TOUR DU VALAT

Activity Report 2012

A research centre
for the conservation of
mediterranean wetlands

TOUR DU VALAT

© Olivier Pineau - Tour du Valat

Herald (*Scoliopteryx libatrix*)

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The Oualidia-Sidi Moussa lagoons, Morroco

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TOUR DU VALAT

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Editorial

With the Rio+20 Summit, the United Nations Climate Change Conference, and the conferences of the Contracting Parties to the Convention on Biological Diversity and to the Ramsar Convention, 2012 was marked by an abundance of international meetings on the environment.

At the same time, new studies confirmed the increasingly rapid degradation of the environment and the numerous consequences of this deterioration. We know that today in nine months we consume what it takes the earth a full year to produce or renew; we therefore widen our ecological deficit every year. The IPCC's latest reports show that we will not achieve the objective of limiting global warming to +2°C by the end of the century. Instead, we are blithely drifting toward a +4°C temperature increase. All of the experts agree: we have entered the "Anthropocene", a new geological era in which a single species - *Homo sapiens* - has become the principal geophysical force shaping the evolution of the planet, drastically changing the fundamental ecological balances so much that we are endangering our very existence. One thing has become obvious in these analyses: we are the first generation that is conscious of the magnitude of the phenomena concerned and of the ecological urgency. It is therefore up to us to take the measures needed to reverse these disastrous trends.

Everything was thus lined up for the participants to make the most solid and sustainable commitments. Really everything? ... Unfortunately, not! One essential ingredient was missing for that magical moment to occur: political will. The determination, when bludgeoned by the current economic crisis, not to cater to short-term interests.

However, even if 2012 has the aftertaste of missed opportunities, we were able to take new steps forward, create new partnerships, and better prepare for the future.

The creation of the IPBES - the IPCC of biodiversity - in April 2012, is a significant and promising step forward, which should help to bridge the gap between scientific research and public decision making.

The recent IUCN World Nature Congress demonstrated the vitality of the conservation community, its ability to innovate, open new paths of discussion, and create alliances.

The general public is increasingly conscious of the environmental issues and mobilised more than ever before.

Finally, the Conference of the Contracting Parties to the Ramsar Convention recognised the contributions of two individuals very dear to the Tour du Valat: Luc Hoffmann and Thymio Papayannis, two tireless pioneers and driving forces behind a humanistic vision of wetlands conservation.

The Mediterranean basin was once again at the heart of the turmoil, where all of the tensions in the world seemed to be concentrated, including political instability, the economic crisis, and the growing pressure on natural resources.

Yet, here again, numerous initiatives were taken. The symposium on water and wetlands in Agadir helped to re-focus the MedWet initiative, with the creation of a new road map, and the new commitments made by its members. The Mediterranean Wetlands Observatory's first report, which is the product of four years of effort by the Tour du Valat and its partners, was published on this occasion. We finally have an initial image of the status and trends of wetlands in the Mediterranean basin. It is certainly an incomplete image, but it provides a great deal of information.

It confirms the ongoing and rapid degradation of wetlands, which are victims of the enormous pressure placed on natural resources, especially water. They are shrinking in number and surface area, and their capacity to deliver their services is being eroded. However, this report also shows us that solutions do exist, and that these negative trends can be reversed. Certain compartments of biodiversity are faring better than 20 years ago; the number of sites designated for the Ramsar list has increased two times faster in the Mediterranean than in the rest of the world; many initiatives show that new alliances between development and conservation stakeholders have been fruitful and provide sustainable solutions.

These tangible items must now inform the decisions made and shape the policies implemented.

In the Camargue, for the first time in over a century, the net loss of natural habitats was reversed! The ecological restoration of more than 6,500 ha of a former salt works area acquired by the French Coastal Protection Agency has been started, in partnership with the Camargue Regional Nature Park, the National Nature Protection Society (SNPN), and the Tour du Valat. This restoration project is a major opportunity to experiment with and implement adaptive management practices in a real-life situation, while trying to satisfy both conservation and societal demands. This new approach should become a model for other initiatives to restore and take back Mediterranean wetlands.

Today, we know that wetlands are the most lavish ecosystems on the planet, contributing the most to the development and well-being of humanity.

Faced with these growing challenges, we are committed more than ever before to studying, understanding, exchanging information, making experiments, discussing, taking action together, and informing public policies so that wetlands will continue to be a source of life, biodiversity, and inspiration.

The following pages bear witness to our commitment.

Jean-Paul Taris
President

Jean Jalbert
Director General

Cédric Cairello

Estate Technician

Already three years at the Tour du Valat,
and still as enthusiastic as ever.
The lawn mower, brushcutter, chainsaw…
just some of the tools I use to groom the Estate.

Contents

Damien Cohez

Regional Natural Reserve Conservation Officer

"Managing the Estate is not an easy job… but what a thrill it is to be on such a beautiful natural reserve with so much diversity, and to observe, count, and preserve the numerous plant and animal species there. Some of them are highly threatened, which places a great deal of responsibility on me in this demanding job full of variety!"

The Tour du Valat

our identity

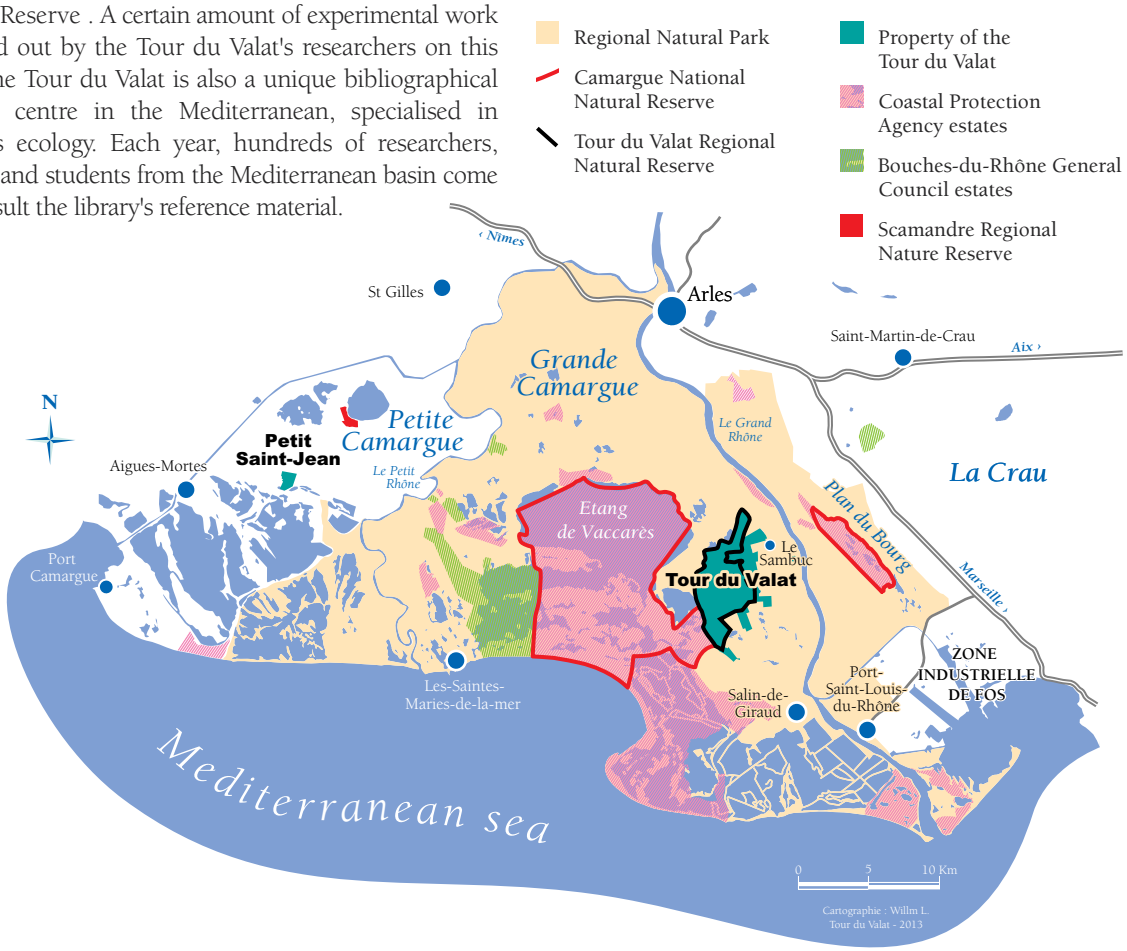
Created more than 50 years ago by Luc Hoffmann, visionary naturalist and patron, the Tour du Valat has since then developed its research activities for the conservation of Mediterranean wetlands with the constant desire to achieve: "Better understanding for better management". Convinced that it will only be possible to preserve wetlands if human activities and the protection of the natural heritage can be reconciled, the Tour du Valat has for many years been developing programmes of research and integrated management that promote interchanges between wetland users and scientists.

It has set itself the mission to halt and reverse the destruction and degradation of Mediterranean wetlands and their natural resources, and promote their wise use. The Tour du Valat, located in the heart of the Camargue, is a private research organization. It has the legal form of a public-benefit foundation since 1978. The estate, which includes all the natural habitats representative of the fluvio-lacustrine zone of the Camargue, extends over an area of 2,700 hectares, of which 1,845 are classified as a Regional Natural Reserve . A certain amount of experimental work is carried out by the Tour du Valat's researchers on this estate.The Tour du Valat is also a unique bibliographical resource centre in the Mediterranean, specialised in wetlands ecology. Each year, hundreds of researchers, teachers and students from the Mediterranean basin come and consult the library's reference material.

© S. Hilaire

Viperine Water Snake

The Tour du Valat employs around sixty employees who are involved throughout the Mediterranean. The scientific team, comprising around thirty specialists, is working on programmes of research into the functioning of wetlands, and is testing out methods of management. The results are communicated via training and the implementation of innovative projects being carried out in collaboration with a wide range of partners.



The Estate

Damasonium polyspermum

The Tour du Valat Estate extends over almost 2,700 hectares and consists of a mosaic of natural habitats characteristic of the Camargue, notably some rare and threatened habitats such as temporary pools and fossil dunes, and also wide expanses of sansouires (saline scrub).The fauna and flora are adapted to these special habitats. In July 2008,1 845 hectares of the estate received approval as a Regional Natural Reserve. The Tour du Valat was one of the first natural reserves in France to draw up a management plan (in 1986). Since then the plan has been updated every five years; it sets the objectives that are to be attained and the means to achieve them. The Petit St-Jean estate, located in the Gard, which was donated to the Tour du Valat by M. Marcel Bernard in 1981, was finally integrated into the estate in 2012, following a thirty-year-old litigation. This site covers 101 ha, and includes a remarkable pine grove (50 ha), marshes (24 ha), and agricultural parcels (26 ha with a 5 ha vineyard).

The principles for the management of the estate are set out within the framework established by the management plan, and are based on three main concepts:

1. **The conservation of the exceptionally rich natural heritage, in particular by means of low-intervention management that takes into account the highly natural character of the site.**

To this end, a wide range of natural heritage surveys and monitoring programmes are regularly carried out: vegetation mapping, botanical surveys, waterbird censuses, mammal counts, etc.The estate team sees to it that the natural reserve regulations are adhered to and that the hydraulic infrastructure that enables 640 hectares of marsh to be kept in optimal condition for supporting biodiversity is well-maintained.

2. **The implementation of research programmes with an experimental proving ground**

The purpose of the programmes is to gain a better understanding of the functioning of the habitats and species in relation to the role of human activities. The aim is to learn the lessons needed to maintain biodiversity, optimise management practices, combat undesirable species, and restore degraded habitats.

The results are put to use in assisting with the management of other sites, drawing up management plans, getting involved in technical networks, and signing up to economic mechanisms (Agri-Environmental Measures, Local Farming Contracts, Sustainable Farming Contracts, etc). The Tour du Valat also accommodates scientists and natural area managers on the estate, to exchange ideas about various projects involving research and its application.

3 Maintaining traditional activities

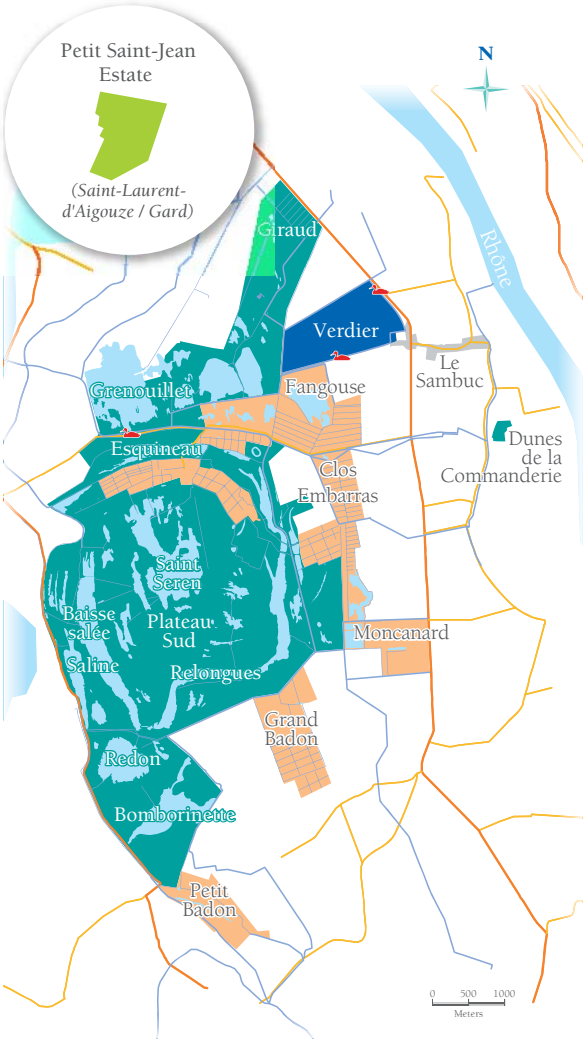
Traditionally, the Tour du Valat's pastures have supported horses, sheep, and bulls. In 1994, the Tour du Valat set up its own extensive farm with 230 cattle and 20 horses of the Camargue breed, which graze 1200 hectares of natural habitats. This farm contributes to the research programmes that are carried out by the scientific teams. The estate's farm is self-financed and environmentally friendly, and conforms to the specifications for organic farming and for the "Camargue Bulls" Appellation d'Origine Protégée (AOP). Four herdsmen (livestock farmers) turn their herds out to graze on a thousand hectares of the estate. In 2012, the livestock grazing on the site amounted to about 450 cattle and 70 horses.

Rice field

Other areas of land are also used for organic farming within a farming cycle that is traditional in the Camargue: rice, wheat, and hay.

Cattle Egret

Hunting is also an activity that has been carried out traditionally on the estate. It takes place subject to innovative regulations: to avoid lead poisoning among ducks, traditional lead shot has been banned since 1994 in favour of tungsten or steel alternatives; detailed shooting records are kept (number of shoots and number of kills) so as to provide reliable statistical data for scientific studies. The Tour du Valat hunting group comprises about twenty current and retired employees of the organisation, who hunt over nearly 25% of the site. The Tour du Valat also takes an active part in local efforts to control the wild boar population, by organising drives (to which many hunters from the region are invited), arranging shoots to protect crops, and organising hunting by bow and arrow in the most sensitive areas (the core nature reserve).



Tour du Valat Foundation property

- Land devoted to farming and hunting
- Regional natural reserve (restricted access)
- Verdier Marshes (open accessto the public)
- Petit Saint-Jean Estate
- Observatory (free access)
- irrigation or drainage canals
- secondary road
- Township road

Common Clouded Yellow

Common Kestrel

Tiger Beetle

Biodiversity on the Estate

The monitoring of its natural heritage, outlined and structured by the site management plan, is one of the most important steps in managing and conserving the Tour du Valat Regional Natural Reserve. In order to preserve the site in its highly natural state, the management approach implemented on the Natural Reserve is relatively non-interventionist and leaves considerable room for the variability of the Mediterranean climate.

In 2012, the year started with a wave of extreme cold, unusual for the Camargue. The marshes and canals froze over completely for several days, and numerous dead birds were found (Greater flamingo, Great white egret, Eurasian coot, Mallard, etc.).

The rest of the year was marked by severe drought (total rainfall 290 mm, compared with an average of 620 mm). By autumn, apart from those which are artificially irrigated, all marshes whose hydraulic regime depends entirely on precipitation had dried out.

Réserve Naturelle Régionale
TOUR DU VALAT

What's new in 2012?

As in the previous year, the most interesting discoveries were botanical, mainly thanks to a team of botanists (H. Michaud, B. Offerhaus / CBN Méditerranéen, & D. Pavon / IMBE) under the guidance of J.B. Mouronval (ONCFS). They came to see the lily species, *Gagea mauritanica*, which had been found the year before, and themselves discovered:

- **A sand crocus species (*Romulae columnae*):** found in the Montilles de Redon area like the *Gagea mauritanica* sites. This discrete little white flower is protected at the regional level. The spring flowers of the Montilles de Redon are thus joined by another variety to go with *Gagea mauritanica* and the wild garlic species *Allium chamaemoly*.
- ***Riella helicophylla:*** this small aquatic liverwort is listed in Annex II of the Habitats Directive, and has recently been accorded protection at the national level. It was discovered in the saline borrow pits and sansouïre bordering la Baisse Salée, la Saline, and la Baisse des Courlis. The only other known population in France, a very large one, is at Salin du Caban on the other side of the Rhone. It disappeared some time ago from a site in the Hérault department.

Financed by the PACA Region, a study was carried out on the **Ocellated lizard** (*Timon lepidus*). The objective was to look for the species on the Tour du Valat Regional Natural Reserve and the Salins de Camargue lagoon and marsh site, the property of the French Coastal Protection Agency. There is a national action plan to try to conserve the Ocellated lizard, which has declined sharply in France, and is now listed as near threatened by the IUCN. The study was carried out by M.A. Marchand (EPHE Montpellier) and J. Chassagnaud (IUT La Roche-sur-Yon), in partnership with the Camargue Regional Natural Park. Various methods were used in combination to try to find the species: visual observation of quadrats, sampling, placing of refuge shelters, seeking presence indicators (tracks, faeces), and camera trapping.

In the end, the Ocellated lizard was detected only at the Tour du Valat. Having found faeces at the entrance to certain burrows, the team used camera trapping to photograph the animals, confirming the presence of at least three different adults. It would seem that the last population of Ocellated lizard in the Camargue is at the Tour du Valat, but it appears to be very isolated and localised, and to comprise very few individuals.

Temminck's Stint

Riella helicophylla

Eurasian Spoonbill

A lacklustre breeding season

In terms of birds, the breeding season was marked by the establishment of four colonies of Collared pratincole (*Glareola pratincola*), all together 39 pairs and 32 successfully fledged chicks. This is the largest ever population at the Tour du Valat, representing 35% of the national total.

Even though, due to the very low rainfall this year, the water level in the marshes was not very favourable for nesting waterbirds, we should still mention the establishment of a very small colony of Purple heron (*Ardea purpurea*) at Relongues nord (8 pairs), the presence of two booming Eurasian bitterns (Botaurus stellaris) detected during annual monitoring, and at least one Little bittern (*Ixobrychus minutus*) holding territory.

The breeding population of White stork (*Ciconia ciconia*) continued to increase (11 pairs), however not one colony of small tree-nesting herons chose to breed in the wooded areas of the estate.

The lack of winter precipitation led to low breeding levels for amphibians and Odonata (dragonflies and damselflies).

