TOUR DU VALAT

Activity Report 2015

A research institute
for the conservation
of Mediterranean
wetlands

TOUR DU VALAT

© M. Thibault

Little Tern

© Jean E. Roché

On the way to ring Ibises

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TOUR DU VALAT

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A word from the President

This introduction will no longer bear the signature that you used to see: Jean-Paul Taris died in July 2015. With his departure Tour du Valat has lost a dear friend whose influence on our Foundation was very significant and highly appreciated. Jean-Paul's humanism, thorough knowledge of the Camargue and Mediterranean environments, and clear vision of the role that we could and should play in the future enabled us to take major steps forward. In my own name, in the name of the Board and in the name of the whole Tour du Valat team, I would like once again to express our sincerest sympathy to all Jean-Paul's family.

At its last meeting, the Board did me the great honour of electing me President of the Foundation and I hope that I will be able to live up to the heritage of my two predecessors. For despite having been in existence for 61 years, the Foundation has had actually only two presidents: my father, Luc Hoffmann, and Jean-Paul. This singular legacy inspires me with the greatest respect and I am honoured to continue their work thanks to your invaluable aid.

But what is the use of the Tour du Valat? Why do we persist in protecting these wetland areas reviled for so long? Would it not be better to drain them and transform these wastelands into productive field and forests?

These questions, which I am regularly asked by well-intentioned people, deserve to be put into context. Our planet has evolved over the years with mechanisms and equilibria that are difficult to reproduce. There is now a large body of research work, often instigated by my father and partially initiated at the Tour du Valat, which shows the very real contribution made by these habitats to the functioning of the planet. Mediterranean wetlands are a very good example of the ecosystem services provided to humanity by nature. Water is a major issue in the region and the significant part played by Mediterranean wetlands in this respect is becoming increasingly obvious with each paper published and each study carried out.

But these areas are also important for other reasons: they support biodiversity, contribute to the quality of life of their inhabitants, and act as vectors for historical and cultural values.

Only a multi-disciplinary approach capable of establishing links between science, public policies and the management of natural areas can have a long-term impact on this issue. And the private sector, creator of added value, must be involved in order to design a model of environmental sustainability based on respecting the above-mentioned equilibria.

That is the proven utility of Tour du Valat: internationally recognised scientific expertise in the service of Mediterranean wetland management practices that enable optimum resolution of the compromises required for the sustainable management and conservation of the natural resources essential to the future of our region.

Yes, an exhilarating task that I am delighted to set about doing in your name with the skilled support of a motivated team, under the efficient management of Jean Jalbert.

André Hoffmann
President

Tatiana Fuentes,

European Voluntary Service

"As an Andalusian, enthralled by the environment and the application of science to the conservation of coastal habitats, I couldn't find a better place in this organisation so committed to the Mediterranean!
All I have to do, to blend in with the environment, is let the mistral take me towards birds, turtles, maps and statistical data."

Contents

Editorial

Sadness and rewards. 2015 was a year of contrasts which started on a mourning note with the passing of Alan Johnson, an emblematic figure at the Tour du Valat. A few months later, it was the turn of Jean-Paul Taris to depart. Together with Luc Hoffmann, in the greatest complicity, Jean-Paul led the Tour du Valat for more than twenty-five years, as Director then as President, and breathed into it the spirit that has now become its identity. Guide and unifier, a Rabelaisian character of mischievous intelligence, Jean-Paul showed us the way to retie the over-stretched bonds between Man and Nature.

And it was those values, that identity, that unique dynamism which was recognised and rewarded in 2015.

First of all by the Ramsar Convention which, at its 12th Meeting of the Conference of the Contracting Parties in Uruguay, granted the Tour du Valat the "Award for Merit" to recompense its exceptional contribution to the conservation of wetlands. This award has a special flavour for the Tour du Valat because it was here, in the heart of the Camargue marshes, 53 years ago, initiated by Luc Hoffmann, that the idea emerged for an international treaty dedicated to the preservation of wetlands. Nine years later, the Ramsar Convention came into being. A nice twist of history !

The relevance and efficacy of the actions of the Tour du Valat and its partners were also hailed at the Sixth Session of the Meeting of the Parties to the African-Eurasian Migratory Waterbird Agreement. On this occasion, many African and Mediterranean countries spoke up for the continuation of the support, training and networking actions carried out on their behalf during the last three years, in the framework of a close partnership with the French National Hunting and Wildlife Agency (ONCFS) and the Senegal National Parks Directorate (DPN), backed by the French Ministry of Ecology.

Finally, COP21 on Climate Change, in Paris, was an opportunity for broad-based communication concerning the role of wetlands as a "climatic shock-absorber" and to plead for these key ecosystems to be at the core of policies for attenuating and adapting to the effects of climate changes.

Things are on the move in the Camargue too. Having shown the impact of Bti mosquito control on biodiversity, at the Tour du Valat we have been seeking alternative strategies. Through collaboration with young local engineers a system was developed and tested that uses mosquito traps inserted into street furniture. This solution seems to be a good compromise, which responds to the demands of society by capturing all species of mosquito including those that could present a health risk, while at the same time minimising the impact on biodiversity and being more economical than current practices. Moreover, the solution is generating a great deal of interest among public authorities, well beyond the Camargue.

All the actions summed up in the coming pages are the fruit of the commitment of men and women. Following in the footsteps of Jean-Paul and Alan, several new young talents have joined us to face the challenges of the future and continue this unique human adventure.

At the time when we embark on our new programme for the next five years, this human capital is more than ever at the heart of our actions, for forging new alliances, building up collective intelligence, and convincing decision-makers and the general public of the need to preserve these prodigiously rich habitats, which are essential for biodiversity in general and Mankind in particular.

