

# SWIM and Horizon 2020 Support Mechanism

Working for a Sustainable Mediterranean, Caring for our Future

## **Case study: cooperative approach in an industrial cluster and environmental benefits: the case of tannery district of S Croce Sull'Arno**

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## **Case study**

**SMEs grouped in an  
industrial cluster: pursuing  
eco-innovation through a  
cooperative approach**

**The tannery industrial  
cluster of S.Croce sull'Arno  
(PI)**

# The relevance tannery sector

Example:  
diffusion of  
leather  
products  
Regional  
Clusters

Source:  
<http://www.clustobservatory.eu>



# The tannery cluster of S. Croce sull'Arno

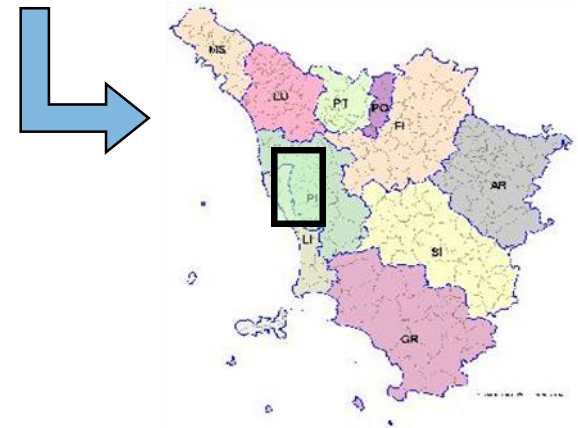
**Italy** provides **66% of EU production** tanned leather, it is the most important location in EU.

**S.Croce** is the biggest tannery cluster in Italy providing **35%** of the Italian production of **tanned leather** and **98%** of the Italian production of **sole leather**.

S.Croce cluster is located in the hearth of Tuscany



Tannery district



# The tannery cluster of S.Croce sull'Arno: the territorial context

- Location: Tuscany Region, province of Pisa and Florence
- Territorial area, 5 municipalities: S.Croce sull'Arno, Castelfranco di Sotto, S.Maria a Monte, Montopoli, Fucecchio
- Dimension of the area: 240km<sup>2</sup>
- Population in the area: around 100.000 inhabitants





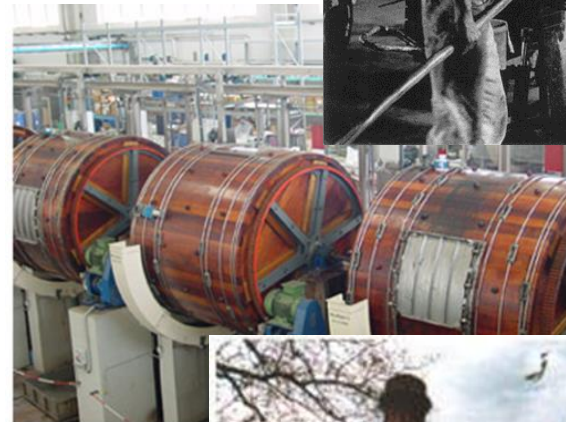
# History

The first tanneries date back to the mid 1800s.

After the end of World War II, the industry expanded and became part of the urban fabric of the municipal areas in the District. This area has always been traditionally linked with the dressing of leather.

Production has expanded, making use of the gradual introduction of new technologies and acquiring increasing importance on the reference markets.

The relocation process of production units from residential areas to especially studied industrial areas was launched in 1970.



# The tannery cluster of S. Croce sull'Arno: key numbers

- **Number of tanneries:** 300
- **Number of other third party companies** involved in the production process for specific activities: 300
- **Number of employees:** 6000
- **Size:** the majority of companies have less than 12 employees
- **Yearly turnover:** around 2,000 millions of euros
- **Yearly turnover from export:** 70% (more than 120 countries), 30% internal market

# Products and sectors

Almost the total production is for the fashion sector





# Industrial associations



Industrial association of tanneries: 200 associated tanneries

Tanneries consortium: 70 tanneries companies



# Tannery cluster of S. Croce: the challenges of sustainability

- the tanning process has always been associated with odours and other important impacts on air, surface and ground water and solid waste (*environmental challenges*);
- in the last years eco-innovation is perceived as a driver for competitiveness, especially to face up to competitors operating in third countries, as India and Pakistan (*economic challenges*);
- in the territorial area of S. Croce sull'Arno, local communities have showed over time a high awareness and sensitiveness on environmental issues (*social challenges*);