On migration or overwintering, it's a bird festival!

The drying out of the large marshes (Relongues, Saint-Seren, Baisse Salée) in the summer once again led to considerable gatherings of large wading birds feeding on the range of prey taking refuge in the last waterholes before exsiccation. "Herds" could be observed made up of more than 300 Eurasian Spoonbill, 125 Great White Egret, some hundred Little Egret and Grey Heron, up to 90 White stork, 11 Black Stork, etc. In addition, there was a wide range of waders present, and in good numbers: up to 55 Pied Avocet, about one hundred Black-Winged stilt, up to 104 Green Sandpiper (a record for the site), numerous Common Greenshank and Spotted Redshank, and also some rarer species such as several Temminck's Stint and one Buff-Breasted sandpiper.

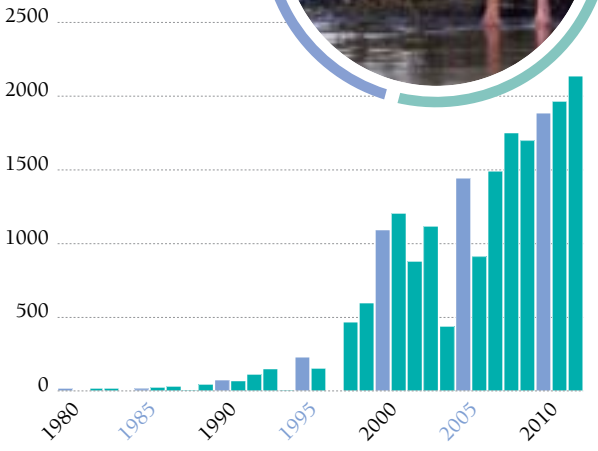
In autumn, the lack of heavy rain meant that most of the marshes remained dried out, the exceptions being Grenouillet, Saint-Seren, and north Relongues, which were irrigated.

In this season, the abundance of Orthoptera (grasshoppers, etc.) and Odonata (dragonflies and damselflies) attract their predators in large numbers, with the possibility of spotting a range of falcon species at the same time: Lesser Kestrel, Common Kestrel, Eurasian Hobby, and Red-Footed and Eleonora's Falcon.

The record for Greylag Goose (*Anser anser*) was beaten twice during the year: first in January, when 2138 geese were counted, and then in December, with 2211 individuals. Several ringed birds were identified. They had come from the Czech Republic (4), Germany (2), the Netherlands (1), and Sweden (1).

Once again, there were several sightings of Greater White-fronted Goose (*Anser albifrons*) and Bean Goose (*Anser fabalis*) among the groups of greylags. These two species appear to be increasingly regular visitors.

Evolution of mid-January Greylag Goose numbers at the Tour du Valat



Among the other animal groups, we should note new nocturnal sightings of European Genet (*Genetta genetta*); this small carnivorous mammal seems to frequent the Tour du Valat more and more often.

Virginie Mauclert

Project Leader
of the Mediterranean
Lagoons Transfer Unit

"Coordinating a project that covers three Mediterranean regions, building bridges between lagoon stakeholders, mutualising knowledge, and all the rest! I am the conductor, and my ambition is that our orchestra will enact the best possible management practices for these fragile lagoon habitats."

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The Programme

Our commitment

The Programme

Romulea requieni

© Tour du Valat

The Foundation's programme is dedicated to operational research, transfer, and wetlands management. During this second year, our research focused on three priority zones defined in the strategic plan: the Camargue, the Maghreb, and the region encompassing the Balkans and Turkey.

In the Camargue, a wide-range of activities were carried out in 2012 including the continuation of vertebrate population monitoring, which has been conducted for several decades for certain groups, our numerous projects concerning the management of the former salinas, as well as ecological restoration and studies on the effects of mosquito eradication on non-target fauna, on the impacts of exotic species on biodiversity, on the circulation of viruses, and more generally on diseases in animal populations. We also studied the relationships between habitat management, the structure of invertebrate communities, and the feeding strategies of the Greater flamingo.

The principal new outcomes of this research are presented in the pages that follow (see in particular the focus for the first two departments). Each of them makes a significant contribution to the management of the delta, showing for instance the very important indirect effects of Bti mosquito control on biodiversity in the Camargue, the current health risks in farms where ducks are bred to be released for hunting, the possibility of early detection among birds of viruses that are potentially dangerous for humans, the improvement of management and restoration techniques, and the detection of very high concentrations of pesticides in certain canals. Much of the Tour du Valat's activities consist in making these outcomes available to decision makers and participating in public debates in order to push the management of the delta toward practices more respectful of nature and human beings.

At a larger scale, we worked very actively on the valorisation of the outcomes of the first report on Mediterranean wetlands and trends in them. The report published in February 2012 shows a disturbing degradation of wetlands and their biodiversity. This observation was highlighted during the major conference on Mediterranean wetlands in Agadir at the beginning of the year and at other forums and conferences. We must raise the awareness of decision makers at the highest levels so that biodiversity will be taken into account more adequately and the services provided by wetlands to humanity will receive better recognition. Along with making these efforts to inform politicians, the Mediterranean Wetlands Observatory continued its work in 2012 to improve knowledge on specific themes for which up until the present time it was not possible to have an overall, standardised vision at the Mediterranean basin level. Data are lacking in particular on the total

Cassaïre project - © Tour du Valat

Work session with our partners in the Gediz delta

© Tour du Valat

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On the road toward new adventures...

area of wetlands today, recent losses, and the causes behind their transformation. The development of remote sensing tools should enable this evaluation to be made rapidly (in one or two years).

At a more local level, in the Mediterranean Basin, and closer to the field, our team is undertaking work in two important areas. In the Balkans (Slovenia and Greece), the long-term studies on the population dynamics of fresh water fish (trout) have led to the production of very precise recommendations and management methods required to conserve these species while maintaining the sustainable exploitation of these resources. In Turkey, we have been providing scientific and methodological support to decision makers and managers to improve their knowledge on how to best manage the Gediz delta.

Scientific and technical production remained very good in 2012. Our goal for 2013, in a difficult context both in the North and in the South, is to maintain this high level of scientific production intended to support the conservation and sustainable management of Mediterranean wetlands.

Patrick Grillas
Programme Director

Pulsia festucae

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Meeting of Mediterranean experts for waterbird counts

Conservation of species and their populations in the context of global changes

The overall objective of the Department is to contribute to the conservation of Mediterranean wetland species and to assist in managing conflicts between these species - not necessarily threatened ones - and human activities. Within this approach, the department concentrates on major impacts of human activities which conform with the definition of global changes.

This involves contributing:

- to the conservation of species, or of certain of their populations,
- to the management of species in conflict with human activities (pests, health, etc.),
- to the management of key species for human activities (exploitation, tourism etc.).The foremost on scientific knowledge, whether applied to the direct running of defined research projects, or to the transfer and application of knowledge generated by the scientific world in general.

The Department focuses on four major themes that are considered to be very important issues for Mediterranean wetlands, and which fall within the sphere of our current areas of expertise:

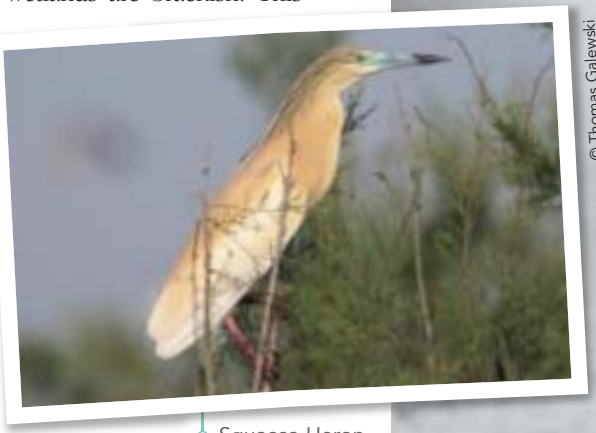
- Population dynamics of Mediterranean wetland species under pressure from human activities.
- The interaction between species conservation and problems of health, both human and animal.
- The interaction between Mediterranean wetland species with unfavourable conservation status and introduced alien species.
- Predicting the distribution and abundance of species in 5, 10, 25 years time, in conjunction with landscape modifications, climate change, and exploitation.

In 2012, numerous scientific results were validated by being published and will now be able to be used to increase our positive impact on the conservation of Mediterranean wetland species.

© Thomas Galewski

The long term studies of the Marble Trout (*Salmo marmoratus*) in Slovenia show that dramatic rises in water level are the principal local extinction risk for the species. The limited flows between trout populations and these repeated large scale mortalities indicate that the species may fail to cope with climate changes that lead to more frequent flooding. The results also enable us to make various recommendations concerning future operations for establishing new populations, for example to avoid high flooding risk areas. They also show that the release of fewer than 500 individuals allows to establish a new population, which would reduce the financial costs. With regard to the conservation of the Prespa trout (*Salmo peristericus*), we suggest that efforts should first target the protection of the lower reaches of rivers so as to limit anthropic pressure and restore riverine woodlands and increase their carrying capacity for wild fauna.

Concerning the eel, one of the main results shows the importance of freshwater for certain individuals. Once established in a freshwater habitat, most of the eels remained in that habitat until they undergo the silvering process. This is even the case near the Mediterranean coast, where most wetlands are brackish. This result has direct consequences on current considerations regarding the conservation and fishing management of the species. A population management tool has been made available online on a website to enable managers and the fishing community to achieve the best possible management taking into account the measures imposed by the national eel management plan.



© Thomas Galewski

Squacco Heron

It was also shown that the flamingos are very faithful to their wintering sites. With the current frequency of cold spells, simulations indicate that the strategies of residents and migrants are possibly equally effective in terms of survival rates.

The results concerning the release of mallard for hunting purposes warned of the need to develop the control of this practice, in particular sanitary control. They also showed that the released ducks never manage to attain as good a body condition as wild ducks and that their survival rate is very low, especially during harsh winters.

Michel Gauthier-Clerc
Head of Department

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FOCUS

Risks associated with emerging diseases in the Camargue

The emergence of diseases such as SARS (Severe Acute Respiratory Syndrome) and West Nile fever in recent decades has made us more conscious of the close relationship between the health of animals, humans, and ecosystems. In fact, most emerging pathogenic agents have zoonotic origins (i.e., they are originally found in wildlife populations).

› The Camargue: a zone of potential emergence

Wetlands are an area in which there is contact between wildlife, domestic animals, vectors, and humans, and are thus an important point of exchange for infectious diseases. The Camargue, which is a patchwork of wetlands located at the crossroads of migratory flyways and human trade routes, is therefore a zone of potential emergence. Conscious of the stakes linked to this situation, the Tour du Valat has been conducting studies since 2003 on the ecology of emerging pathogenic agents. This research has shown that Camargue avifauna regularly carries influenza A viruses (avian flu agents; Lebarbenchon 2008) as well as the West Nile virus (Jourdain 2006).

Over the past three years, two principal questions have been investigated to continue this research within the framework of a doctoral thesis, which was jointly sponsored by the Tour du Valat and the MIVEGEC (IRD/CNRS/UM) mixed research unit, in collaboration with the French National Hunting and Wildlife Agency (ONCFS), and the Pasteur Institute in Paris. 1) Is West Nile virus still present in the Camargue, even though no cases of human or horse infection have been detected since 2004? 2) Do other hosts besides wild ducks play a role in influenza A virus dynamics in the region?

› West Nile Virus still present

Birds are natural reservoirs in West Nile Virus (WNV) cycle, and mosquitoes act as vectors. Humans and horses can be infected by WNV, but they cannot transmit it. The infection sometimes causes severe neurological disorders, and can even lead to death. In recent years, equine and human cases have increased throughout the

© Thomas Blanchon - Tour du Valat

Determining the age of a magpie by observing its feathers

Mediterranean basin. In addition, Usutu virus, which is closely related to WNV and has a similar cycle, was detected in Austria in 2001, then in several countries bordering France. Usutu virus is sometimes responsible for the death of captive and wild birds. It has not yet been detected in France, and the last clinical (equine) cases of WNV infections date back to 2004 in the Camargue.

› Monitoring the avifauna: a public health issue

In this context, serological monitoring (searching for antibodies) of magpies (*Pica pica*) was conducted in the Camargue in 2009 and 2010. It enabled the recent circulation (in 2009 and/or 2010) of WNV among Camargue avifauna to be identified (Vittecoq *et al.* in press). The detection of antibodies specific to Usutu virus indicates the presence of this virus in the region, which should be confirmed by isolating the virus. These outcomes are a sign that we should continue monitoring the situation and set up blood donation safety measures, because Usutu virus, just as WNV, can be transmitted by blood. Meanwhile, most infections they cause are asymptomatic, and can thus be passed on unnoticed when blood is donated, as blood is not systematically tested in France for West Nile virus except during periods of time when clinical cases have been detected.

› Avian influenza viruses naturally present in wild birds

Wild birds are the natural reservoir of avian influenza viruses (AIVs). There are two types of AIVs: low pathogenic AIVs, which are naturally present in wild birds and cause asymptomatic or benign infections, and highly pathogenic AIVs, which flourish in the conditions found on poultry farms, and can be associated with a high mortality rate. The AIV study at

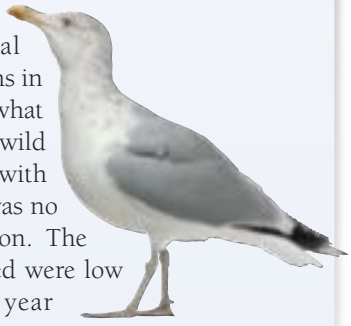
the Tour du Valat was started in 2005. The sampling conducted from 2005 to 2008 showed that the most often infected Species in the region are wild ducks. For the Common Teal (*Anas crecca*) and Mallard (*Anas plathyrynchos*), a peak of infection is regularly observed in September. All the AIVs detected during this monitoring were low pathogenic. AIV monitoring for th Mallard and Common Teal were continued from 2009 to 2012, and included additional monitoring of other kinds of hosts.

› Higher risks for captive-bred ducks

The samples taken in 2009 and 2010 at four farms, where Mallards are bred and then released for the purposes of hunting, revealed the presence of low pathogenic AIVs at two farms. The rate of infection observed was up to 99%, whereas the rate detected in the wild rarely exceeds 20% (Vittecoq *et al*. 2012). At the same time, H5 AIVs were identified, which could evolve toward higher pathogenicity. Knowing that duck breeding conditions make viral exchanges possible between wild ducks and captive-bred ones, these results show that sanitary controls should be made before these Mallards are released into the wild.

› Gulls relatively unaffected, wild boars spared

The samples taken in 2010 from Yellow-legged Gulls (*Larus michahellis*) have enabled us to better understand the temporal dynamics of AIV infections in this species. Contrary to what was observed among the wild ducks living in contact with the gulls studied, there was no seasonal peak of infection. The rates of infection observed were low (0 to 4%) throughout the year (Vittecoq 2012).



Finally, no AIVs were detected in the 315 samples taken from the wild boars killed or captured in the Camargue in 2009 and 2010. Therefore, the wild boar does not seem to play a major epidemiological role in AIV dynamics in the region (Vittecoq 2012).

All of these results have contributed to better defining the risks associated with the pathogenic agents circulating in the Camargue, and to better understanding how to fight them. Control measures must be set up to manage these risks, such as testing of Mallards before they are released. Long-term interdisciplinary research must also be continued, because it is indispensable for the ongoing assessment of these constantly changing risks.

Capture of a wild boar at the Tour du Valat for sampling

© Hugo Cayuela

References:

Jourdain E. 2006. Oiseaux sauvages et virus West Nile : étude éco-épidémiologique en Camargue. Thèse de doctorat. Grenoble 1.

Lebarbenchon C. 2008. Maladies infectieuses et écosystèmes: écologie des virus influenza aviaires en Camargue. Thèse de doctorat. Montpellier 2.

Vittecoq M. 2012. Maladies infectieuses émergentes au sein des zones humides méditerranéennes dans le contexte des changements globaux. Thèse de doctorat. Montpellier 2.

Vittecoq M., Lecollinet S., Jourdain E., Thomas F., Blanchon T., Arnal A., Lowenski S. & Gauthier-Clerc M. Recent circulation of West Nile and other flaviviruses in Southern France. Vector-Borne and Zoonotic Diseases. Press time.

Vittecoq M., Grandhomme V., Champagnon J., Guillemain M., Crescenzo-Chaigne B., Renaud F., Thomas F., Gauthier-Clerc M. & van der Werf S. 2012. High Influenza A virus infection rates in Mallards bred for hunting in the Camargue, South of France. PloS One. 7(8): e43974. doi:10.1371/journal.pone.0043974

Project leader:

Michel Gauthier-Clerc.

Team:

Michel Gauthier-Clerc, Marion Vittecoq, Thomas Blanchon, Jocelyn Champagnon, Yves Kayser.

Financial partners:

MAVA Foundation, AXA Research Fund, CNRS-Ecology and Environment Institute (INEE)..

Scientific partners:

National office for hunting and wildlife (ONCFS), Pasteur Institute - Paris, French Agency for Food, Environmental and Occupational Health Safety (ANSES) - Maisons-Alfort and Ploufragan

Sea lavender

Limonium girardianum

is an endemic Iberian-Provençal species, which is protected in France, and characteristic of coastal Mediterranean mud flats. It has been very negatively impacted by urban and industrial development and the use of coastal zones (tourism), but remains abundant locally in Camargue.

THE PROJECTS:

"Conservation of species and their populations in the context of global changes"

AT A GLANCE

Population dynamics in response to human activities

Arnaud Béchet - bechet@tourduvalat.org

The aim is to gain a better understanding of variations in the response of species to the effects of global change (land use, exploitation, etc.), in order to raise awareness of species conservation problems and to suggest more favourable management methods or means for controlling problem species.

Three main activities are being undertaken:

- Demographic analysis of populations and metapopulations using Capture-Mark-Recapture studies and population genetics (birds, fish, reptiles).
- Long-term biodiversity monitoring in the Camargue (in particular, communities of birds, fish, amphibians, reptiles, etc.).
- Development of tools to enable data to be gathered, managed, analysed, networked, and retrieved

Compared with 2010, breeding populations of Little Egret, Cattle Egret, and Night Heron fell by more than 50%, those of Squacco Heron and Purple Heron by more than 70%, and that of Glossy Ibis by 30%. Spoonbill and Great Cormorant populations remained stable.

With regard to colonial Laridae species, the trend of setting up colonies in managed hunting marshes continued. First analysis concerning the Slender-billed Gull highlighted the effect of climatic conditions on the physical condition of its chicks. Isotope analysis suggested considerable variability of diet between nearby colonies, with a possible effect on the physical condition of fledglings.

Papers have been published on the impact of practices aimed at increasing wild vertebrate populations and on dietary and habitat changes in surface-feeding ducks since the 1960s. Three papers have been published on the ecology of pelicans, in Aquatic Biology, Ecohydrology and Hydrobiology, and Zoology in the Middle East.

The preliminary results of studies regarding the dynamics and genetics of European pond terrapin populations show different genetic structures in the two core populations studied at the Tour du Valat, due to the lack of dispersion of females within the population as a whole.

The Atlas of Mediterranean Waterbirds (http://medwaterbirds.net/) was completely revised and redeveloped. Its functionalities were modified to enable management of data about all waterbirds. The Tour du Valat's biodiversity observation database (http://obsnature-camargue.net/) was enhanced with a photo gallery including a search function covering the whole taxonomic hierarchy of the species, and their scientific and vernacular French names.

