



# SYMADREM

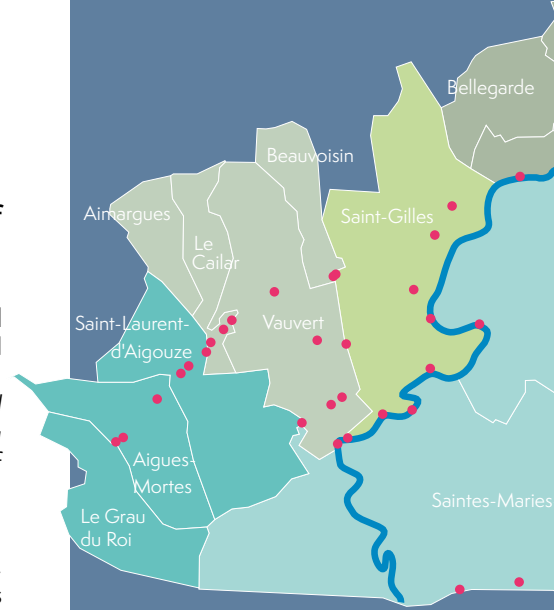
A PUBLIC INSTITUTION FOR MANAGEMENT OF RIVER AND SEA LEVELS IN THE RHÔNE DELTA

# A public institution

The Symadrem mission consists in the management of aquatic environments and flood prevention (abbreviated as "GEMAPI" in french) on the Great Rhône Delta territory.

## TO THIS END, IT:

- ▶ Carries out studies and works to improve the **protection against the flooding risks** for the Rhône and the sea;
- ▶ Represents the territory alongside the instances charged with the global management of the River Rhône or the sea;
- ▶ Monitors, **maintains and operates the levees** in all circumstances;
- ▶ Determines the **regulatory protection** levels and inform the **crisis management authorities** (Mayor, Prefect) in case of a hazard coming from the levees;
- ▶ Ensures the **integrated management of the shoreline**;
- ▶ **Maintains and values the ecological environments** restored or created (wetlands, "lônes" - branch of the Rhône, set back from the main stream bed and supplied from the alluvial table or during floods -, ponds...) on the occasion of improvement works;
- ▶ Is in charge of **drainage after flooding**, in partnership work with residents associations and other actors.



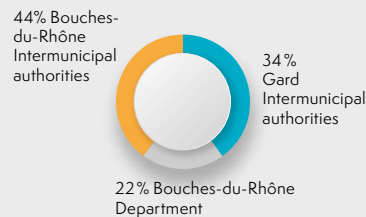
## SIX INTERMUNICIPAL AUTHORITIES AND ONE DEPARTMENT.

The Chairman is elected by a board, composed of 19 delegates from the member institutions. He's supported by two Vice-Presidents.

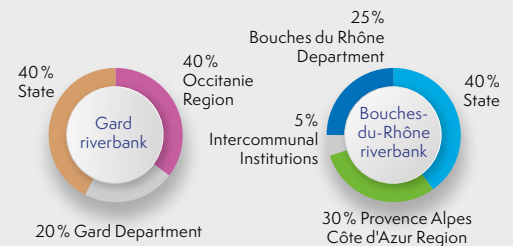
Led by a General Manager, its team regroups 3 main competences: technical expertise (7 engineers and 2 technicians), field knowledge (7 levees guards) and the administrative management (10 agents).

## To perform its missions the SYMADREM has a budget of:

### Operating budget: members contributions



### Investment budget: 100 % of public funding





## THE SYMADREM MEMBERS:

- The Bouches-du-Rhône department;
- The Aix Marseille Provence metropolis;
- The Arles Crau Camargue urban community;
- The Nîmes Metropolis urban community;
- The Terre de Camargue community of communes;
- The Beaucaire Terre d'Argence community of communes;
- The Petite Camargue community of communes.
- Wiping works

## TERRITORY

### Twenty municipalities are protected by the levees :

Aigues-Mortes, Aimargues, Arles, Beaucaire, Beauvoisin, Bellegarde, Fontvieille, Fourques, Le Cailar, Le Grau-du-Roi, Maussane-les-Alpilles, Mourières, Paradou, Port-Saint-Louis-du-Rhône, Saint-Etienne-du-Grès, Saint-Gilles, Saint-Laurent-d'Aigouze, Saintes-Maries-de-la-Mer, Tarascon et Vauvert.

