordination and governance functions for the characterization, remediation and securing of the SIN (DGR 119/2019)
- transmit to the MATTM (every six months or annually) the state of progress of the characterization, remediation and any judicial process

IZSLT - stakeholders

Stakeholders related to the HCH waste management:

- Municipal administrations: a total of 19 municipalities are affected by the SIN. The Municipality of Colleferro is the one in which the primary source is located and the main remediation interventions are planned
- Provincial administrations: Rome and Frosinone provinces are both interested by the the problem
- ReTuVaSa (<http://www.retuvasa.org>) is an association of citizens of Colleferro, Anagni and Ferentino that talks with the authorities, shows problems, organizes meetings with Lazio Region authorities and offers a communication service to the citizens



Mechanisms of relation with stakeholders:

- As required by D.Lgs.152/2006, the publication of environmental protection programs and projects must occur on public media (magazines, newspapers, etc). The responsibility of the communication is of the project proponent (Lazio Region). The MATTM is the competent authority for the environmental assessment of projects and is required to publish the data on its website: <https://va.minambiente.it/it-IT>.
- According to D.Lgs 152/2006, for environmental impact assessments (VIA), Strategic environmental assessments (VAS), Integrated environmental authorization (AIA) presented to the MATTM for waste management projects, the citizens can view and make observations on the following web sites: <https://va.minambiente.it/it-IT> and <https://va.minambiente.it/it-IT/Comunicazione/Cittadino>
- The Official Commissioner has punctually reported the activities carried out between 2010 and 2012 to the regional authorities

IZSLT - Transparency

Transparency measures:

- documents concerning the SIN "Bacino del Fiume Sacco" are published on the Lazio Region website:
http://www.regione.lazio.it/rl_main/?btnG=+&q=sacco&vw=cerca
- documents concerning the SIN "Bacino del Fiume Sacco" are published on the MATTM website: https://www.minambiente.it/ricerca?tipo-contenuto=All&title=sacco&tid_direzioni-notizie=All&year%5Bvalue%5D%5Byear%5D=&year_month%5Bvalue%5D%5Bmonth%5D=&year_month%5Bvalue%5D%5Byear%5D=

On November 2019 a meeting has been organized in Colleferro by ReTuVaSa association involving population and the manager of the Lazio Region responsible for the current SIN characterization and reclamation project (DGR 119/2019).



Situation on Policies

<IZSLT>

<Lazio (Italy)>

IZSLT - Public policies

LINDANET Policy instrument:

- Deliberation of the Lazio Region n. 119 of 06/03/2019 (DGR 119/2019). "Agreement Program between the MATTM and the Lazio Region was approved for the implementation of safety interventions and reclamation of the SIN "Bacino del Fiume Sacco".
 - Aim: The agreement provides for the allocation of 53 million euros which will be spent from 2019 within 4 years for the characterization and reclamation of 10 polluting sites inside SIN "Bacino Fiume Sacco"

Other Policy instruments:

- Deliberation of the Lazio Region n. 228 of 09/05/2017 (DGR 228/2017). "Implementation of a Health and Environment Presidium at the Anagni Hospital (FR) and approval of the "Program of epidemiological evaluation ", regarding the technical requirements, of the population residing on the Site of National Interest (S.I.N.) Valle del Sacco - D.M. n. 321/2016.
 - Aim: in the period 2017-2018 a long-term epidemiological program will be created which will provide administrations and the population with information on health status, risk factors and possible changes through prevention. The project includes the construction of a Health and Environment Presidium (PresSA) at the Anagni Hospital (FR).

Since the late '90s in Italy a National Residues Plan is carried out on zootechnical primary production aimed at investigating on chemical substances deriving from veterinary treatment or frauds (EU Directive 96/22)

Later on, the program was integrated with the controls on environmental contaminants on food and feed

Regional governments are in charge of planning a supplementary control program on the basis of specific territorial problems

Since 2007 (after the ban of contaminated feed and the slaughter of contaminated cows) the Lazio Regional government planned each year to monitor the presence of B-HCH in animal feed and in milk produced in the contaminated area

The study was charged to IZSLT: the Epidemiological Unit planned the sampling and the Chemical Lab performed the analyses

Each year around 600/800 milk samples are analysed. In case of positivity, a tracing back on feed and relative chemical test is carried out

The trend of contamination in milk is constantly decreasing in terms of positive samples and concentration of B-HCH. This is probably due to the prohibition of pasture on contaminated areas and to grow forage in the same areas

Situation on Regulation

<Partner>

<Region (Country)>

<Partner> - Regulation

Regulation on		National	Regional	Local
Groundwater	Name	D.Lgs. 152/2006		
	Reference levels	0.1 µg/l for HCH isomers (β, α, γ)		
Surface water	Name	D.Lgs. 152/2006		
	Reference levels	0.1 µg/l for HCH isomers (β, α, γ)		
Drinking water	Name	D.Lgs. 152/2006		
	Reference levels	0.1 µg/l for HCH isomers (β, α, γ)		
Soils	Name	D.Lgs. 152/2006		
	Reference levels	0.01 mg/Kg for HCH isomers (β, α, γ)		
Milk	Name	Reg UE 2017/978, 09/06/2017		
	Reference levels	0.01 mg/Kg for HCH isomers (β, α, γ)		