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Cattle Egret chick

Mediterraean waterbirds atlas

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THE PROJECTS:

"Conservation of species and their populations in the context of global changes"

AT A GLANCE

Ecology of Health and Conservation

Michel Gauthier-Clerc
gauthier-clerc@tourduvalat.org

The scientific objective is to understand the interactions between biodiversity and problems of public and veterinary health in the context of global change. The applied objectives are to assist in reconciling the conservation of Mediterranean wetland biodiversity with the presence and well-being of human populations; to assist with the conservation of species of unfavourable status during epizootic episodes and pollution incidents.

Four research topics are being studied:

- Study of zoonoses and the role of Mediterranean wetland species in their epidemiology.
- Investigation of the impact of treatments (antiparasitic, antibiotic, antivectoral, etc.) on the wildlife of Mediterranean wetlands.
- Evaluation of the impact of pathogens on the dynamics of Mediterranean wetland species.
- Investigation of the impact of pollutants on the wildlife in Mediterranean wetlands.

In 2012, a paper about the threats posed by emerging infectious diseases in the Mediterranean basin was published in the journal Transboundary and Emerging Diseases.

The study of the Influenza A virus among wild boar in the Camargue was published in *Infection, Genetics and Evolution*. No virus was detected, showing the limited role of wild boar in the epidemiology of the Influenza A virus in the region, despite close contact with wild ducks.

Dalmatian Pelican

The study of ducks reared for hunting in the Camargue was published in the journal PLoSOne. It revealed a very high infection rate (up to 99%) among certain game breeders, greatly exceeding the prevalence rate usually observed in wild populations.

The first analysis of pollutants (PCB and cadmium) was carried out on silver eels in the Vigueirat marsh. Subsequent to the 2007 study, new investigations were carried out on antibiotic-resistant bacteria in the Yellow-legged Gull, in collaboration with MIVEGEC-CNRS-Montpellier.

Introduced species and interactions with local species

Alain Crivelli - a.crivelli@tourduvalat.org

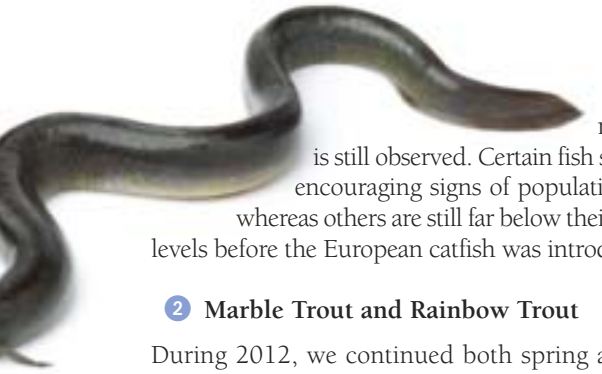
Invasive species can threaten local species, altering their habitats or even affecting the functioning of the ecosystem. This project only deals with the interactions between introduced predatory fish and threatened local species. Studies showing negative impacts of introduced species on local species are often unconvincing, for the following reasons: (a) no data are available from before the introduction, (b) the date of the introduction is unknown, (c) these studies are short-term, and (d) the studies have difficulty in distinguishing between effects due to introduced species and those due to environmental and anthropogenic changes. With these reservations in mind, this project provides two opportunities to study the potential impact of introduced predatory fish on threatened local species.

Two avenues of research are being followed:

① Studying the interactions between catfish and eels.
② Studying the interactions between Rainbow Trout and Marble Trout.

1 Catfish and eels

The elimination of European catfish was continued for the 4th consecutive year in 2012. The new objective is to maintain the population of the predator at a minimum level in zones where we have observed that it only has a limited effect on other fish species. Although the largest individuals have clearly disappeared, successful



reproduction is still observed. Certain fish species show encouraging signs of population recovery, whereas others are still far below their population levels before the European catfish was introduced.

2 Marble Trout and Rainbow Trout

During 2012, we continued both spring and autumn sampling in various water courses where Marble Trout, Brown trout, and hybrid cohabit with Rainbow Trout that have succeeded in establishing populations. In 2012, we observed one isolated, allopatric Rainbow Trout population and two sympatric populations, one with Marble Trout and the other with hybrid Trout, and started an individual marking programme. In addition, we carry out biannual monitoring of two other sympatric populations of Marble Trout with hybrid Trout, notably to assess their first-winter survival rate.

Initial isotope analysis was carried out in order to determine the level of cannibalism among Marble Trout populations. Preliminary results confirm for certain populations, especially relatively small ones, that cannibalism is significant and may play a considerable role in their population dynamics. We are continuing our policy of duplicating pure Marble Trout populations and our genetic, population dynamics and modelling analysis of the resilience of pure populations with regard to catastrophic floods.

Predicting distribution and numbers

Alain Sandoz - sandoz@tourduvalat.org

The objective is to predict, over time scales of 5, 10, 25, and 50 years, changes in the distribution and numbers of species, including vectors of parasites or the parasites themselves, and the diseases associated with them, resulting from human activities (landscape changes, climate change, over-exploitation, etc.).

Four main activities are involved:

- Prediction of the distribution of species in relation to landscape variables.
- Prediction of the distribution of species in relation to climatic variables (local and global).
- Prediction of the emergence of epizootics.
- Prediction of species' numbers in relation to their exploitation.

Ringing the Eurasian Spoonbill chicks

© Thomas Galewski

The impact assessment was continued concerning the consequences for the Camargue flamingo population of the reconversion of the saltworks. The studies carried out highlighted the importance to the flamingos of brine shrimps (*Artemia*), the principal prey found in this area.

The results showed lower ingestion efficiency than theoretically predicted for a filter-feeder, that it was easier for the flamingos to feed in the water column (therefore on brine shrimps) than on benthic larvae, and a much higher energy gain per time unit when flamingos fed on rice rather than brine shrimp and Chironomidae species. In addition, historical flamingo count data showed high frequentation of saltier lagoons with high concentrations of brine shrimp, together with their preference for larger, simple-shaped lagoons.

This year Camille Roumieux defended his thesis on climatic conditions and the potential distribution area of the mosquito *Aedes caspius*, and modelling hatching and the seasonal dynamics of occurrences on the French Mediterranean coast until 2080 in function of climate scenarios.

In the context of the project "From one marsh to another, changing marshes, exercise in reflexivity within a water and territory system: renaturation/restoration of wetlands", the results of studies of the Vallée des marais des Baux in the Alpilles and Salins-de-Giraud Regional Natural Park revealed considerable modifications to landscapes and associated ecological habitats at the two study sites over a sixty year period.

The Team:

Audrey Arnal, Antoine Arnaud, Fatiha Bakaria, Arnaud Béchet, Abdennour Boucheker, Thomas Blanchon, Anne-Laure Brochet, Clarisse Boulenger, Jocelyn Champagnon, Pascal Contournet, Alain Crivelli, Anne-Sophie Deville, Olivier Devineau, Sébastien Ficheux, Michel Gauthier-Clerc, Julia Geraci, Christophe Germain, Yves Kayser, Stephen Larcombe, Sylvain Maillard, Claire Pernollet, Camille Roumieux, Alain Sandoz, Marion Vittecoq.

Ecosystem modelling, restoration & management

Mediterranean wetland ecosystems are modified by many forces, some of which have recently increased as a result of the combined effects of climate change and human activities. The popularity of coastal areas of the Mediterranean Basin, changes in land tenure, and intensification of uses and of agriculture, as well as future changes in environmental conditions, call into question the capacity of wetlands to maintain their condition and their biodiversity and to continue to provide their functions and services.

The existing socio-economic and political contexts tend to generate short-term responses, which are not very consistent with the long-term environmental issues. The implementation of appropriate responses (management) requires the development of tools to explain the changes that are taking place in ecosystems and to anticipate their development and their impacts, in order to redirect management or to undertake active rehabilitation initiatives.

The Department's overall objective is to conserve biodiversity, functions, and ecosystems services in the context of global changes, in accordance with a multi-disciplinary framework that sets out four approaches corresponding to four specific projects:

1. **The modelling of ecosystem dynamics, centred on the interactions among the physical, biological, and social components of the functioning of the hydrosystem and the principal ecosystems in the Camargue.**
2. **The restoration of degraded ecosystems, to improve their biodiversity and their functionality, making use of scientific expertise to direct restoration activities and management decisions.**
3. **The management of ecosystems to implement and promote adaptive, intersectoral, and sustainable types of management that are adapted to land-use development plans, giving priority to long-term approaches (pilot site).**
4. **The transfer of knowledge to scientists, managers, decision makers, and the general public by developing suitable tools, particularly through the activities of the Mediterranean Lagoons Transfer Unit.**

In this second year of the 2011-2015 five-year programme, a fifth project (Adaptive management of the former salinas) was created within the Department. This project groups together all of the activities conducted by the Tour du Valat on the 6,500 ha of coastal ecosystems near Salin-de-Giraud, which were recently sold by the Groupe Salins to the French Coastal Protection Agency.

Petit St-Jean estate - © Tour du Valat

In addition to this project, which mobilised the expertise of several members of the team, new research activities were started with the launch of the project to restore the Vigueirat canal by pulling out Ludwigia, and the European Farmland project, which focuses on interactions between farming practices, biodiversity, and ecological services. Some of the activities already in progress were consolidated. In particular, there was renewed monitoring of the impact of mosquito control in the Camargue under the supervision of the Tour du Valat, which is handling the entire project. The Cassaïre restoration project is now in full swing, and the ecosystemic approach has been strengthened in the actions carried out at the pilot site in the Gediz Delta. The Tour du Valat is also increasingly involved in the development of the concept of a red list of ecosystems (IUCN), and a new team leader joined the Lagoons Transfer Unit to improve the transfer activities completed in the PACA Region.

Ceriagrion tenellum

© K. Lessells

While the Tour du Valat was a pioneer in the conception of management plans for protected areas, various methodological approaches are being applied today (e.g. French Natural Reserves, Natura 2000 sites, Ramsar, Eurosite, Open Standards). The Tour du Valat's integrated management unit, in association with the Ecosystem Department, completed a comparative study of these different approaches based on a multi-criteria grid in order to quantify changes in management plans, and to be able to make thoughtful recommendations for the future. The initial results of this research will be valorised in 2013.

Finally, a two-year postdoctoral study on the factors explaining the distribution of the Louisiana Red Swamp Crayfish in the Camargue and its trophic role in ecosystems was finished in 2012. The results of this research, which was funded by the MAVA Foundation, are reported in the "Focus" section for our Department.

Brigitte Poulin
Head of Department

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FOCUS

Red Swamp Crayfish, a newcomer impacting the Camargue biodiversity

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Biodiversity is currently facing a worldwide crisis that corresponds to global change. The principal factors contributing to this loss in biological diversity are climate change, the overexploitation of resources, changes in land use, and the proliferation of exotic species (biological homogenization). Biological invasions are considered to be one of the principal causes of biodiversity loss, particularly in aquatic ecosystems (Rahel, 2002).

› A high invasive success species

Red swamp crayfish (*Procambarus clarkii*) is a species native to the southeastern United States and northeastern Mexico, which has colonised 11 European countries since the 1970s. Its life history traits, such as its high reproduction rate, great trophic flexibility, and ecological adaptability, enable it to have great success as an invasive species. It is listed as one of the exotic species that has the most impact on aquatic ecosystems (Savini *et al.*, 2010). This classification takes account of impacts on individuals, population dynamics, and the genetic integrity of native species in communities and essential processes in the functioning of ecosystems (Parker *et al.* 1999). The Red Swamp Crayfish has an impact at all of these levels, except in terms of the genetic integrity of species.

› A research project aiming a deeper knowledge on its geographical distribution and its impacts

The presence of this species in the Camargue was only detected in the middle of the 1990s (Rosecchi *et al.*, 1997). Today, it is abundant and contributes to the diet of several vertebrate species such as the European pond terrapin (Otonello *et al.*, 2007), the Great Bittern (Poulin *et al* 2007), and the European Catfish (Martino *et al* 2011). Nevertheless, its place in the trophic chain and its actual impact on ecosystems in the Camargue are still not well known.

In this context, the Tour du Valat conducted a research project (April 2010-December 2012) aiming to ascertain the distribution of the Louisiana Red Swamp Crayfish according to environmental parameters, and also the impacts caused by this species on biodiversity compartments in the Camargue.

With the assistance of partners who manage natural areas in the Camargue (SNPN for the Camargue National Reserve, marshes of Vigueirat, Joint association for the Protection and Management of the Camargue gardoise, and the Listel Corporation), samples were taken for one year at 48 stations in five different types of habitats (rice fields, canals, permanent and semi-permanent marshes, and temporary pools). Results show that the crayfish are less abundant in the Camargue in rice fields and canals than in the other habitats studied. The demographic success of this crayfish in natural habitats is partly due to the fact that the water in the Camargue is getting less salty due to human activities (it reproduces at a salinity of less than 5 g/l, Meineri *et al.*, soumis).

The average abundance of crayfish in Camargue wetlands is significantly lower than in Doñana where, in addition, they are very abundant in rice fields (Alcorlo *et al.*, 2008).

The impacts of the Louisiana Red Swamp Crayfish on biodiversity have been studied at three different levels: (1) the food web functioning in the Camargue; (2) the functioning of a temporary pool, and (3) for amphibian populations (Mediterranean Tree Frog).

Pulling up crayfish nets

› A keystone node in the food web

The study confirms the important role played by the crayfish in food webs, both as a prey and as a predator. It accounts for up to 80% of the diet of the chicks of three species of wading birds: the Glossy Ibis, White Spoonbill, and Cattle Egret. Stomach content analyses of this predator show that this crayfish has a varied diet (insects, fish, amphibians, other invertebrates, plants, and seeds), but essentially (80%) made up of organic matter and detritus. The presence of the Red Swamp Crayfish creates a direct link in the food webs between organic detritus and top predators, providing the latter a large invertebrate (primary consumer). Given the high numbers of this crayfish in the Camargue, this represents an important quantity of food available for these predators. In a certain way, the crayfish shortens the energy pathway between organic matter and the upper levels in the food web, thus contributing to an increase in the productivity of habitats in the Camargue.

› Strong impact on temporary ponds biodiversity

The second area of research concerns the functioning of one of the ecosystems that has been the least modified by humans in the Camargue, temporary ponds. Thirty experimental ponds were created in plastic containers (mesocosms) in order to assess the impact of three densities of crayfish (0, 1, or 3 crayfish/m²) on the structure and functioning of ecosystems. The results show that after 10 weeks, a density of 3 crayfish/m² leads to an 80% decrease in the biomass of macrophytes, and a 33% decrease in the diversity of macroinvertebrates, with no visible impacts on the zooplankton community (Rodríguez-Pérez *et al.*, in prep.).

› Weak impact on Mediterranean tree frog

The third part of the project focuses on a particularly abundant species likely to be affected by the Red Swamp Crayfish in the Camargue, the Mediterranean tree frog. Although various experimental and descriptive approaches were used, no negative impact on clutches or tadpoles could be demonstrated, at least with the current densities of crayfish in the Camargue (Rodríguez-Pérez et al., in press).

This exotic species can also have consequences on socioeconomic activities in the Camargue, in particular through the impact of its burrows on hydrological infrastructure. Local stakeholders' perception of the consequences of the presence of the Red Swamp Crayfish was studied on the basis of surveys within the framework of a partnership with Carole Barthélémy (Aix-Marseille University). The perception of stakeholders from the farming community is very negative in spite of densities that are much lower in their rice fields than in Spain. Wetlands managers are much less critical. Although they are worried about possible risks in terms of the disappearance of biodiversity, paradoxically, they see some positive points in the presence of the Louisiana Red Swamp Crayfish in the Camargue.

Project Leader:

François Mesléard

Team 2011:

Héctor Rodríguez-Perez, Eric Meineri, Samuel Hilaire, Timo Prola, Lisa Ernoul, François Mesléard.

Financial partner:

MAVA Foundation.

Technical partners:

Camargue National Reserve, Vigueirat National Reserve, Joint association for the Protection and Management of the Camargue gardoise, and the Listel Corporation.

Reference :

Alcorlo P., Geiger W., & Otero M.C. 2008. Reproductive biology and life cycle of the invasive crayfish Procambarus clarkii (Crustacea; Decapoda) in diverse aquatic habitats of South-Western Spain: Implications for population control. Fundamental and Applied Limnology 173:197-212.

Martino A., Syväranta J., Crivelli A., Cereghino R. & Santoul F. 2011. Is European catfish a threat to eels in Southern France Aquatic Conservation: Marine and Freshwater Ecosystems 21:276-281.

Ottonello D., Salvidio S. & Rosecchi E. 2005. Feeding habits of the European pond terrapin Emys orbicularis in Camargue (Rhône delta, Southern France). Amphibia-Reptilia 26:562-565.

Parker I.M., Simberloff D., Lonsdale W.M., Goodell K., Wonham M., Kareiva P.M., Williamson M.H., Von Holle B., Moyle P.B., Byers J.E. & Goldwasse L. 1999. Impact: toward a framework for understanding the ecological effect of invaders. Biological Invasions 1:3-19.

Poulin B., Lefebvre G. & Crivelli A. 2007. The invasive red swamp crayfish as predictor of Eurasian bittern density in Camargue, France. Journal of Zoology 273 :98-105.

Rahel F.J. 2002. Homogenization of freshwater faunas. Annual Review of Ecology and Systematics 33:291-315.

Rosecchi E., Poizat G. & Crivelli A.J. 1997. Introductions de poissons d'eau douce et d'écrevisses en Camargue : Historique, origines et modifications des peuplements. Bull Fr Peche Piscic 344-345:221-232.

Savini D., Occhipinti–Ambrogi A., Marchini A., Tricario E., Gherardi F., Olenin S. & Glolasch S. 2010. The top 27 animal alien species introduced into Europe for aquaculture.

Collared Pratincole

Glareola pratincola

In France, the Collared pratincole is very rare, and is principally limited to the Camargue where there are generally less than 100 pairs. The colonies, which nest on the ground, are very sensitive to disturbances, and to the flooding of these areas in the spring and summer.

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THE PROJECTS:

"Ecosystem modelling, restoration, and management"

AT A GLANCE

Ecosystems dynamics modelling

Brigitte Poulin - poulin@tourduvalat.org
Olivier Boutron, Philippe Chauvelon, Emilien Duborper/Samuel Hilaire, Patrick Grillas, Gaëtan Lefebvre, Hector Rodriguez, Loïc Willm/Nathalie Patry.

PhD student: Aurélien Loubet.

This project's objectives are to conserve biodiversity and the functions and services provided by ecosystems, in the context of global changes, through (1) the acquisition of knowledge on their functioning and dynamics; (2) the development of models based on predictive scenarios that include changes in water management, salinity, and uses linked to global change; (3) transfer and exchange tools for stakeholders in the local area, as well as managers and researchers to encourage the implementation of sustainable and adaptive practices. The Camargue, where biogeographic and social issues are closely related, is particularly well-suited for studying the impact of global changes.

In the first place, this project concerns the principal ecosystems in the Camargue (Salicornia formations (sansouïres), reedbeds, marshes with aquatic macrophytes, the former salt works area, and the Vaccarès lagoon system), which have a varying degree of sensitivity to stressors (water, salt, uses) according to how artificial their environment is or how much they depend on the hydrological system, which is a key element modelled in the project. The biological compartments concerned differ according to the ecosystems studied, but are generally related to prey-predator relationships among flagship, economically valuable, and invasive animal species. The plant communities are generally studied in terms of how they support animal biodiversity, and they are used as indicators of environmental conditions.