### Four other municipalities are also included in the Symadrem intervention perimeter :

Boulbon, Saint-Martin-de-Crau, Saint-Pierre-de-Mézoargues, et Vallabrègues.

## KEY FIGURES:

Total length of the Rhône: **756 km**

1 Delta: **1 500 km<sup>2</sup>**

2 branches

Petit Rhône: **60 km**

Grand Rhône: **50 km**

**220 km** of river levees

**30 km** of maritime constructions

**20 municipalities** in protected area

**100 000 inhabitants**

More than **200 000 inhabitants** in summer

**350** dike crossing structures

**38** draining devices

**1 700 m<sup>3</sup>/s** average flow at the head of the delta

**11 500 m<sup>3</sup>/s** in December 2003

**12 500 m<sup>3</sup>/s** in May 1856

**13 000 m<sup>3</sup>/s** in November 1840

## DID YOU KNOW?

The Symadrem owns the accreditation "studies and works" linked to levees and small dams. It can draw up internal hazards studies. They aim to define the protection level of the people living in the protected area. It also assesses the relation between cost and effectiveness of its works, thanks to different studies known as multi-criteria analysis.





# Restoration/creation of wetlands

## SYMADREM'S WORKS CROSS RICH NATURAL ENVIRONMENTS.

The works led by the institution have different effects on the natural environment. To minimise them, the Symadrem applies a regulatory method named **Avoid, Reduce and Compensate**, abbreviated as **ERC** in French. Its goal, in a first instance, is to avoid the impacts on the environment, then it reduces those which are not possible to be avoided and, at last, it compensates the effects which cannot be avoided or reduced.

The Symadrem doesn't confine itself to these only regulatory obligations and falls within a genuine value process of the environments, integrating an **ecological consideration**, from the first design phases of its constructions.



In the South of Arles, 10 hectares of wetlands and riverside vegetation were given back to the river;



"Lône" and ponds Tarascon et Arles



4 500m<sup>2</sup> of areas filled with round leaves Aristolochia, host plant for the "Diane" egg-laying (kind of butterfly), were relocated outside the working area of the levee linking Beaucaire to Fourques (**National award of ecological engineering 2018**)

### Hence it is called to:

**1** **Preserve the environmental issues along the levees**, by deconstructing the former levees and reconstructing new ones further from the river, on areas deprived of environmental issues;

**2** **Value** the areas given back to the river, by creating wetlands, "**lônes**" - branch of the Rhône, set back from the main stream bed and supplied from the

*alluvial table or during floods* – also by reconnecting the areas deprived of riverside vegetation and thus contributing to the expansion of green corridors;

**3** **Execute safeguard campaigns for sensitive species;**

**4** **Execute a works phasing** suitable with species breeding season, but also with the climatic variations (flood, heavy rainfall);

**5** **Reduce building site's carbon footprint** by favouring the former levees materials recycling and the reuse of soils located between the river and the levee;

**6** **Integrating the climate change** (rising sea levels...) in construction design.



| Tarascon-Arles levee

## Rhône Plan and a program to improve levees safety

Following the centennial flood in December 2003 and the numerous damages it created, the French State and the Regions defined an interregional strategy (from the Lemman Lake to the sea) to prevent the floods and enlarged to other aspects: the Rhône Plan. This strategy was described by the Symadrem in a program to improve the safety of 220 km river levees, from the Vallabrègues dam to the sea.

**Rather than heighten the levees, which was, till then, the solution recommended after each catastrophe by the public authorities, two choices were selected:**

- ▶ **Accept the flood** for rare events (return period of respectively 100 years between Beaucaire and Arles and 50 years downstream Arles\*);
- ▶ **Consider the breaches apparition as unacceptable until exceptional events** (return period of 1 000 years\*\*).

This choice requires the construction of levees which resist to overflow. The levee slope, on the “protected zone” side is thus strengthen with concreted rip rap, so that it can resist to water high speed, in case of spill, causing the breaches. Upstream and downstream, the levees are set 50 cm above the millennium flood to avoid any circumvention risk in case of overflow.