China prime minister **Wen Jiabao** visited the cluster in 2004





# The eco-innovation responses have raised interest in your Country

President of the People's Republic of China **Hu Jintao** visited the cluster in 2009







# **Tannery cluster of S.Croce sull'Arno: Process and technological eco-innovation**

# Process and technological eco-innovation as response to the challenge of sustainability

300 tannery SMEs grouped in an industrial cluster can have a high impact on the environment and population due to the **cumulative effect of these impacts**.

SMEs have often **lack of knowledge and resources** to well manage their impacts.

The fact that the companies located in the limited territorial area (cluster of S Croce) have the same needs in terms of management of pollution helped to find **technological solution with a territorial cooperative approach**

# Cluster key technological eco-innovation

**Consorzio Aquarno SpA** (Waste Water Treatment Plant): was established in 1983 for the purpose of solving the wastewater problem within the Tuscan Leather District. Despite its legal registration, the wastewater treatment plant (WWTP) was operating since 1974, five years before the emanation of the first environmental national Law, this because of the tannery wastewater's pollution potential. The WWTP collects and treats sewages incoming from three of the four main towns within the Tuscany Leather District, respectively: Santa Croce sull'Arno, Fucecchio and Castelfranco di Sotto.



# Cluster key technological eco-innovation

Over the last 30 years, Aquarno has experienced a continuous evolution both structural and technological, with the aim of reducing environmental impacts, guaranteeing high efficiency water depuration, at the same time. The figure which best expresses the combination of continuous efforts and outcomes, is the WWTP's **treatment capability that is around 2 Mlns of I.E. and about 36.000m<sup>3</sup>/d as urban wastewater incomes. These parameters make Consorzio Aquarno one of the biggest WWTP in Europe.** A proportional enlargement of its catchement area has followed the increase of the WWTP's treatment capacity. At the beginning of Nineties two different treatment section were built inside the plant in order to satisfy the new hydraulic and legal requirements:

- Municipal wastewater section
- Industrial wastewater section





# Consorzio Aquarno treatment process: overview

Consorzio Aquarno has developed an **innovative biological process** that requires a **minimal chemical consumption**. The "Tutto Biologico" process has significantly changed the plant configuration, **two biological oxidation stages followed by a tertiary treatment** (Fenton + clariflocculation) have been arranged within the plant. Compared with the old physico-chemical process, this transformation has *allowed a drastic sludge production reduction*.

The Whole treatment process is now stricly controlled and a centralized **remote control system** continuously monitors each operating machine inside the plant, beside this the automation system also provides real time data collection and analysis. The internal analysis laboratory, due to its modern instruments and high qualified staff, provides the characterization of all fluxes' with a view of completing the plant control in a very efficient and effective way.

# Consorzio Aquarno: industrial wastewater section

The centralized WWTP in Sant Croce sull'Arno receives wastewater produced by the whole industrial area on the right bank of the river Arno within the Tuscan Leather District. This implies that 95% of incoming flow is tannery wastewater while the remaining 5% arises from minor manufacturing processes or extra-fluxes which arrive by tankers. That condition makes the industrial stream flow very difficult to clean.

The intrinsic characteristics of industrial wastewater, present several unfavorable issues for conventional activated sludge (CAS) process. However, CAS was the selected process for many years in the past in combination with a heavy physico-chemical treatment which produced huge quantities of excess sludge.

The process foresees the following phases:

- 1) Primary lifting, fine screening and grit removal**
- 2) Desulphurization and pre-oxidation**
- 3) Biological oxidation - First stage**
- 4) Primary biological sludge sedimentation**
- 5) Denitrification**
- 6) Biological oxidation - Second Stage**
- 7) Secondary biological sludge sedimentation**
- 8) Tertiary physico-chemical treatment and chiariflocculation**
- 9) Sludge thickening and transfer to Ecoespanso**
- 10) Final discharge**

# Circular Economy system