An outing during the "Manifestations deltaïques"

The principal topics studied in 2012 were:

- Modelling the hydrological and salinity regime in the Vaccarès hydrological system, and extending these measurements (water and salinity levels) to the left bank of the mouth of the Great Rhone.
- Modelling monthly variations in water levels and salinity in reed swamps in function of climatic parameters (precipitation, temperature, and wind).
- Modelling environmental factors (in particular, threshold values on duration of flooding and dry periods), which influence species richness and the Mediterranean specificity of the submerged macrophytes in hunting marshes.
- Habitat preferences and trophic role of the Louisiana Red Swamp Crayfish (see the focus on page 28).
- Impact of Bti mosquito control on non-target fauna, with a study on the persistence of Bti in the environment, and its effects on long-term counts of reed passerines and waterbirds in the Camargue.
- The effect of Ludwigia cover (an invasive exogenous plant) on aquatic flora and fauna within the framework of a project to restore the Vigueirat canal.
- The launch of a project on the relationship between the spatial configuration of agricultural crops, biodiversity, and ecological services within farming landscapes in the Camargue.

THE PROJECTS:

"Ecosystem modelling, restoration, and management"

AT A GLANCE

Ecosystems restoration

François Mesléard - mesleard@tourduvalat.org
Olivier Boutron, Philippe Chauvelon, Olivier Pineau, Marc Thibault, Loïc Willm/Nathalie Patry, Nicole Yavercovski.

PhD students: Teddy Baumberger, Solène Masson, Isabelle Muller.

Restoration needs for Mediterranean wetlands are significant. Local changes in land-use allocation offer opportunities for ecological rehabilitation projects. Likewise, the objectives of this project are to (1) restore biodiversity compartments and/or functions of ecosystems and degraded communities; (2) test out and promote rehabilitation and management methods. It is based on knowledge of the processes involved in the dynamics and organisation of ecosystems to predict and shape how they will develop. This project has been developed within the framework of partnerships, and it includes three sub-projects

Rehabilitation of the Cassaïre Estate

The Cassaïre Estate (70 ha owned by the Conservatoire du Littoral) is mainly made up of formerly cultivated fields. In this area, we are testing out our capacity to rehabilitate a wetland for several uses. On the basis of land-development (ecological engineering) and management scenarios in function of the reference ecosystems, techniques for reintroducing and/or strengthening communities are being put in place.

Restoration of populations of *Limonium girardianum*

The spatial and temporal dynamics of this nationally protected species of sea lavender, and its dependency on perturbations (nature, intensity, repetition) have not yet been well understood. This project studies the niche and biology of populations of this species, which is much too often destroyed by development projects, in order to propose restoration techniques and, in particular, to test out the pertinence of population augmentation.

Rangeland restoration

The rangelands face many threats, such as habitat closure and the development of undesirable species, which undermine their value for grazing and conservation purposes. The causes have been generally well-identified and concern in the first place irrigation and inappropriate livestock management. For the 2011-2015 programme, we will focus our efforts on fighting against the closure of these habitats by Phillyrea and bramble.

The team working on the Cassaïre Estate

Ecosystems

Lisa Ernoul - ernoul@tourduvalat.org
Arnaud Béchet, Nicolas Beck, Coralie Beltrame, Olivier Boutron, Philippe Chauvelon, Damien Cohez, Patrick Grillas, François Mesléard, Christian Perennou, Olivier Pineau, Alain Sandoz, Marc Thibault, Nicole Yavercovski.

This project aims to 1) test and validate management methodologies and approaches on specific sites, 2) implement and monitor activities identified in the management plan on the Tour du Valat Estate, 3) inform and influence site managers on sustainable site management approaches, 4) improve our understanding

of stakeholder decision-making processes to increase our effectiveness in terms of conservation, and 5) develop tools for transfer and awareness raising concerning the methodologies developed and tested.

International pilot site: Gediz Delta, Turkey

The project has initiated a stakeholder analysis in the delta. Outcomes of this analysis phase include contacts that have been made and the development of partnerships for setting up monitoring operations on hydrology, reed beds, habitat mapping, mammal populations, and grazing pressure. We are currently reflecting on habitat management and restoration operations. In addition, a research project is being developed with Curtin University (Australia), to assess the importance local communities place on biodiversity and their perception of nature management, based on a comparison of the Gediz Delta and the Camargue.

Izmir, Turkey: advertisement for the photo exhibition jointly organised by Doğa Derneği, Photographes pour la Planète, and the Tour du Valat

Tour du Valat estate

Finalised en 2011, the Estate's management plan, was approved by the reserve's Scientific Council, and officially validated by the PACA Regional Government in 2012. This management plan places a priority on natural heritage conservation, focusing on the naturalness and the functional characteristics of Camargue habitats. After validating its 2nd participative management plan, the Verdier Marshes Association continued the activities it has developed since 2003, with in particular in 2012 developments concerning the Pesquier lagoon intended to facilitate fishing activities there and the installation of an apiary for educational purposes.

Le Petit St-Jean is an estate located in the Gard that was recently inherited by the Tour du Valat, and was included in the Estate's management plan in 2012. This site covers 101 ha, and includes a remarkable pine grove (50 ha), marshes (24 ha), and agricultural parcels (26 ha with a 5 ha vineyard). It has a good potential for the development of an agro-ecology project combining innovative farming activities with nature conservation activities, and the rehabilitation of the buildings with bio-sourced materials and environmental education. In 2012, activities focused mainly on defining the current state of this property, and completing the administrative procedures necessary for the Tour du Valat to really take over the site.

Other sites and management methodologies

The management plan for the nature reserves of the Bouches-du-Rhône in the Camargue was finalised and validated this year. Its principal objectives are to maintain lagoon habitats in good ecological condition (fight against pollution and the restoration of several natural hydrological cycles), improve biological exchanges with the sea (to control the different uses such as fishing and recreation), maintain good conditions for the reproduction of colonial waterbirds, and promote the natural heritage and ecological value of these sites for the general public. The ArcelorMittal management plan for its natural areas (Fos-sur-Mer) has now been finalised, marking the end of our partnership and involvement on the site.

Our team also contributed widely to participative approaches for integrated management tools for coastal zones via the FP7 PEGASO project. Workshops were also organised with IFREMER this year with the principal stakeholders in the Bouches-du-Rhône in order to validate spatial indicators (LEAC – Land and Ecosystem Account method), and to build prospective scenarios. Within this framework, the Tour du Valat also hosted the regional Mediterranean workshop "Imagining the future" bringing together participants from more than ten countries.

2012 Retrospective in pictures


© Tour du Valat

The Tour du Valat's November team
www.novembre.com


© Tour du Valat

Ringing flamingos:
time for a bit of rest and relaxation!


© Tour du Valat

Work session with the Society
for the Protection of Prespa

Open D


© Tour du Valat

PEGASE regional workshop in Arles


© Hervé Hôte

Ringing flamingos from another perspective


© Quartzfilm.ro

French delegation at the Ramsar COP11
in Bucharest


© Tour du Valat

A precious moment

Ringing glossy ibises

Chicks, we've

© J.Jobert

A frozen sea? No... the Vaccarès in February 2012!

© Tour du Valat

International Symposium on water and wetlands in the Mediterranean - Agadir - Morocco

The famous 450 year-old "Iron Pine" on the Petit St Jean Estate

© Tour du Valat

e Tour du Valat was at Jeju, South Korea for the IUCN World Nature Congress

© Jean Francois Legrel

Flamingos in the snow

© Marjorie Mercier - PNRC

Ringing under high surveillance

© Tour du Valat

© Tour du Valat

World Water Forum in Marseille, where advances on MDG water indicators were presented

© Tour du Valat

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"Nature Day" event at the Vaccarès marsh

© H. Hötte

© Tour du Valat

Employees visiting the Petit St Jean Estate

© Tour du Valat

On the road again !

THE PROJECTS:

"Ecosystem modelling, restoration, and management"

AT A GLANCE

Adaptive management of the former salinas

Brigitte Poulin - poulin@tourduvalat.org
Antoine Arnaud, Nathalie Barré, Arnaud Béchet, Thomas Blanchon, Olivier Boutron, Philippe Chauvelon, Damien Cohez, Alain Crivelli, Lisa Ernoul, Patrick Grillas, Jean Jalbert, Yves Kayser, Gaëtan Lefebvre, François Mesléard, Marc Thibault, Loïc Willm/Nathalie Patry, Nicole Yavercovski.

PhD student: Jean-Paul Rullmann.

This project capitalises on the expertise developed in the three previous projects, and that of the Species programme on flamingos and Charadriiformes to guide the rehabilitation of an exceptional site by encouraging a transdisciplinary approach that includes different spatial and temporal scales. The former salt works area is made up of 6,758 ha purchased by the Conservatoire du Littoral (CdL) in three different operations since September 2008. These areas have a high ecological potential, are adjacent to the Camargue National Reserve, and are part of the largest area benefiting from long-term protection on the French coast (20,000 ha). The development of 5000 ha of this area for salt production starting in the 1960s extended the zones flooded by sea water, and greatly increased the length of dykes. The acquisition of these areas by the CdL raises questions in terms of how to manage water and the coastline, which is regressing locally by up to 10 m/year on average. A six year management agreement has been established between the CdL (owner), the Camargue Regional Nature Park (manager/coordinator), the Tour du Valat, and the National Nature Protection Society (co-managers) stipulating the following conditions:

- reestablishing more natural hydrological functioning, which would require a reconnection with the nearby hydrological systems (the Vaccarès lagoon, the sea, and the Canal du Japon);
- regenerating coastal ecosystems typical of Mediterranean coastal lagoons and sandy sea fronts (dunes, saline and xeric grasslands);
- maintaining or increasing the carrying capacity for colonial waterbirds;
- implementing adaptive management practices in response to the rising sea level, particularly through the progressive and controlled retreat of the coastline in the areas where erosion is significant;
- taking account of local economic issues, being sure to offer various possibilities in terms of economic development and diversification in a way that is not aggressive and respectful of the environment.

Principal activities conducted in 2012:

- the implementation of the LIFE+ MC SALT (2011-2015) project, and in particular actions required for hydrological restoration works, creating nesting islets for waterbirds, and regenerating vegetation;
- our contribution to the hydrology and biodiversity sections of the management guide (2012-2015);
- continuing our study on the spatial and temporal distribution of invertebrates and waterbirds in function of variations in the water level and the salinity of lagoons.

Training on macrophytes by the Lagoons Transfer Unit

© C. Brochier SMCG

Mediterranean Lagoons Transfer Unit

Virginie Mauclert - mauclert@tourduvalat.org
Nathalie Barré, Nathalie Chokier.

The Mediterranean Lagoons Transfer Unit is included in the Wetlands Transfer Units network which was set up in 2001 as part of the National Wetlands Plan. It is coordinated by the Tour du Valat in the PACA Region, and works closely with the Languedoc-Roussillon Conservatory of Natural Spaces and the Corsican Environment Office in order to have representatives in each French Mediterranean Region. It is an innovative programme, which provides assistance to all lagoon habitat stakeholders, regardless of the geographical or administrative situation.

The Mediterranean Lagoons Transfer Unit encourages the sustainable management of these environments, providing expertise and advice with:

- Knowledge transfer via its website, Lagoons newsletter, bibliographic database, and on-line directory.
- The organisation of information-exchange meetings for the stakeholders.
- The publication of guides and articles for the general public.
- Communication and awareness-raising activities.

In 2012, the Lagoons Transfer Unit conducted several key actions in three regions:

- The beginning of the Feder project "Strengthening Mediterranean Lagoons Transfer Unit activities in PACA 2012-2014" with the employment of a third person working on awareness raising in PACA.
- World Wetlands Day on the theme of "Tourism in wetlands: a unique experience", which we coordinated for the 8th consecutive year, with more than 100 events along the Mediterranean coast. Our new website (www.pole-lagunes.org) was put on line on this occasion.
- The success of European Heritage Days on the theme of "hidden treasures in our lagoons", which we coordinated for the 4th consecutive year, with some 100 events and 7000 participants.
- The coordination of the work groups evaluating the conservation status of coastal lagoon habitats on Natura 2000 sites in the aim of publishing a methodological guide by the French National Museum of Natural History.
- Training on how to recognise macrophytes in lagoon and "peri-lagoon" habitats, conducted in collaboration with the French National Hunting and Wildlife Agency (ONCFS).
- An information exchange day co-organised with the ARPE PACA on the theme of reducing the use of pesticides and fertilisers in urban areas for local authorities in the PACA Region.

Ganivelle fencing on the Fangassier thanks to Accor employees

Monitoring and evaluation & wetlands policies

Evaluating and communicating the state of wetlands conservation, their functioning and their values; continuous assessment of the trends affecting these habitats as well as the causes of changes in respect of which it is possible to act: these activities are of the highest priority for raising the awareness of decision makers and the general public. These activities have been defined while acknowledging that the information that would enable this need to be addressed is still fragmentary, not always up to date, and has not been transferred in an adequate way to the various target groups.

The "Monitoring and evaluation & wetlands policies" department, in liaison with the other two departments, aims to:

1. **Catalogue, evaluate, develop, share, and promote knowledge about the state, trends, and management of Mediterranean wetlands.**
2. **Identify and analyse the factors and pressures which explain the state of Mediterranean wetlands and the trends affecting them.**
3. **Promote decision-making in favour of their protection, restoration, use, and sustainable management.**
4. **Improve the way in which wetland conservation is taken into account in the context of sustainable development in the Mediterranean region.**

To achieve these objectives, a participative, interdisciplinary, and targeted approach has been adopted, with adaptive management in accordance with the expectations and needs of the users of the department's results. The activities that are initiated are taking place within two interdependent projects; the first, "Methodology and innovation for monitoring wetlands" feeding directly into the second, "Observatories and wetlands policies". The Mediterranean Wetlands Observatory (MWO) forms the backbone of the department and brings together a wide-ranging technical and institutional partnership as well as the 27 MedWet member states.

In this second year of the 2011-2015 five-year programme, efforts were mainly focused on the **production, valorisation, and transfer of MWO monitoring results**. After publishing the first MWO report on the status and trends of Mediterranean wetlands and the first thematic report on the biodiversity in these ecosystems in early 2012, the department took advantage of the international, regional and national platforms in eight countries to make them immediately accessible to the people concerned. Several side events focusing on these outcomes were organised at the same time. These reports have already become the regional reference that support our activities and will enable us to compare subsequent results relating to wetlands indicators.

Efforts within the GlobWetland II project focused on producing maps and calculating indicators for countries in the southern part of the Mediterranean basin. In October 2012, Anis Guelmami was recruited to use this tool to **map wetlands in countries in the northern part of the Mediterranean basin and calculate indicators for them**. The outputs of this research will be valorised in the synthesis report to be published as our second thematicl report in 2014.

MWO indicator development focused principally on ecological services through the Hula-Camargue project, and the monitoring of cultural services at nine Mediterranean sites. The preparatory phase for defining an **indicator on local planning and wetlands** came to an end in 2012 with the study on Morocco. A synthesis report will be written on the different studies undertaken, and an indicator should be defined in 2013-2014.

Three projects came to an end in 2012; their valorisation as articles, documents for the general public, and a final results seminar are still in progress or have been scheduled. The project on the **participation of civil society in water management** activities, which was coordinated by Wetlands International, came to an end in June. The lessons learned were incorporated into a joint project on the management of catchment areas in the Mediterranean, which was submitted for funding. The **Hula - Camargue ecosystem services project** came to an end in December 2012, and the outcomes were presented during a closing seminar in November. Three articles are being written to valorise this research, and the work on biodiversity in the Camargue and in Hula will be continued. The first phase of the **RhoMeO project** (Rhone catchment) was completed in December. The department completed a great amount of work in terms of coordinating the teams involved in the RhoMeO project, and the first results of the programme were presented at a national seminar. A bigger seminar for reporting these results has been scheduled for October 2013.

Meanwhile, new projects and additional studies were prepared in 2012, and will start in early 2013: a three-year programme for the development of indicators and the valorisation of MWO monitoring results (**water, biodiversity, and ecosystem services**), which is funded by the Prince Albert II of Monaco Foundation, and an NGO capacity building project, which is funded by the MAVA Foundation and coordinated by WWF MedPo.

Finally, during the Ramsar COP in July, the Mediterranean Wetlands Committee validated the MWO governance system and its 2012-2015 Strategic Plan.

Laurent Chazée
Head of Department

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FOCUS

The Mediterranean Wetlands Observatory's first Special Report on biodiversity

The Mediterranean Wetlands Observatory (MWO), which is coordinated by the Tour du Valat, was created in 2008 within the framework of the MedWet Initiative. The MWO provides up-to-date information on wetlands in 27 countries to help preserve these highly-threatened areas.

Following the publication of its first technical report "Mediterranean Wetlands Outlook", an overview of the current state of wetlands, the MWO has just published the first in a series of special reports, which will provide in-depth knowledge on a particular theme. This first issue focuses on biodiversity, particularly on the conservation status and trends of plant and animal species, the threats to them, the services they provide to humanity, and the possible solutions for reversing negative trends. Outcomes are presented at the Mediterranean regional and sub-regional levels (Europe, North Africa, and the Middle East).

› The conservation status of most species is a cause for concern

One third of the species living in Mediterranean wetlands are threatened by extinction according to IUCN Red List Criteria. Threatened species are often small in numbers and concentrated in small distribution areas. They can be found especially in Spain, Greece, France, Croatia, Morocco, Turkey, Israel, and Italy *(Figure 1)*.

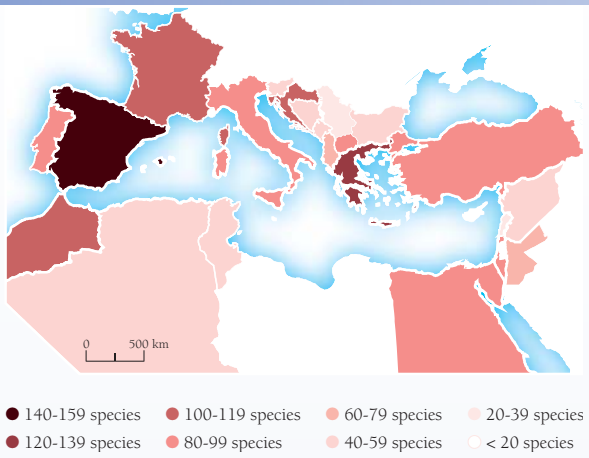
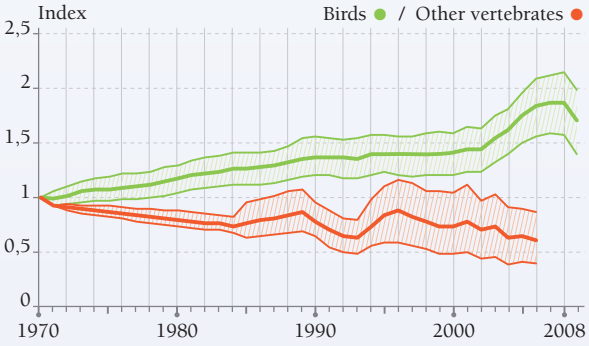


Figure 1
Number of endangered species in wetlands

The living planet index shows that there is only a positive trend for birds in Mediterranean wetlands (a 70% increase since 1970), whereas the other groups of vertebrates (amphibians, reptiles, mammals, and fish) have decreased by an average of 40% since 1970 *(Figure 2)*. The better conservation status of waterbirds can be explained in terms of their greater capacity to adapt to the degradation of wetlands and their widespread protection since the end of the 1970s.