In addition to these protection and security aims, the decision of fairly split the spilling volumes between the departments, followed by a quick draining of the flooded lands, was taken.

### DID YOU KNOW?

#### The Symadrem innovates:

- ▶ Setting up fibseepage optics in the levees between Beaucaire / Tarascon and Arles to detect very small temperature variations, witnesses of potential seepages in the levee;
- ▶ Treating with lime the construction materials on the fluvial and maritime levees, to test their resistance in case of water spill (overflow) and scouring created by the waves.

\* flood which potential occurrence each year is respectively of 1/100 and 1/50.

\*\* flood which potential occurrence each year is of 1/1000.





## Strategy and coastline Plan

| Saintes-Maries-de-la-Mer

The Symadrem maintains 30km of sea levees and other constructions to protect the coastline (ears, breakwater).

Holder of the "GEMAPI" competence (French abbreviation for Aquatic environment management and flood prevention), it is responsible for the integrated management of the coastline located between "**le They de la Gracieuse**", on the East side and "**le Grau-du-Roi**" on the West.

It will have the task of elaborating an interregional **strategy of intervention on the coastline** regarding the erosion / accretion issues and of marine submersions taking account of:

- ▶ The national strategy for the coastline integrated management, settled in 2012, for a better anticipation of the coastline evolutions and ease the territories adaptations to these changes;
- ▶ The sea level rise considering hypothesis of the Intergovernmental experts group on climate evolution (aka GIEC in French) for 2100 (+ 43 to + 84 cm).

This strategy will have to be applied as a "Coastline Plan" and a short and long term agenda of actions.

### DID YOU KNOW?

In the middle of the 19th century, the Saintes-Maries-de-la-Mer village was distant of more than 400 metres from the seashore. Today the urbanized area adjoins the shore. This situation is linked with a strong sea erosion. Between 1895 and 2000, the coastline receded from 1 to 5m per year in average. The town protection against the marine submersions, is all the more essential today.



| Picture of an emergency intervention on a river levee during a storm event at Les Saintes-Maries-de-la-Mer

# Surveillance, maintenance of the structures and drainage after flooding

## OUT OF FLOOD PERIODS

The Symadrem levees guards inspect daily the levees to:

- ▶ **maintain** and put them back into shape: located clearings, wood cuttings. They also maintain free the accesses and take care of the levees furniture (barriers and sector road signs);
- ▶ **monitor them** with **routine visits** to rapidly detect initiation of a damage and avoid it to be worse;
- ▶ **check** their integrity;
- ▶ **supervise the companies** in charge of clearing the levees and deal with the burrowing animals holes.



They support the Symadrem engineers:

- ▶ each year for an **in-depth technical visit**;
- ▶ every 3 years to:
  - **inspect the embankments** from a boat,
  - test and operate, with the private owners, the gates of crossing structures and also the individual cofferdams.

After a flood, with a more than 6 500 m<sup>3</sup> per second flow, the levees guards carry out **a visit along the river, where the banks have been in contact with the water**, to ensure there is no damages.

## DURING FLOOD PERIODS:

During flood period, a graduated monitoring and emergency response is employed.

For small floods, the levees surveillance is ensured by the levees guards.

For bigger floods, a **linear surveillance** is set up. It is ensured by **44 municipal officers or citizen volunteers**.



As soon as a deterioration or a damage is detected, a seriousness evaluation is made by the levee guard in connection with the Symadrem command post. Depending on its significance, the visual surveillance is strengthened or an emergency intervention is decided.

## AFTER THE FLOOD:

The Symadrem is responsible for **the drainage after floodings**. These actions are led in partnership with the Owners associations and other actors who handle the pumps and water level regulation devices.

## DID YOU KNOW?

The levees guards are sworn and thus are authorised to notice some infractions made on the Symadrem constructions (waste disposal, degradation, thefts, graffiti, wildfire...) and to draft tickets. Furthermore, in the aim of preserving the construction integrity, the motorised traffic is forbidden on the levees.





| North Arles levee and wiping in the Trebon lowland

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d'Aménagement  
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des Dignes du Delta  
du Rhône et de la Mer

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