Figure 2
Living Planet Index for Mediterranean wetlands



› Threats to biodiversity growing

While the campaigns to drain huge wetland areas for farming or urban development have slowed down, small wetlands continue to be destroyed. Yet, these are the very habitats (temporary ponds, sources, and peatlands) that host a significant proportion of the species threatened by extinction.

Many wetlands are in bad shape today because they have been polluted or have dried up due to excessive water extraction. Intensive farming, which uses great quantities of water for irrigation, and large amounts of fertilisers and pesticides, is greatly responsible for the bad conditions of wetlands and the loss of species that are dependent upon them.

In addition to the disappearance or degradation of their habitats, flora and faune face many other direct threats: the overexploitation of certain species through fishing, hunting, and harvesting, various disturbances and disorders caused by mass tourism, the introduction of exotic competitive and predatory species, and climate change.

› These species provide a wide range of services

The fish living in coastal areas, lagoons, and big lakes still guarantee the survival of numerous communities in the Mediterranean Basin today. Yet, industrial (over) fishing and especially the degradation of aquatic ecosystems are threatening the future of traditional fisheries.

Wetland plants too are the basis of several economic sectors. They provide fodder for livestock, construction materials, and are widely used in traditional as well as modern pharmacopoeia!

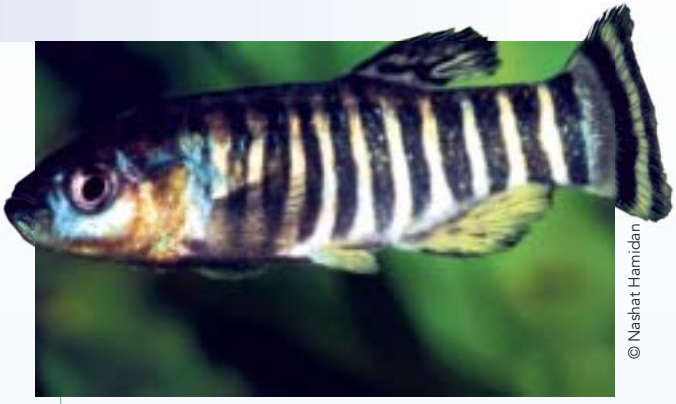
Birds, dragonflies, and fish are also at the heart of many leisure time activities, thus contributing to our moral well-being while supporting the local economy. Naturalists, hunters, fishers, seashell gathers, and even tourist themselves thus have an interest for wetlands in which biodiversity is abundant and preserved.

› Solutions to reverse the loss of species

The number and surface area of legally protected Mediterranean wetlands are on the rise, even if the total surface area remains below the objectives set in international conventions. While the most important sites for waterbirds are often protected, conservation efforts must be increased for wetland areas, such as courses of water, temporary marshes, wetland prairies, and peatlands, which are home to many threatened species, even when they are very small in area. The legal protection provided for plant and animal species also proves to be an effective means for reversing negative trends, as can be seen by the significant advances made by some species, most often waterbirds. We should encourage the adoption and strengthening of nature protection laws in the short and medium-term; however, it is equally important to be sure that we have the financial and human means required to apply and enforce them.

In recent decades, projects have been conducted throughout the Mediterranean to reintroduce species and restore wetlands that had been drained. The outcomes are often spectacular, and offer hope that the conservation status of many species will be improved if these initiatives are put into widespread use.

Finally, as it is clearly explained in the MWO report: Mediterranean Wetlands Outlook, the preservation of plant and animal communities in wetlands cannot be accomplished sustainably unless we address the underlying causes responsible for the degradation of these ecosystems: today's economic development model, which is incompatible with the conservation of natural resources, the segmentation opposing conservation and development stakeholders, and the lack of interest for wetlands on the political agenda.



© Nashat Hamidan

Aphanius sirhani

Outcomes and reports can be downloaded from the MWO website:

www.medwetlands-obs.org

Team:

Thomas Galewski, Coralie Beltrame, Laurent Chazée, Caroline Mayaudon, Christian Perennou.

Website:

www.medwetlands-obs.org

Financial partners:

Prince Albert II of Monaco Foundation; Total Foundation; MAVA Foundation for Nature; Pro Valat Foundation; Ministry of Foreign Affairs – France; Ministry of Ecology; Sustainable Development and Energy – France; Ministry of Higher Education and Research - France.

Institutional and technical partners:

A Rocha - Lebanon; National Environment Protection Agency (ANPE) - Tunisia; Friends of the Birds Association/Birdlife - Tunisia; Friends of the Vigueirat Marshes Association - France; University of Bejaïa - Algeria; Birdlife International; CNRS-CEFE - France; World Conservation Monitoring Centre (UNEP/WCMC); General Directorate of Forests - Tunisia; Doša Derneši//BirdLife - Turkey; University of Ége - Turkey; Conservatory of Natural Spaces; Greek Biotope/Wetland Centre - Greece; Practical School of Higher Education; Med-INA; National Office for Hunting and Wildlife (ONCFS) - France; ONEMA - France; Camargue Regional Nature Park - France; Pont de Gau Ornithological Park - France; Blue Plan; WWF MedPo; Camargue National Reserve - France; Ramsar Secretariat; Society for the Protection of Prespa - Greece; SPEA/ BirdLife - Portugal; IUCN Mediterranean Office - Spain; University of Tel-Aviv - Israel; Convention on Biological Diversity Secretariat; Wetlands International; French Society for the Study and Protection of Mammals - France; Royal Society for Nature Conservation - Jordan; Zoological Institute - UK; WWF Greece.

Ocellated lizard

Timon lepidus

There is a national action plan for the conservation of the Ocellated lizard. Its numbers have sharply declined in France, and it is now considered to be a vulnerable species by the IUCN. This species can be found on the Tour du Valat Estate.

© J. Renet - CEN PACA

THE PROJECTS:

"Monitoring and evaluation & wetlands policies"

AT A GLANCE

Observatories and wetlands policies

Christian Perennou - perennou@tourduvalat.org
Coralie Beltrame, Laith El Moghrabi, Thomas Galewski, Christian Perennou, Maïlis Renaudin.

This project is made up of two parts (sub-projects): the Mediterranean Wetlands Observatory (MWO) and an institutional support for wetland policies. The first is a scientific monitoring tool which acts as a major management and communication instrument for monitoring the conservation status of these habitats. The second part is considered to be a direct practical application of the first, aiming to raise the awareness of decision makers through institutional, strategic, and policy capacity building within countries and international organizations.

In 2012, for the first sub-project, the main activity consisted in producing and publishing the MWO's monitoring results in two reports. The first targets technical and scientific users, and the second is intended for decision makers and citizens. These results were also featured in a film and presented on posters. A website and an electronic newsletter increase the visibility of our research and results. All of the products created were widely promoted in 2012, in particular at the MedWet Symposium in Agadir, the World Water Forum in Marseille, the Ramsar COP in Bucharest, and the IUCN World Nature Congress in Jeju. The MWO's activities were presented in eight countries (Morocco, France, Romania, South Korea, Turkey, Italy, Bosnia - Herzegovina, and Israel) at various seminars and training sessions, and its partnership was strengthened and broadened, especially in the Balkans. The updated governance structure and the MWO's 2012-2015 strategic calendar were approved by the Mediterranean Wetlands Committee (MedWet/Com) at the July meeting in Bucharest.

In the other sub-project, the Department continued to help draft the Moroccan wetlands strategy and the management plans for two wetlands in Algeria, as well as set up four observatories (France, Morocco, and Algeria). It also participated in discussions with the Directorate of Forests in Algeria to revive the process of formulating a wetlands strategy and to set up an observatory. It provided support for the Wetlands International water management project involving participants from civil society until it came to an end in June 2012.

© Maïlis Renaudin - Tour du Valat

Agadir Symposium

THE PROJECTS:

"Monitoring and evaluation & wetlands policies"

AT A GLANCE

Methodology and innovation for monitoring wetlands

Christian Perennou - perennou@tourduvalat.org
Coralie Beltrame, Laurent Chazée, Thomas Galewski, Anis Guelmami.

This project develops and tests methodologies, concepts, and wetlands monitoring indicators before they are validated and implemented on a routine basis within the framework of the Observatories and wetlands policies project. Exploratory research is also completed in new areas, for which indicators have not yet been developed.

In 2012, four major actions were carried out:

- Further development and application at the "Site" scale of Mediterranean Wetlands Observatory biodiversity indicators, leading to the 1st publication on this subject for the Mediterranean basin.
- Continuation of the "Sites & Biodiversity" database for the Observatory, to enable comparative analyses. New studies were conducted on the topics such as the link between the protection status and ecological characteristics of a wetland (its surface area and habitats).
- Methodological research on MWO indicators that can be measured by remote sensing, such as the surface area of wetlands, the sites converted for the purposes of agriculture or urbanisation, etc. The tests run locally (for the Rhone catchment area) continued within the framework of the RhoMeO project, as well as at 200 sites in the southern and eastern Mediterranean regions (GlobWetland II project). Within the framework of the GlobWetland II project, training sessions were conducted in different countries on how to use the wetlands mapping tool box. The project was extended until July 2013 to be able to complete the mapping and the calculation of spatial indicators. The initial results of the RhoMeO programme were presented at a national seminar, and greatly appreciated. These findings were also used in the first outcomes produced by the PACA's Regional Biodiversity Observatory.
- The development of MWO indicators on ecological services, in two areas:

1) The end of the study on the impact of management methods on ecological services, based on the comparison of two wetlands (Hula in Israel, and the Camargue in France). Several papers are being written on the research conducted.
2) Further development of the MWO indicator on the recreational and educational cultural services provided by wetlands, in partnership with the Greek NGO Med-INA. At the end of 2012, this work covered nine sites in five countries. After defining **the cultural services indicator** at the end of 2011, a first monitoring and survey test was performed successfully at the Sidi Boughaba site in Morocco, with the University of Casablanca and the NGO Spana, which is in charge of managing the site. This result enabled monitoring to be launched at eight other sites in Algeria, Tunisia, and Slovenia, and to prepare monitoring at other sites in France, Spain, Greece, Croatia, and Bosnia - Herzegovina.

The PACA Nature barometer meeting offered the Tour du Valat the occasion to strengthen its contacts with the PACA Regional Biodiversity Observatory

Transfer tools

Our annual report describes the various aspects of the Tour du Valat and each year zooms in on a single project or theme that has been developed in each of our three programmes. It does not aim to be exhaustive. If you wish to go further you can find out about our full range of activities at our website:

www.tourduvalat.org

A number of general-public publications, leaflets, and reports can also be obtained at cost price from the secretariat of the Tour du Valat:

secretariat@tourduvalat.org

"Conservation of Mediterranean Wetlands" collection

Between 1994 and 2005, the Tour du Valat has been publishing a series of booklets "Conservation of Mediterranean Wetlands" as part of the MedWet Initiative. The central aim of the series is to improve the understanding of Mediterranean wetlands and to make sound scientific and technical information available to those involved in their management. To date, the series is composed of thirteen titles:

- Characteristics of Mediterranean Wetlands
- Functions and Values of Mediterranean Wetlands
- Aquaculture in Lagoon and Marine Environments
- Management of Nest Sites for Colonial Waterbirds
- Wetlands and Water Resources
- Aquatic Emergent Vegetation
- Conservation of Freshwater fish
- Vegetation of Temporary Marshes
- Salinas and Nature Conservation
- Wetlands and Hydrology
- Amphibians and Reptiles
- Mediterranean Riparian Woodlands
- Integrated Management of Mediterranean Wetlands

At the end of the LIFE "Temporary Pools" project coordinated by the Tour du Valat from 2000 until 2005, a management guide in two volumes was produced. It summarizes the main outputs of the programme and is also available for sale:

- Mediterranean Temporary Pools: Volume 1 - Issues relating to conservation, functioning and management
- Mediterranean Temporary Pools: Volume 2 - Species information sheets

"Science and management" collection

The booklets in our "Science and management" collection are at the crossroads of research outcomes and implementation in the field.

- Regards croisés sur 20 ans d'expériences en Camargue
- Gestion Partagée d'un marais en Camargue
- Cistude d'Europe en Camargue
- Refus de pâturage dans les parcours de Camargue

MWO reports

- Mediterranean wetlands outlook: 1st Mediterranean Wetlands Observatory report
- Thematic report 1: Biodiversity, status and trends of species in Mediterranean wetlands

Download our booklets and reports on our internet site

http://www.tourduvalat.org/documentation/nos_brochures

Coralie Hermeloup

Communication Manager

"Promoting, popularising knowledge, information transfer, organisation, welcoming people, creating links, and interacting with the media: who said that communication was an easy job?"

© H. Hôte - Agence Caméléon

The publications
our achievements

Transfer is at the heart of the Tour du Valat's mission, and particular efforts are being undertaken in this sphere. Communication with the scientific world, via publications and conferences, and making our research results available to potential users (managers in particular), are major activities for the team.

© Laurent Chazée - Tour du Valat

All in the same boat

Scientific output was sustained and diversified in 2012 (Figure 1) with 46 papers already published or in press in international journals, 47 interventions in national or international conferences, three books, and documents dealing with technical subjects (10), awareness-raising and transfer (14). We also produced three regular newsletters. The number and significance of scientific publications remains at a high level given the size of the team.

PhD students play an important role in the scientific output of the Tour du Valat. Six PhD thesis were submitted in 2012.

The publication of our research in scientific journals is essential, as much in terms of its validation by peer-reviewed journals, as in terms of disseminating our outcomes to the scientific world. An increasing number of these scientific publications concern experimentations on the management of populations and species, and thus contribute directly to their conservation.

More technical publications and awareness-raising documents are also indispensable for making our research useful for the conservation of Mediterranean wetlands. Among this research, the Mediterranean Wetlands Observatory's first report constitutes an important contribution, and is a good demonstration of the Tour du Valat's scientific excellence. The book written by Michel Gauthier-Clerc and Yves Kayser "Observer les oiseaux en Camargue," is a guide intended for both the general public and experienced ornithologists, and is a perfect model of effective knowledge transfer.

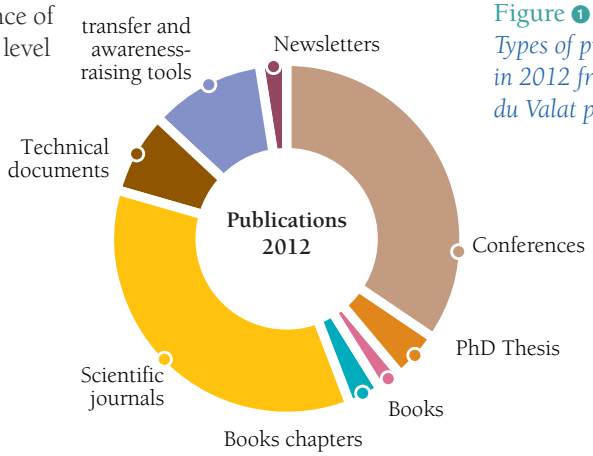
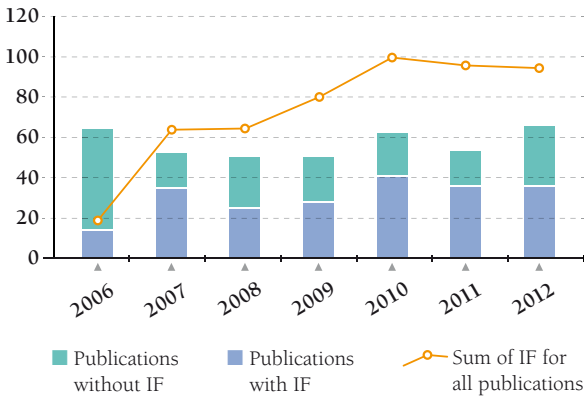


Figure 1
Types of publications in 2012 from the Tour du Valat programme

Publications



Annual summary of the number of scientific publications in journals with and without Impact Factor (IF), and sum of Impact Factor for all publications. Although not devoid of bias, the Impact Factor (IF) is a commonly used measure of the importance of scientific journals.

- Baumberger T., Croze T., Affre L. & Mesléard F. 2012 - Co-occuring species indicate habitats of the rare Limonium girardianum. Plant Ecology and Evolution, 145: 31-37.
- Baumberger T., Croze T., Mesléard F. & Affre L. 2012 - Habitat requirements and population structure of the rare endangered Limonium girardianum in Mediterranean salt marshes. Flora, 207: 283-289.
- Baumberger T., Mesléard F., Croze T. & Affre L. 2012 - Effects of experimental submersion on survival, growth, and dry biomass allocation of the rare salt marsh plant Limonium girardianum. Aquatic Botany, 102: 65-70.
- Béchet A., Rendon-Martos M., Rendon M.A., Aguilar Amat J., Johnson A.R. & Gauthier-Clerc M. 2012 - Global economy interacts with climate change to jeopardize species conservation: the case of the greater flamingo in the Mediterranean and West Africa. Environmental Conservation, 39: 1-3.
- Brochet A.L., Dessborn L., Legagneux P., Elmberg J., Gauthier-Clerc M., Fritz H. & Guillemain M., 2012 - Is diet segregation between dabbling ducks due to food partitioning? A review of seasonal patterns in the Western Palearctic. Journal of Zoology, 286: 71-178.
- Brochet A.L., Mouronval J.B., Aubry P., Gauthier-Clerc M., Green A.J., Fritz H. & Guillemain M. 2012 - Diet and feeding habitats of Camargue dabbling ducks: what has changed since the 1960's? Waterbirds, 35: 555-576.
- Brouckaert L., Schwartz T., Tron F. & Poulin B. 2012 - Sélection des habitats d'alimentation de l'hirondelle rustique Hirundo rustica en halte migratoire postnuptiale en Provence. Alauda, 80 : 277-284.
- Cayuela H., Besnard A., Béchet A., Devictor V. & Olivier A. 2012 - Reproductive dynamics of three amphibian species in Mediterranean wetlands: the role of local precipitation and hydrological regimes. Freshwater Biology, 57: 2629-2640.
- Céréghino R., Oertli B., Bazzanti M., Coccia C., Compin A., Biggs J., Bressi N., Grillas P., Hull A., Kalettka T. & Scher O. 2012 - Biological traits of European pond macroinvertebrates. Hydrobiologia, 689: 51-61.
- Champagnon J., Crochet P.A., Kreisinger J., Cizkova D., Gauthier-Clerc M., Massez G., Söderquist P., Albrecht T. & Guillemain M. 2012 - Assessing the genetic impact massive restocking on wild mallard. Animal Conservation. Online first - doi:10.1111/j.1469-1795.2012.00600.x
- Champagnon J., Elmberg J., Guillemain M., Gauthier-Clerc M. & Lebreton J.D. 2012 - Conspecifics can be aliens too: A review of effects of restocking practices in vertebrates. Journal for Nature Conservation, 20: 231-241.
- Champagnon J., Guillemain M., Elmberg J., Massez G., Cavallo F. & Gauthier-Clerc M. 2012 - Low survival after release into the wild: assessing the burden of captivity on Mallard physiology and behaviour. European Journal of Wildlife Research, 58: 255-267.
- Cizkova D., Javurkova V., Champagnon J. & Kreisinger J. 2012 - Duck's not dead: does restocking with captive bred individuals affect the genetic integrity of wild mallard (Anas platyrhynchos) population? Biological Conservation, 152: 231-240.
- Davranche A., Poulin B., Lefebvre G. 2012 - Reedbed monitoring using classification trees and SPOT-5 seasonal time series. In: Csaplovics E. & Schmidt J. (eds.) International Symposium on Advanced Methods of Monitoring Reed Habitats in Europe. Rhombos-Verlag, pp 15-28.
- Demnati F., Allache F., Ernoul L. & Samraoui B. 2012 - Socio-economic stakes and perceptions of wetland management in an arid region: a case study from Chott Merouane, Algeria. Ambio, 41: 504-512.
- Doxa A., Robert A., Crivelli A., Catsadorakis G., Naziridis T., Nikolaou H., Jiguet F. & Theodorou K. 2012 - Shifts in breeding phenology as a response to population size and climatic change: a comparison between short- and long-distance migrant species. Auk, 129: 753-762.
- Doxa A., Theodorou K., Crivelli A.J., Hatzilakou D., Catsadorakis G., Malakou M., Nazirides T. & Robert A. 2012 - Spatially correlated environmental factors drive synchronisation in populations of the Dalmatian pelican. Population Ecology, 54: 499-507.
- Dumont B., Rossignol N., Loucougaray G., Carrere P., Chadoeuf J., Fleurance G., Bonis A., Farrugia A., Gaucherand S., Ginane C., Louault F., Marion B., Mesléard F. & Yavercovski N. 2012 - When does grazing generate stable vegetation patterns in temperate pastures? Agriculture, Ecosystems & Environment, 153: 50-56.

- Ernoul L., Sandoz A. & Fellague A. 2012 - The evolution of two great Mediterranean deltas: remote sensing to visualize the evolution of habitats and land use in the Gediz and Rhone deltas. Ocean & Coastal Management, 69: 111-117.
- Gayet G., Croce N., Grillas P., Nourry C., Deschamps C. & Defos du Rau P. 2012 - Expected and unexpected effects of waterbirds on Mediterranean aquatic plants. Aquatic Botany, 103: 98-105.
- Geraci J., Béchet A., Cézilly F., Ficheux S., Bacetti N., Samraoui B. & Wattier R. 2012 - Greater flamingo colonies around the Mediterranean form a single interbreeding population and share a common history. Journal of Avian Biology, 43: 341-354.
- Gillingham M.A.F., Béchet A., Geraci J., Wattier R., Dubreuil C. & Cézilly F. 2012 - Genetic polymorphism in dopamine receptor D4 is associated with early body condition in a large population of greater flamingos, Phoenicopterus roseus. Molecular Ecology, 21:4024-4037.
- Grémillet D., Nazirides T., Nikolaou H. & Crivelli A.J. 2012 - Fish are not safe from great cormorants in turbid water. Aquatic Biology, 15: 187-194.
- Hammouda A., Selmi S., Pearce-Duvet J., Chokri M.A., Arnal A., Gauthier-Clerc M. & Boulinier T. 2012 - Maternal antibody transmission in relation to mother fluctuating asymmetry in a long-lived colonial seabird: the yellow-legged gull Larus michahellis. PLoS One, 7(5): e34966.
- Lefèbvre F. & Crivelli A.J. 2012 - Salinity effects on anguillicolosis in Atlantic eels: a natural tool for disease control. Marine Ecology Progress Services, 471: 193-202.
- Lefèbvre F., Fazio G. & Crivelli A.J. 2012 - Anguillicoloides crassus. In: Fish parasites. Pathobiology and protection. Woo P.T.K. & Buchmann K. Cabi Wallingford (GBR), pp 310-326.
- Lorenzoni M., Giannetto D., Maio G., Pizzul E., Pompei L., Turin P., Vincenzi S. & Crivelli A. 2012 - Empirical standard mass equation for Salmo marmoratus. Journal of Fish Biology, 81: 2086-2091.
- Panfili J., Darnaude A.M., Lin Y.J., Chevalley M., Iizuka Y., Tzeng W.N. & Crivelli A.J. 2012 - Habitat residence during continental life of the European eel Anguilla anguilla investigated using linear discriminant analysis applied to otolith Sr:Ca ratios. Aquatic Biology, 15: 175-185.
- Poulin B. 2012 - Indirect effects of bioinsecticides on the non target fauna: the Camargue experiment calls for future research. Acta Oecologica, 44: 28-32.
- Poulin B., Davranche A., Lefebvre G. 2012 - A robust scheme for monitoring indicators of reedbed ecological state by satellite imagery. In: Csaplovics E. & Schmidt J. (eds.). International Symposium on Advanced Methods of Monitoring Reed Habitats in Europe. Rhombos-Verlag. pp1-14.
- Pradel R., Choquet R. & Béchet A. 2012 - Breeding experience might be a major determinant of breeding probability in long-lived species: the case of the greater flamingo. PLoS One, 7(12): e51016.
- Rhazi L., Grillas P., Saber E.R., Rhazi M., Brendonck L. & Waterkeyn A. 2012 - Vegetation of Mediterranean temporary pools: a fading jewel? Hydrobiologia, 689: 23-36.
- Rodríguez-Pérez H. & Green A.J. 2012 - Strong seasonal effects of waterbirds on benthic communities in shallow lakes. Journal Freshwater Sciences, 31(4):1273-1288.
- Sanz-Aguilar A., Béchet A., Germain C., Johnson A.R. & Pradel R. 2012 - To leave or not to leave: survival trade-offs between different migratory strategies in the greater flamingo. Journal of Animal Ecology, 81: 1171-1182.
- Thomas F., Lafferty K.D., Brodeur J., Elguero E., Gauthier-Clerc M. & Misse D. 2012 - Incidence of adult brain cancers is higher in countries where the protozoan parasite Toxoplasma gondii is common. Biology Letters, 8: 101-103.
- Tolf C., Bengtsson D., Rodrigues D., Latorre-Margalef N., Wille M., Figueiredo M.E., Jankowska-Hjortaas M., Germundsson A., Duby P.Y., Lebarbenchon C., Gauthier-Clerc M., Olsen B. & Waldenström J. 2012 - Birds and viruses at a crossroad: surveillance of influenza A virus in portuguese waterfowl. PLoS One, 7(11): e49002.
- Vincenzi S., Crivelli A.J., Giske J., Satterthwaite W.H. & Mangel M. 2012 - Selective consequences of catastrophes for growth rates in a stream-dwelling salmonid. Oecologia, 168: 393-404.
- Vincenzi S., Crivelli A.J., Jesensek D. & De Leo G.A. 2012 - Translocation of stream-dwelling salmonids in headwaters: insights from a 15-year reintroduction experience. Review in Fish Biology Fisheries, 22: 437-455.
- Vittecoq M., Elguero E., Lafferty K.D., Roche B., Brodeur J., Gauthier-Clerc M., Misse D. & Thomas F. 2012 - Brain cancer mortality rates increase with Toxoplasma gondii seroprevalence in France. Infection, Genetics & Evolution, 12: 496-498.
- Vittecoq M., Grandhomme V., Champagnon J., Guillemain M., Crescenzo-Chaigne B., Renaud F., Thomas F., Gauthier-Clerc M. & Van Der Werf S. 2012 - High influenza A virus infection rates in mallards bred for hunting in the Camargue, south of France. PLoS One, 7(8): e43974.
- Vittecoq M., Grandhomme V., Simon G., Herve S., Blanchon T., Renaud F., Thomas F., Gauthier-Clerc M. & Van Der Werf S. 2012 - Study of the influenza A virus in wild boars living in a major duck wintering site. Infection, Genetics & Evolution, 12: 483-486.
- Vittecoq M., Thomas F., Jourdain E., Moutou F., Renaud F. & Gauthier-Clerc M. 2012 - Risks of emerging infectious diseases: evolving threats in a changing area, the Mediterranean Basin. Transboundary & Emerging Diseases online first, doi:10.1111/tbed.12012.

Thesis

- Arnal A. 2012 - Circulations d'agents pathogènes en populations naturelles : approches éco-épidémiologiques chez le Goéland leucophée (Larus michahellis). Thèse de doctorat : biologie des populations et écologie : Université Montpellier 2 (FRA). 359 p.

- Baumberger T. 2012 - Compréhension des facteurs de rareté chez les plantes. Le cas de Limonium girardianum (Guss.) Fourr. (Plumbaginaceae) dans les marais salés. Thèse de doctorat : biologie des populations et écologie : Université Aix-Marseille (FRA). 137 p.
- Boucheker A. 2012 - Dynamique de la métapopulation de flamants roses en Méditerranée : rôle des zones humides d'Afrique du Nord et implications pour la conservation. Thèse de doctorat : sciences de la vie et de la terre : Ecole Pratique des Hautes Etudes EPHE Montpellier (FRA). 171 p.
- Loubet A. 2012 - Modélisation de l'hydrosystème Vaccarès : contribution à une gestion adaptative des ressources en eau dans le delta du Rhône, France. Thèse de doctorat : Université d'Aix-Marseille (FRA). 319 p.
- Roumieux C. 2012 - Modélisation de la dynamique saisonnière des éclosions d'Aedes (Ochlerotatus) caspius (Pallas, 1771) (Culicidae) en contexte de changement climatique. Thèse de doctorat : biologie des populations et écologie : Université d'Aix-Marseille (FRA). 168 p.
- Vittecoq M. 2012 - Changements climatiques et maladies infectieuses émergentes au sein des zones humides méditerranéennes. Thèse de doctorat : Biologie de l'évolution et Ecologie : Université Montpellier II. 284 p.

Selected technical documents

- BRL-ingénierie, Tour du Valat & Société Nationale de Protection de la Nature, 2012 - Plan de gestion des propriétés départementales de Camargue. Plan d'actions. Rapport pour le Conseil Général des Bouches-du-Rhône. 73 p.
- Cohez D., Chauvelon P., Yavercovski N., Ernoul L. 2012 - Plan de gestion 2011-2015 de la Tour du Valat. Région PACA, Agence de l'eau. 248 p. + annexes.
- Cohez D., Pedrot C., Olivier A., Pineau O. 2012 - Evaluation du plan de gestion 2007-2010 de la Tour du Valat. 177 p.
- Ernoul L., Mesleard F. & Béchet A. 2012 - Diagnostic de l'échec de la contractualisation des mesures agri-environnementales pour réduire les incursions des flamants dans les rizières de Camargue (France). VertigO, 12(1) : 10 p.
- Isenmann P. 2012 - L'évolution de l'avifaune nicheuse de Camargue au cours du XXe siècle (Hommage à Luc Hoffmann). Alauda, 80 : 241-266.
- Le Nève A., Kayser Y. & Iliou B. 2012 - Synthèse ornithologique hoedicaise annuelle du 16 juillet 2005 au 15 juillet 2006. Groupe Ornithologique Breton Brest (FRA). 74 p.
- Marchand M.A. & Olivier A. 2012 - Suivi d'une communauté de reptiles en zone humide méditerranéenne : mise au point d'une méthodologie standardisée. Garde du Littoral, 73 : 3-5.
- Mediterranean Wetlands Observatory 2012 - Mediterranean wetlands outlook. Mediterranean Wetlands Observatory's first technical report. OZHM Tour du Valat Arles (FRA) 126 p. ill. French & English version.
- Poulin B. 2012 - Synthèse et analyse des diagnostics environnementaux des roselières réalisés en France en 2010-2011 dans le cadre du Plan National d'Actions sur le Butor étoilé. DREAL Basse Normandie. 46 p.
- Thibault M. & Beck N. 2012 - Plan de gestion 2013-2017 des Espaces Naturels d'ArcelorMittal - Site de Fos, Tour du Valat, ArcelorMittal.
- Tour du Valat 2012 - Etat écologique initial des étangs et marais des salins de Camargue - Secteur des salins et anciens salins. Rapport pour le Parc Naturel Régional de Camargue et le Conservatoire du Littoral. 210 p. + annexes.

Selected awareness-raising documents

- Béchet A. 2012 - Compte-rendu : Ecologie de la restauration et développement durable. Dépasser les frontières (Conférence, Avignon, 23-27/08/2010). Natures Sciences Sociétés, 20 : 100-103.
- Beck N., Hermeloup C., Association des Marais du Verdier. 2011 - Gestion partagée d'un marais. Brochure Tour du Valat, Collection Science et Gestion. 37 p.
- Ernoul L., Yilmaz E. 2012 - Contre les boues illégales, qui détient les clés de l'action? Espaces Naturels, 38 : 14-15.
- Gauthier-Clerc M. & Kayser Y. 2012 - Observer les oiseaux en Camargue. Delachaux & Niestlé Paris (FRA) 160 p. ill.
- Mediterranean Wetlands Observatory 2012 - Biodiversity. status and trends of species in Mediterranean wetlands. Tour du Valat Arles (FRA), OZHM Thematic Collection 1. 52 p. Ill. French & English version.
- Mediterranean Wetlands Observatory 2012 - Mediterranean wetlands outlook. Synthesis of the 1st Mediterranean Wetlands Observatory report for decision makers. OZHM Tour du Valat Arles (FRA). 70 p. ill. & 17factsheets. French & English version.
- Pôle-relais lagunes méditerranéennes 2012 - Bilan des Journées mondiales des ZH 2012 en Méditerranée. Europe (FEDER PACA), Onema, Agence de l'eau RM&C, Conseils régionaux de Provence-Alpes-Côte d'Azur et du Languedoc-Roussillon, Conseil Général de l'Hérault et le groupe ACCOR.
- Pôle-relais lagunes méditerranéennes 2012 - Programmes Journées Européennes du Patrimoine, Europe (Feder PACA), Agence de l'eau Rhône-Méditerranée et Corse, Conseils régionaux de Provence-Alpes-Côte d'Azur et du Languedoc-Roussillon.
- Pôle-relais lagunes méditerranéennes. 2012 - Programme Journées mondiales des zones humides en Méditerranée 2012. Onema, Agence de l'eau RM&C, Conseils régionaux de Provence-Alpes-Côte d'Azur et du Languedoc-Roussillon, Conseil Général de l'Hérault et le groupe ACCOR. 36 p.
- Renet J. & Olivier A. 2012 - Le Triton crêté Triturus cristatus Laurenti, 1768 (Caudata: Salamandridae) en région Provence-Alpes-Côte d'Azur : enjeux et problèmes de conservation de l'unique population connue. Nature Provence, 1: 15-20.
- Willm L., Yavercovski N., Mischler L. & Mesleard F. 2012 - Refus de pâturage dans les parcours en Camargue. Tour du Valat Arles (FRA). 43 p. ill.

Conferences and seminars

Tour du Valat welcomes numerous partners and scientists to attend conferences and seminars dealing with the conservation of Mediterranean wetland areas. Other subjects are also approached.

Conferences

Tour du Valat organizes an annual lecture on conservation biology, in order to highlight the work on waterbirds conservation of Heinz Hafner. This year, we welcomed Professor Ben Sheldon (Luc Hoffmann Professor of Field Ornithology, Edward Grey Institute, University of Oxford) who presented his work on "Phenotypic plasticity and adaptation to a warming world in birds".

Seminars

Generally these seminars take place each Monday morning from 11.00 to 12.00 with between 20 and 50 participants. Most of the participants are staff members from the Tour du Valat. The programme of seminars is also communicated to all managers of natural spaces with whom we are in contact, and is available on our website:

www.tourduvalat.org

- **Premiers résultats des actions du Life+ LAG' Nature**
  Benjamin Sirot and Magali Boyce *(Conservatory of Natural Spaces in Languedoc-Roussillon)*
- **Outil d'évaluation environnementale : "L'analyse de cycle de vie"**
  Mélissa Cornélus *(INRA Montpellier / SupAgro)*
- **Wadi Wurayh National Park and wetland conservation efforts on the national and regional level, a case study from the UAE**
  Maral Khaled Shuriqi *(Fujairah Municipality Environment Protection, Chreiki Department)*
- **Coordinateur de l'Observatoire des Zones Humides Méditerranéennes**
  Laurent Chazée, Christian Perennou, Coralie Beltrame and Thomas Galewski *(Tour du Valat)*
- **Impact du stress sur la biologie de la Chouette effraie.**
  Alexandre Roulin *(Lausanne University)*
- **Evaluation participative de scénarios : "Quelles perspectives pour les systèmes agricoles camarguais ?"**
  Sylvestre Delmotte *(INRA UMR Innovation)*
- **Distribution spatiale des invertébrés aquatiques et de leur prédateur, le Flamant rose (*Phoenicopterus roseus*), évaluation des impacts d'un changement d'activité dans un salin en Camargue**
  Manon Annetin *(Tour du Valat)*
- **Combien coûte l'agriculture camarguaise ? L'évaluation ex post des dépenses publiques dans un territoire emblématique à haute valeur environnementale : la Camargue**
  Coralie Calvet, Robert Lifran *(INRA UMR Lameta)*
- **Projet GlobWetland II : Cartographie et étude des changements dans et autour des zones humides côtières méditerranéennes**
  Anis Guelmami *(Tour du Valat)*

Common Teal

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- **Modélisation de la dynamique saisonnière des éclosions d'Aedes (Ochlerotatus) caspius (Pallas, 1771) (Culicidae) en contexte de changement climatique, le cas du littoral méditerranéen français**
  Camille Roumieux *(Tour du Valat)*
- **Caractérisation des services rendus par les écosystèmes d'une zone humide méditerranéenne : l'exemple de la Camargue**
  Maryse Thollon *(Tour du Valat)*
- **Première cartographie mondiale des zones humides**

Catherine Prigent *(CNRS, LERMA)*

- **L'Ecrevisse de Lousiane en Camargue**
  Eric Meineri, Timo Prola and Hector Rodriguez Perez *(Tour du Valat)*
- **Maladies infectieuses émergentes au sein des zones humides méditerranéennes dans le contexte des changements globaux**
  Marion Vittecoq *(Tour du Valat)*
- **La restauration des zones humides**
  David Moreno *(Standford University)*

Media

The Tour du Valat enjoyed good media coverage in 2012 with ninety articles in the written press, and several TV and radio reports.

Among the themes covered, the first to be cited is the "IUCN Red List of Ecosystems," with an article in the national daily newspaper Le Monde after the World Nature Congress in Jeju, South Korea. The release of the Mediterranean Wetlands Observatory's first technical report, presented at the symposium in Agadir, also received a great deal of attention from numerous national, foreign, and web media services. The cold wave last February and its impact on avifauna were also widely covered by the media, and our studies on the Greater Flamingo were highly cited. They were also featured in Laurent Charbonnier's documentary The return of species: the Greater Flamingo, shown on Arte, and in the France 3 series "Des racines et des ailes" focusing on the Camargue. In the framework of the "Rehabilitation of the Cassaïre Estate" project, in partnership with the CNRS we welcomed a delegation of journalists on the site, and many media feedbacks appeared subsequently (France Inter, France Info, Le Figaro, Le Journal du CNRS…).

Other themes covered include mosquito control in the Camargue, the Salinalgues project (project concerning the production of microalgae on salt ponds to promote their use for bioenergies and other bioproducts), and the release of the book "*Observer les oiseaux en Camargue*" by Michel Gauthier-Clerc and Yves Kayser, as well as hunting and the various environmental events we organise (World Wetlands Day and Nature Day).

Des Racines et des Ailes, 18th January 2012

Africa- Bird and birding

Library

The library was established 1954 at the same time as the Tour du Valat Research Centre. It is dedicated to François Bourlière, a pioneer in the field of nature conservation and ecology.

The library's reference material, at first devoted mainly to ornithology, has been built up to include related fields of research, ecology and conservation. The catalogues of publications of the researchers at the Tour du Valat, as well as the bibliographic references of the journals and publications are available at:

www.tourduvalat.org

Collections

Comprising:

- 9,600 publications and thesis
- 1,200 different periodicals of which 500 are running
- 22,200 offprints, booklets and reports

The reference section specialises in the following fields:

- General ecology, wetland ecology
- Nature conservation
- Management and protection of wetlands, especially in the Mediterranean region
- Ornithology
- Zoology: mammalogy, ichthyology, herpetology
- Botany

The Tour du Valat library

Arrangements for access

The library is open to anyone who wishes to consult publications on site; they may not be removed from the library.

Opening hours

Monday, Tuesday, Thursday and Friday, 9 am to 12 noon and 1 pm to 5 pm.

Adress

Tour du Valat
Bibliothèque
Le Sambuc - 13200 Arles
Tél. : +33 (0)4 90 97 20 13
Fax : +33 (0)4 90 97 20 19
E-mail : j.crivelli@tourduvalat.org

Jean-Jacques Bravais

Administrative and Financial Director

"After spending 20 years dressing up in a suit and tie for the industrial sector, I chose at the Tour du Valat to wear a more comfortable outfit."

© H. Hôte - Agence Caméléon

The structure

our foundations

The Tour du Valat is a non-profit public benefit organisation. Its governance is handled by two official bodies: the Board, made up of three committees: the founders, ex officio members, and qualified personalities; and the Scientific Council, composed of internationally acclaimed scientists from the major fields in wetlands research and conservation. In addition, six thematic experts (two for each of the three scientific Departments), provide specialised advice to support the Scientific Council.

This new system of governance, which was set up in 2008, seems to be appropriate to our needs and to completely fulfil its functions. However, within the framework of our continuous improvement programme, it was becoming important to specify what the members of the Board commit to when they join it, and to better understand what they expect from their participation on the Board, by checking whether their demands are being satisfied, and assessing their contribution to it. The Board has therefore adopted a "commitment contract", which stipulates the terms of reference of this specific body and its members' commitments. It has validated the principle of a periodical assessment of its operations, which includes a section in which each member evaluates his or her contributions. The first assessment will take place in early 2013.

This year, we were supposed to re-elect one third of the Board and half of our Scientific Council. All of the incumbent members were re-elected unanimously, proving the value of their personal investments and contributions. The President and Vice-President of the Scientific Council and the Executive Committee members were also re-elected as before. We would like to express our heartfelt thanks to all of these people for their ongoing commitment to the Tour du Valat.

The Tour du Valat family gathered around Luc Hoffmann for his 90th anniversary

© Tour du Valat

Governance

The Tour du Valat Board, June 2012

Board

- **Luc Hoffmann** . . . . . *Honorary president*

COLLEGE OF FOUNDERS

- **André Hoffmann** . . . . . *Vice-president*
- **Maja Hoffmann**
- **Vera Michalski**
- **Jean-Paul Taris** . . . . . *President*

COLLEGE OF EX OFFICIO MEMBERS

- **Pierre Castoldi** . . . . . *Sub-prefect of Arles, representing the Home Office*
- **Jacques Moret** *then*
- **Jean-Christophe Auffray** . . . *Official representative for biodiversity, representing the Ministry of Higher Education and Research*
- **Laurent Roy** . . . . . *PACA Regional Director for Environment, Planning and Housing, representing the Ministry of Ecology, Sustainable Development, Transport and Housing*
- **Hervé Schiavetti** . . . . . *Mayor of Arles, representing the town council of Arles*

COLLEGE OF QUALIFIED PERSONALITIES

- **Lucien Chabason** . . . . . *Deputy director of the "Institut du développement durable et des relations internationales"*
- **Elisabeth Laville** . . . . . *PDG of Utopies and sessional lecturer at HEC*
- **Dr Mike Moser** . . . . . *Treasurer - Consultant in environment*
- **Thymio Papayannis** . . . . . *Secretary - MedWet Senior Advisor, President of MedINA*

Scientific Council

- **Dr Patrick Dugan** . . . . . *President - WorldFish Centre, Penang, Malaysia*
- **Pr Tim Clutton-Brock** . . . . . *University of Cambridge, UK*
- **Dr Jean-Dominique Lebreton** *Vice-President - Centre d'écologie fonctionnelle évolutive/CNRS, Montpellier*
- **Pr Jean-Claude Lefeuvre** . . . *Muséum national d'histoire naturelle and university of Rennes*
- **Dr Laurent Mermet** . . . . . *ENGREF, Paris*
- **Pr William Sutherland** . . . . . *University of Cambridge, UK*

THEMATIC EXPERTS

In support of the Scientific Council, a high level of expertise will be provided by six thematic experts, two for each of the three Tour du Valat programmes, for the duration of the five-year plan.

- **Jacques Blondel** . . . . . *Centre d'écologie fonctionnelle évolutive/CNRS, Montpellier*
- **Pierre Chevallier** . . . . . *Institut de recherche pour le développement/CNRS, Laboratoire d'hydrosciences, Montpellier*
- **Luis Costa** . . . . . *SPEA/BirdLife, Portugal*
- **Jonathan Loh** . . . . . *Institute of Zoology, Zoological Society of London, UK - WWF International*
- **François Renaud** . . . . . *Institut de recherche pour le développement/CNRS, Montpellier*
- **Sophie Thoyer** . . . . . *Supagro-Lameta, Montpellier*

Budget

The budget for the year 2012 amounts to 5,071,000 euros.

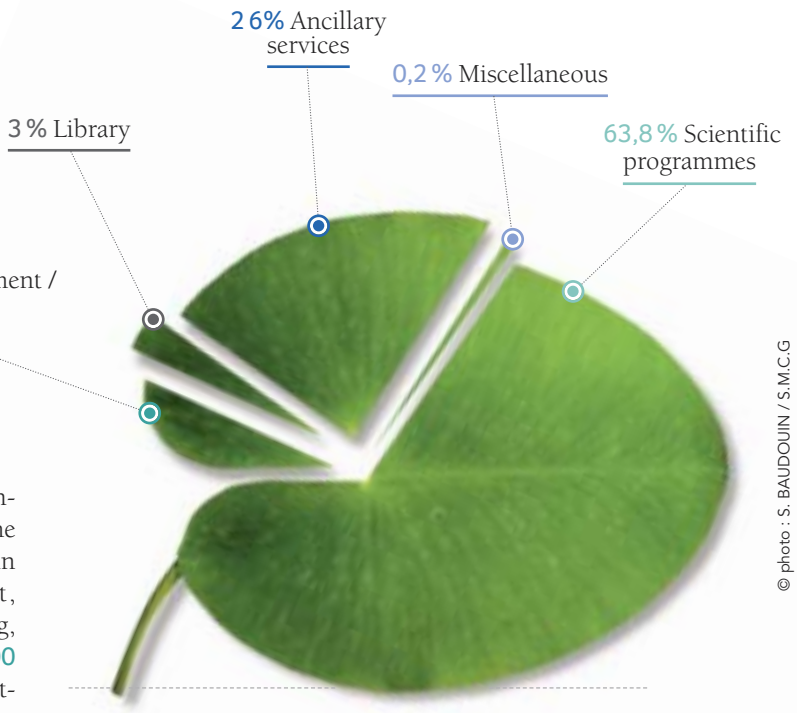
Expenditure:

- 3,233,000 euros have been allocated to the scientific programmes, including 791,000 euros for the "Conservation of species and their populations in the context of global changes" department, 1,412,000 euros for the "Ecosystem modelling, restoration and management" department, 412,000 euros for the "Monitoring and evaluation & wetlands policies" department, 381,000 euros for the management of the estate, and 237,000 euros for shared scientific activities (scientific management, conferences, training, transfer, project development, etc.).
- 360,000 euros have been allocated to general management (including the governance of the organisation as well as the representation of the Tour du Valat in major forums) and to communication (website, annual report, etc.).
- 173,000 euros have been allocated to managing the Tour du Valat library, principally the purchase of books and scientific journals.
- 1,295,000 euros have been allocated to ancillary services, which include financial and administrative services, the canteen, building maintenance, and the repairs workshop.
- 10,000 euros have been set aside to cover the retirement allowances.

Tour du Valat receives its financing from a number of sources:

- 16 % of its receipts come from its own funds, held by the Fondation Pro Valat (797,000 euros).
- 48 % of its receipts come from the MAVA Foundation (2,350,000 euros).
- 30 % of its receipts come from agreements with public organisations.
- 2 % of its receipts come from agreements with private organisations.
- 3 % of its receipts are revenues from the estate.
- 2 % of its receipts are donations.

Expenditure in %



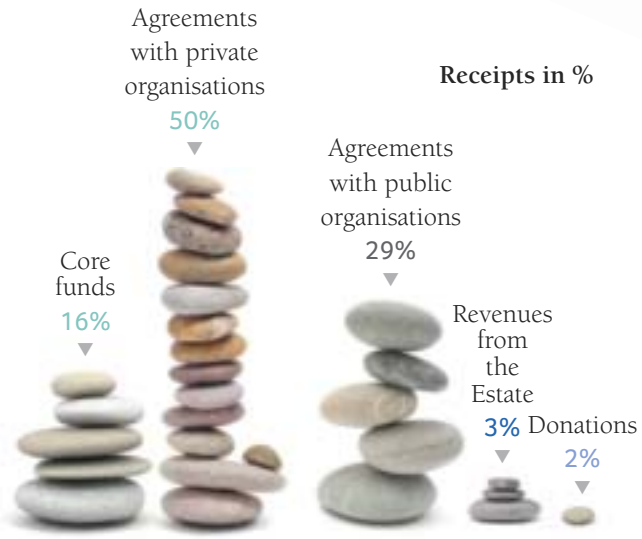
© photo : S. BAUDOUIN / S.M.C.G

Expenditure in €

Scientific programmes	3 233 000
General management / Communication	360 000
Library	173 000
Ancillary services	1 295 000
Miscellaneous	10 000

Total: **5 071 000**

Receipts in %



Receipts in €

Core funds	797 000
Agreements with private organisations	2 452 000
Agreements with public organisations	1 482 000
Revenues from the Estate	229 000
Donations	111 000

Total: **5 071 000**

Environmental management

A mid-point review in figures

- *100 % of wastewater is cleaned by our reed bed water treatment plant.*
- *100 % of household waste is sorted, with fermentable waste processed on-site (compost) and the rest recycled through specific recycling channels.*
- *Installation of a 160 kW multi-fuel biomass boiler (replacing five fuel oil and gas boilers with a total output of 580 kW), combined with a 590 m heating network and seven substations controlling the input to each building.*
- *Energy consumption reduced by 35% after installing cellulose wadding and rice-straw insulation (176 kW/m²/yr before insulation work, 114 kW /m²/yr after).*
- *CO2 emissions reduced by 77% due to the modified heating system (39 tonnes of CO2 in 2010 compared with 168 in 2009).*

Reducing our energy needs to a quarter of the current level: an ambitious but realistic objective!

To divide our overall energy consumption by four, reducing it to 50 kW/m², was the challenge taken up by the Tour du Valat in 2008.

Based on an overall energy audit carried out for all of our premises since that time, our approach to energy control is inspired by the "NégaWatt" Approach, which means:

- reducing our use of energy by modifying our behaviour to limit our needs,
- reducing our energy consumption, in particular by optimising building insulation,
- obtaining nearly all of our energy needs from renewable sources (biomass for heating and solar power for hot water supplies),
- developing suitable projects at the local scale, for example by finding sources of biomass produced on site or close by, and by encouraging the transfer of solutions that are appropriate to the Camargue situation, characterized by scattered habitations.

2012, continuation of thermal renovation work

In order to achieve our ambitious objective of limiting the energy consumption of our buildings, in 2012 we started work on insulating the north façades of the Mas and the Château. This work, which is complementary to the insulation of the attics with cellulose wadding (completed in 2011), will significantly improve the thermal comfort of the buildings concerned. The innovative aspect of the work is the material used: rice straw. The rice straw is packed behind wood-fibre panels (providing an additional layer of insulation), which are attached to perpendicular Douglas-fir rafters. Then this double layer of insulation is coated with lime plaster. New thermally efficient double-glazed sealed window units have been placed in the wooden frames incorporated into the structure, replacing the old single glazing.

With regard to wastewater, the overhaul of the lift pumps carried out in 2012 re-optimised the collecting of effluents, and their subsequent cleaning by the reed bed water treatment plant before being discharged into the environment. The selective recyclable waste collection system was also optimised, with the setting up of new collection units (oils, used tyres, light bulbs, and fluorescent strips)

In 2013, we shall be tackling the transportation aspect with, for example, measures to favour car sharing or the use of public transport. A strategy will also be drawn up concerning the acquisition of vehicles and circulation within our immediate environment (Estate, Mas).

Installation of framework for insulation

1. négaWatt association http://www.negawatt.org

Hosted organisations

The Tour du Valat has been hosting three partner organisations at its site for many years:

Association TAKH

Through the safeguard and study of the Przewalski horse as a flagship species, Association Takh leads a pilot conservation project which allies steppe and wetland restoration, as well as endangered species protection, to the promotion of sustainable development, on Khomyn Tal in Mongolia.

Learn more: www.takh.org

FIBA

The Fondation Internationale du Banc d'Arguin was created in 1986, on the initiative of Dr Luc Hoffmann and a number of research and conservation organisations, to support the Parc National du Banc d'Arguin (PNBA) in Mauritania, which is today a management model in this ecoregion. Drawing on this experience, it has extended its area of intervention to countries in the West African coastal zone by becoming involved in the Regional Programme for the Conservation of Marine and Coastal Areas in West Africa (PRCM).

Learn more: www.lafiba.org

National Office for Hunting and Wildlife (ONCFS)

The French National Office for Hunting and Wildlife (ONCFS) is a public organisation employing 1,700 officers. Its twofold mission is to safeguard the environment and hunting, and to conduct studies and research on wildlife and their habitats. The offices of the ONCFS at the Tour du Valat accommodate two units of the Centre National d'Etudes et Recherches Appliquées (CNERA), one of which is devoted to the smaller resident plains fauna and the other to migratory birds.

Learn more: www.oncfs.gouv.fr

Anis Guelmami

Project Leader

"I analyse and process satellite images to create maps enabling us to study the surface areas of Mediterranean wetlands, measure how they are changing, and assess the anthropogenic pressures they face. That is my small contribution to the better understanding and protection of these extremely precious areas."

The teams

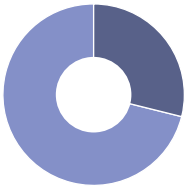
our living force

In 2012, we conducted an in-depth study on how to improve working conditions and identify and reduce professional risks and physically demanding work. This project, which concerns all of the teams and activities at the Tour du Valat, was carried out by a group of employees, with the assistance of an intern, who was completing a Master's degree in Environmental Studies and health in the workplace, and worked with us for ten months.
This basic research enabled us to identify and carry out 130 actions related to ergonomy, validate a work and equipment purchasing programme, update our "Single occupational risks assessment document", and draw up various management procedures for our teams.

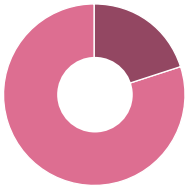
In 2012, the Tour du Valat team was made up of 71 employees, and 6 doctoral students with an outside contract, which represents 67 FTEs (full time equivalents).

38 interns helped to strengthen our team, bringing their enthusiasm and valuable energy to boost the scientific research at the Tour du Valat.

Total FTEs = **67**



Operational = **47,5**
Support = **19,5**

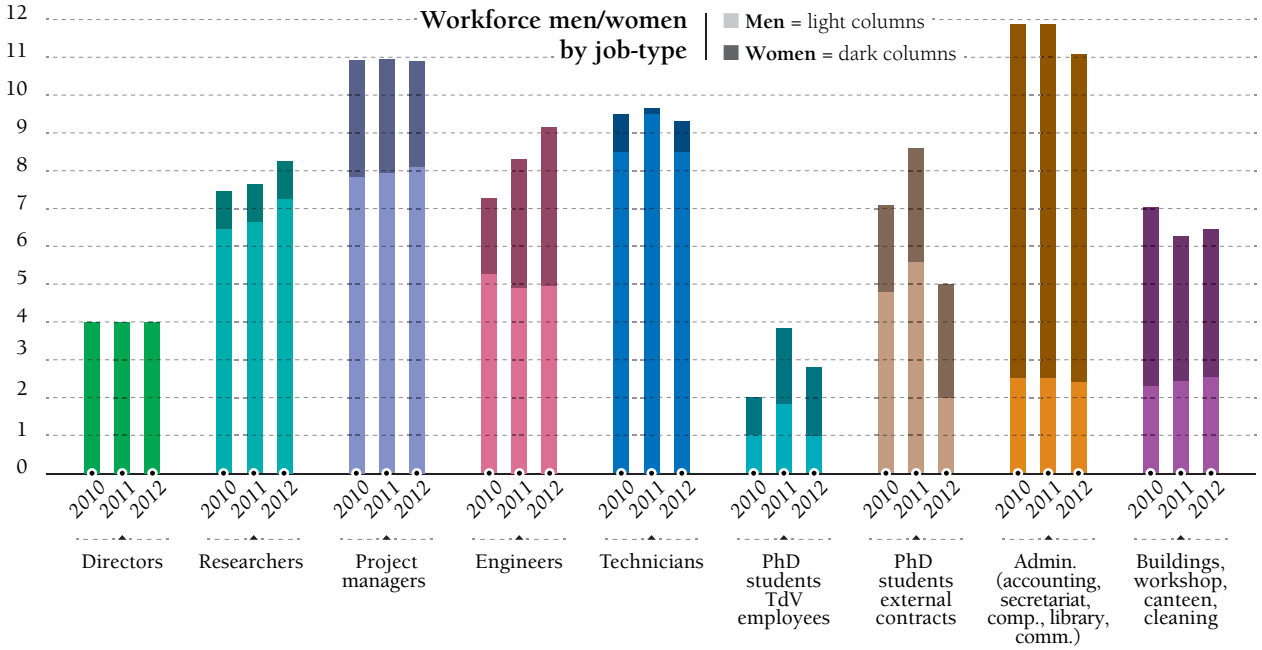


Permanent contract = **53,5**
Temporary contract = **13,5**

Men = **41**
Women = **26**

Total Interns = 38

Master's degree = **20**
BSc = **11**
HNDs or Vocational baccalaureates = **6**



Us

Management

- **Jean Jalbert** . . . . . *Director General*
- **Dr Patrick Grillas** . . . . . *Programme Director*
- **Olivier Pineau** . . . . . *Director of the Estate*
- **Jean-Jacques Bravais** . . . . *Administrative and Dinancial Director*

Department "Conservation of species and their populations in the context of global changes"

- **Dr Michel Gauthier-Clerc** *Head of Department, Research director*
- **Audrey Arnal** . . . . . *PhD, University of Montpellier*
- **Antoine Arnaud** . . . . . *Research Technician*
- **Dr Arnaud Béchet** . . . . . *Research Scientist*
- **Thomas Blanchon** . . . . . *Research Technician*
- **Abdennour Boucheker** . . *PhD, EPHE, Montpellier*
- **Clarisse Boulenger** . . . . . *PhD, Muséum national d'histoire naturelle (co-funding Brittany Region)*
- **Anne-Laure Brochet** . . . . *Project leader*
- **Pascal Contournet** . . . . . *Research Technician*
- **Dr Alain Crivelli** . . . . . *Research Director*
- **Anne-Sophie Deville** . . . . *PhD, University of Montpellier II (funding OSEO "Salinalgues")*
- **Dr Olivier Devineau** . . . . *Project Leader*
- **Sébastien Ficheux** . . . . . *PhD, University of Burgundy*
- **Christophe Germain** . . . *Research Assistant*
- **Yves Kayser** . . . . . *Research Assistant*
- **Dr Stephen Larcombe** . . . *Post-doc, Edward Grey Institute, Oxford - UK*
- **Sylvain Maillard** . . . . . *PhD, University of Provence (funding CIFRE*
- **Camille Roumieux** . . . . . *PhD, University Aix Marseille (co-funding PACA Region - EID)*
- **Dr Alain Sandoz** . . . . . *Research Assistant*
- **Marion Vittecoq** . . . . . *PhD, University of Montpellier II (funding AXA Foundation)*

Department "Ecosystem modelling, restoration and management"

- **Dr Brigitte Poulin** . . . . . *Head of Department, Research Scientist*
- **Nathalie Barré** . . . . . *Research Technician*
- **Teddy Baumberger** . . . . . *PhD, Paul Cézanne University, Marseille (funding Electrabel - compensatory measures)*
- **Nicolas Beck** . . . . . *Project Leader*
- **Dr Olivier Boutron** . . . . . *Research Assistant*
- **Dr Philippe Chauvelon** . . *Research Scientist*
- **Nathalier Chokier** . . . . . *Research Assistant*
- **Emilien Duborper** . . . . . *Research Technician*
- **Lisa Ernoul** . . . . . *Project Leader*
- **Samuel Hilaire** . . . . . *Research Technician*
- **Dr Gaëtan Lefebvre** . . . . *Research Assistant*
- **Aurélien Loubet** . . . . . *PhD, University of Provence (co-funding PACA Region)*
- **Laurent Martinez** . . . . . *Research Assistant*
- **Solène Masson** . . . . . *PhD, University of Avignon*
- **Virginie Mauclert** . . . . . *Project Leader*
- **Dr François Mesléard** . . . *Research Director*
- **Isabelle Muller** . . . . . *PhD, University of Avignon*
- **Nathalie Patry** . . . . . *Research Assistant*
- **Jean-Paul Rullmann** . . . . *PhD, University of Burgundy (funding OSEO "Salinalgues")*
- **Marc Thibault** . . . . . *Project Leader*
- **Loïc Willm** . . . . . *Research Assistant*
- **Nicole Yavercovski** . . . . . *Research assistant*
- **Dr Hector Rodriguez** . . . *Post-doc*

Department “Monitoring and evaluation & wetlands policies”

- **Laurent Chazee** . . . . . *Head of Department*
- **Dr Coralie Beltrame** . . . . *Project Leader*
- **Laith El Moghrabi** . . . . . *Project Leader*
- **Dr Thomas Galewski** . . . *Project Leader*
- **Anis Guelmami** . . . . . *Research Assistant*
- **Dr Christian Perennou** . . *Project Leader*
- **Maïlis Renaudin** . . . . . *Project Leader Assistant*

Estate management

- **Philippe Bouzige** . . . . . *Estate Technician*
- **Cédric Cairello** . . . . . *Estate Technician*
- **Frédéric Castellani** . . . . . *Estate Technician*
- **Richard Chanut** . . . . . *Estate Team leader*
- **Damien Cohez** . . . . . *Deputy Director of the estate*
- **Dimitri Gleize** . . . . . *Estate Technician*
- **Ludovic Michel** . . . . . *Estate Technician*
- **Elvin Miller** . . . . . *Technician - Guard*
- **Anthony Olivier** . . . . . *Technician - Guard*

Support services

- **Mireille Arnoux** . . . . . *Secretary*
- **Vincent Boy** . . . . . *Computer Specialist*
- **Nicodème Conin** . . . . . *Management Secretary*
- **Jacqueline Crivelli** . . . . . *Librarian*
- **Corinne Cuallado** . . . . . *Cook*
- **Florence Daubigney** . . . . *Management Secretary*
- **Marie-Antoinette Diaz** . . *Secretary*
- **Rosalie Florens** . . . . . *Management Secretary*
- **Cécile Girard** . . . . . *Cleaning Officer*
- **Stéphanie Gouvernet** . . . *Cleaning Officer*
- **Coralie Hermeloup** . . . . . *Communication Manager*
- **Caroline Mayaudon** . . . . *Communication Officer*
- **Jenyfer Peridont** . . . . . *Communication Officer (on sabbatical leave)*
- **Jean-Claude Pic** . . . . . *Chief Accountant*
- **Catherine Picard** . . . . . *Accountant*
- **Josiane Trujas** . . . . . *Canteen Assistant*
- **Josiane Xuereb** . . . . . *Accountant*
- **Gwenael Wasse** . . . . . *Communication Officer*

- **Emmanuel Thévenin** . . . *Project leader seconded to GIP ATEN*

Students

Manon Annetin, Samuel Artigou, Alexandre Baduel, Nina Bastian, Nadia Bergeron, Alice Bijou, Thomas Boutreux, Valério Cardone, Aurélien Carré, Pierre Casimir, Guillaume Cavailles, Juliette Chassagnaud, Julie Chenot, Laurie Chevron, Julien Claret, Joséphine Depoers, Marie-Pier Désy-Parent, Rémi Fay, Justine Filippi, Julie-Anne Fougere, Johan Friry, Loëva Gasnot, Najoua Ghouat, Sophie Labaude, Benoît Lime, Marc-Antoine Marchand, Marion Martini, Fatima Zohra Najjar, Elodie Oliveira, Timo Prola, Aurélie Raynaud, Pauline Rocarpin, Aurélien Roussel, Margaux Ruiz, Ana Elena Sanchez de Dios, MaryseThollon, Camille Treilhes.

Fixed-term contracts (short period)

Clément Borrel, Emilie Clarion, Emilie Germain, Mark Gillingham, Eric Meineri.

Our partners

Funding partners

- ACCOR Group - France
- ADEME - France
- ArcelorMittal - France
- Bouches-du-Rhône General Council - France
- Bouches-du-Rhône Prefecture - France
- Burgundy Region - France
- Camargue Regional Nature Park - France
- CNRS - France
- Conservatory of Natural Spaces in Languedoc-Roussillon - France
- Corsica Regional Direction for Environment, Planning and Housing - France
- Corsican Environment Office - France
- Ebro Delta Natural Park - Spain
- Electrabel - France
- European Space Agency
- European Union - FEDER, FP7, Life+, SMAP, EVS
- France-Quebec Office for Youth
- Friends of the Vigueirat Marshes Association - France
- Gard General Council - France
- Government Service for Land and Water Management (DLG) - The Netherlands
- ISIS - SPOT images - France
- IUCN International - Switzerland
- Joint Association for the Protection and Management of the Camargue gardoise - France
- Languedoc-Roussillon Region - France
- Languedoc-Roussillon Regional Direction for Environment, Planning and Housing - France
- League for the Protection of Birds - France
- Marseille Fos Port Authority - France
- MAVA Foundation - Switzerland
- Meridionalise - France
- Ministry of Ecology, Sustainable Development and Energy - France
- Ministry of Higher Education and Research - France
- National Office for Hunting and Wildlife (ONCFS) - France
- National Office for Water and Aquatic Environments (ONEMA) - France
- National Research Agency (ANR) - France
- OSEO « Salinalgues » - France
- Prince Albert II of Monaco Foundation - Monaco
- Pro Valat Foundation - Switzerland
- Provence-Alpes-Côte d'Azur Region - France
- Provence-Alpes-Côte d'Azur Regional Direction for Environment, Planning and Housing - France
- Rhone-Mediterranean and Corsica Water Agency - France
- Rhone-Mediterranean Migratory Fish Association - France
- TOTAL Foundation - France

Scientific partners

- A Rocha Association - France
- Agro-Paris-Tech - France
- Albufera Initiative for Biodiversity - Spain/UK
- Alpilles Regional Natural Park - France
- ANSES - Animal Health Laboratory - France
- Camargue National Reserve - France
- Camargue Regional Natural Park - France
- CEREGE - France
- Charles University - Czech Republic
- CNRS - CEBC - France
- CNRS - CEFE - France
- CNRS - DESMID - France
- CNRS - MIVEGEC - France
- Doñana Biological Station - Spain
- Ecological Monitoring Center - Senegal
- European Environment Agency - Danemark
- European Space Agency
- European Topic Centre on Land Use and Spatial Information - Spain/UK
- French Ecological Society - France
- GIPREB - France
- Greek Biotope/Wetland Centre - Greece
- Hebraic University of Jerusalem - Israel
- Hellenic Centre for Marine Research - Greece
- HydroSciences - France
- Ifremer - France
- INRA - ENSAM - France
- INRA - INNOVATION - France
- INRA - LAMETA - France
- INRA - UAPV Mediterranean Environment and Agro-Hydrosystems Modelisation - France
- INRIA - France
- Institute for Environmental Protection and Research (ISPRA) - Italy
- IRD - CNRS Evolution of Symbiotic Systems Team - France
- IRSTEA - France
- IUCN French Committee - France
- IUCN International - Switzerland
- National Environment Protection Agency (ANPE) - Tunisia
- National Institute of Agronomy/Tunis - Tunisia
- National Museum of Natural History - France
- National Veterinary School/Lyon - France
- Pasteur Institute - Molecular Genetics of RNA Viruses - France
- Paul Sabatier University/Toulouse - France
- Polytechnic Institute of Milan - Italy
- Practical School of Higher Education (EPHE)/Montpellier - France
- Remote Sensing Center/Montpellier - France
- Ressources - France
- Science Academy - Czech Republic
- Scientific Institute/Rabat - Morocco
- University Hassan II of Casablanca - Morocco
- University Joseph Fournier of Grenoble - UMR LECA, UFR PHITEM - France
- University of Aix Marseille - CEJU - France
- University of Aix Marseille - IMEP - France

- University of Aix Marseille - UMR Espace - France
- University of Aix-Marseille - DENTES - IUP Environnement - France
- University of Angers - UMR LETC LEESA - France
- University of Annaba - Wetlands Research Team - Algeria
- University of Avignon - IUT/Hydrogeology Team - France
- University of Brookes Oxford - UK
- University of Burgundy - UMR BioGéoSciences - France
- University of Chott Meriem - Tunisia
- University of Curtin - Curtin Institute for Biodiversity and Climate - Australia
- University of Ege - Turkey
- University of El Tarf - Algeria
- University of Gabès - Science Department - Tunisia
- University of Guelma - Algeria
- University of Kalmar - Sweden
- University of Konstanz - Germany
- University of Kristianstad - Sweden
- University of Leuven - Belgium
- University of Ljubljana - Slovenia
- University of Lyon - France
- University of Malta - Malta
- University of Melbourne - ARC Centre of Excellence for Environmental Decisions (CEED) - Australia
- University of Montpellier 2 - Ecosym Team - France
- University of Montpellier 2 - Institute of Evolutionary Sciences - France
- University of New South Wales - Australian Wetlands Rivers and Landscapes Centre - Australia
- University of Oxford - Edward Grey Institute - UK
- University of Parma - Italy
- University of Provence - Chemistry and Environment Team - France
- University of Rennes - UMR ECOBIO - France
- University of Sassari - Sardinia
- University of Sfax - Tunisia
- University of Skikda - Algeria
- University of Sienna - Italy
- University of Tel-Aviv - Israel
- University of the Sunshine Coast - Sustainable Research Centre - Australia
- University of Tizi-Ouzou - Algeria
- University of Toulouse - Ecolab - France
- University of Tripoli - Libya
- University of Uppsala - Sweden
- VERSeau Development Association - France
- Wetlands Research and Study Group - Mauritania
- Zoological Society of London - UK

Technical partners

- A Rocha Association - France
- Anthus - Italy
- ArcelorMittal - France
- Arles Hunting Group - France
- Arles Town Council - Environment Service - France
- Asphodèle Association - France
- Banc d'Arguin National Park - Mauritania
- BirdLife International
- Bolmon and Jaï Joint Association - France
- Bouches-du-Rhône Departmental Territories and Sea Authority - France
- BRL ingénierie - France
- Camargue Horse Centre - France
- Camargue National Reserve - France
- Cépralmar - France
- Chrea National Park - Algeria
- Coastal Protection Agency - France
- Compagnie des Salins du Midi et des Salines de l'Est - France
- Conservatories of Natural Spaces Federation - France
- Corsica Regional Direction for Environment, Planning and Housing - France
- Corsican Environment Office - France
- Departemental Hunting Federations (Bouches-du-Rhône, Gard) - France
- Doga Dernegi - Turkey
- Doga Koruma Merkezi - Turkey
- Doñana Biological Station - Spain
- Doñana Natural Space - Spain
- Ebro Delta Nature Park - Spain
- EID Méditerranée - France
- El Kala National Park - Algeria
- ENSAT - Functional Ecology and Environement Team/Toulouse - France
- Environmental Agency - Abu Dhabi
- European Environment Agency - Danemark
- European Space Agency
- European Topic Centre on Land Use and Spatial Information - Spain/UK
- Foundations of Success
- France Natural Reserves - France
- French Rice Centre - France
- Friends of the Birds Association - Tunisia
- Friends of the Pont de Gau Ornithological Park Association - France
- Friends of the Vigueirat Marshes Association - France
- Fuente de Piedra Natural Reserve - Spain
- Gard Departmental Territories and Sea Authority - France
- Green Balkans NGO - Bulgaria
- Ichkeul National Park - Tunisia
- International Foundation of Banc d'Arguin - France
- IUCN French Committee - France
- IUCN International - Switzerland
- IUCN Mediterranean Cooperation Centre - Spain
- Joint Association for the Management of the Palissade Estate - France
- Joint Association for the Protection and Management of the Camargue gardoise - France
- Languedoc-Roussillon Conservatory of Natural Spaces - France
- Languedoc-Roussillon Graine - France
- Languedoc-Roussillon Regional Direction for Environment, Planning and Housing - France

- Le Citron jaune/Ilotopie, National Centre for Street Arts - France
- League for the Protection of Birds - France
- Listel - France
- MedINA - Greece
- Mediterranean Botanical Conservatory of Porquerolles - France
- MedPan Association - France
- MedWet - Greece
- Molentargius-Saline Regional Nature Park - Italy
- Narbonnaise Regional Nature Park - France
- National Institute for Nature Protection - Croatia
- National Office for Hunting and Wildlife (ONCFS) - France
- National Office for Hunting and Wildlife (ONCFS) / Migratory Birds CNERA - France
- National Space Studies Centre - France
- Nature Conservation - Egypt
- Noé Conservation - France
- Palissade Estate - France
- Permanent Centre for Environmental Initiatives/Arles - France
- Po Delta Emilia-Romagna Regional Park - Italy
- Provence-Alpes-Côte d'Azur Conservatory of Natural Spaces - France
- Provence-Alpes-Côte d'Azur Graine - France
- Provence-Alpes-Côte d'Azur Regional Direction for Environment, Planning and Housing - France
- UNEP-RAC/Blue Plan
- UNEP-RAC/SPA - Tunisia
- Regional Nature Park - France
- Regional Network of Aquatic Ecosystems Managers/PACA - France
- Regional Network of Naturel Spaces Managers/PACA - France
- Research Group for Bird Protection in Morocco - Morocco
- Rhône-Alpes Conservatory of Natural Spaces - France
- Rhone-Mediterranean Migratory Fish Association - France
- Royal Society for Nature Conservation - Jordan
- Saintes Maries de la Mer Town Council - France
- Savoie Natural Heritage Conservatory - France
- Scamandre Centre - Camargue Gardoise Observatory - France
- Society for the Protection of Prespa - Greece
- Spanish Centre for Wetlands (CEHUM) - Spain
- SPEA - Portugal
- Taza National Park - Algeria
- Technical Workshop for Natural Areas (ATEN) - France
- Tlemcen National Park - Algeria
- Tolmin Angling Association - Slovenia
- Verdier Marshes Association - France
- Wetlands International - The Netherlands
- Wetlands Transfer Units - France
- WWF Mediterranean Programme Office - Italy
- Zoological Institute - UK

Institutional partners

- 2010 Biodiversity Indicators Partnership
- AEWA - Germany
- Agropolis Foundation - France
- Arles Chamber of Commerce and Industry - France
- Autonomous Region of Sardinia - Italy
- Banc d'Arguin National Park - Mauritania
- Barcelona Convention - Greece
- Bird Paradise Union of Izmir (Izkuş) - Turkey
- Bouches-du-Rhône General Council - France
- CESAB/Aix-en-Provence - France
- CIHEAM/IAMM/Montpellier - France
- Coastal Protection and Planning Agency - Tunisia
- Convention on Biological Diversity
- Corsica Regional Direction for Environment, Planning and Housing - France
- Corsican Environment Office - France
- Ebro Delta Natural Park - Spain
- Egyptian Environment Affairs Agency - Egypt
- El Kala National Park - Algeria
- Environment General Authority - Libya
- Environment Quality Authority - Palestine
- Foundation for Biodiversity Research - France
- France Natural Reserves - France
- French Foundations Centre - France
- High Commission for Waters and Forests and the Fight against Desertification - Morocco
- IUCN French Committee - France
- IUCN International - Switzerland
- IUCN Mediterranean Cooperation Centre - Spain
- Izmir Provincial Department for Forestry and the Environment (National Parks) - Turkey
- Languedoc-Roussillon Region - France
- Languedoc-Roussillon Regional Direction for Environment, Planning and Housing - France
- Marseille Provence 2013, Euromediterranean workshops - France
- MedWet - Greece
- Ministry of Agriculture and Hydraulic Resources - Directorate General of Forests - Tunisia
- Ministry of Agriculture and Rural Development - Directorate General of Forests (DGF) - Algeria
- Ministry of Ecology, Sustainable Development and Energy - France
- Ministry of Environment and Forests - Turkey
- Ministry of Higher Education and Research - France
- National Environment Protection Agency (ANPE) - Tunisia
- National Museum of Natural History - France
- National Office for Hunting and Wildlife (ONCFS) - France
- Nature and Parks Authority - Israel
- Provence-Alpes-Côte d'Azur Region - France
- Provence-Alpes-Côte d'Azur Regional Direction for Environment, Planning and Housing - France
- Ramsar Convention - Switzerland
- Ramsar France Association - France
- Regional Agency for Environment/PACA - France
- Regional Council for the Environment of Andalucía - Spain
- Regional Natural Park - France
- Wetlands International - The Netherlands
- World Conservation Monitoring Centre - UK
- WWF France - France
- WWF International - Switzerland

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Visiting us

The Tour du Valat is open to the general public on several occasions each year:

- On World Wetlands Day, usually the first Sunday in February, the Tour du Valat has an open house, with conferences, video presentations and guided tours of the Estate.
- If you would like to receive information about the programmes and other events the Tour du Valat organizes for the general public, please write to us at:

secretariat@tourduvalat.org

TOUR DU VALAT

A research centre for the
conservation of Mediterranean wetlands

Le Sambuc - 13200 Arles - France
Tél. : + 33 (0)4 90 97 20 13
Fax : + 33 (0)4 90 97 20 19
secretariat@tourduvalat.org

www.tourduvalat.org