Jean Jalbert
Director General

Elie Gaget,

Doctoral student

"What are the impacts of global change on the waterbird communities that winter in the Mediterranean? In the Doctorate I'm doing at the Tour du Valat, in collaboration with the French National Museum of Natural History, I use citizen science data and statistical modelling to study that question."

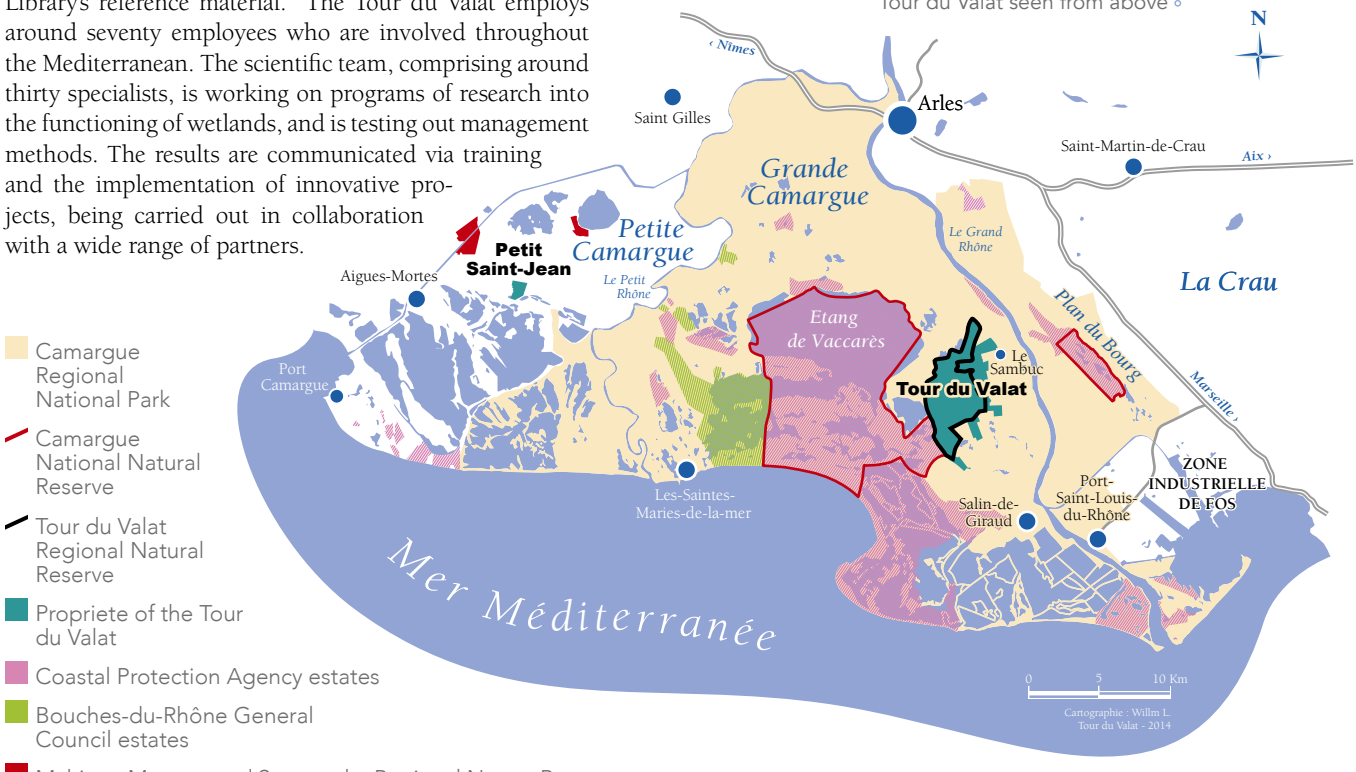
The Tour du Valat

Created more than 60 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 favor interchanges between wetland users and scientists, and promote wetlands benefit to decision makers.

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 fluviolacustrine zone of the Camargue, extends over an area of 2,700 hectares, of which 1,845 are classified as a Regional Natural Reserve. Beyond its role of biodiversity conservation, it is a privileged site for conducting researches, test and develop agricultural and hunting activities compatible with the maintenance of this exceptional biodiversity.

The Tour du Valat is also a unique bibliographical resource center in the Mediterranean, specialized in wetlands ecology. Each year, hundreds of researchers, teachers and students from the Mediterranean basin come and consult the Library's reference material. The Tour du Valat employs around seventy employees who are involved throughout the Mediterranean. The scientific team, comprising around thirty specialists, is working on programs of research into the functioning of wetlands, and is testing out management methods. The results are communicated via training and the implementation of innovative projects, being carried out in collaboration with a wide range of partners.

Tour du Valat seen from above



- Camargue Regional National Park
- Camargue National Natural Reserve
- Tour du Valat Regional Natural Reserve
- Propriete of the Tour du Valat
- Coastal Protection Agency estates
- Bouches-du-Rhône General Council estates
- Mahistre-Musette and Scamandre Regional Nature Reserve

The Estate

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 Saint-Jean Estate, located in the Gard Department, which was donated to the Tour du Valat by M. Marcel Bernard in 1981, was finally integrated into the estate in 2012, following thirty-year 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, water bird censuses, mammal counts, etc. The Estate team ensures 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.

© J. Jalbert / Tour du Valat

2 The implementation of research programmes with an experimental proving ground

Programs are meant to better understand the functioning of habitats and species in relation with human activities. The aim is to learn the lessons needed to maintain biodiversity, optimize 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.

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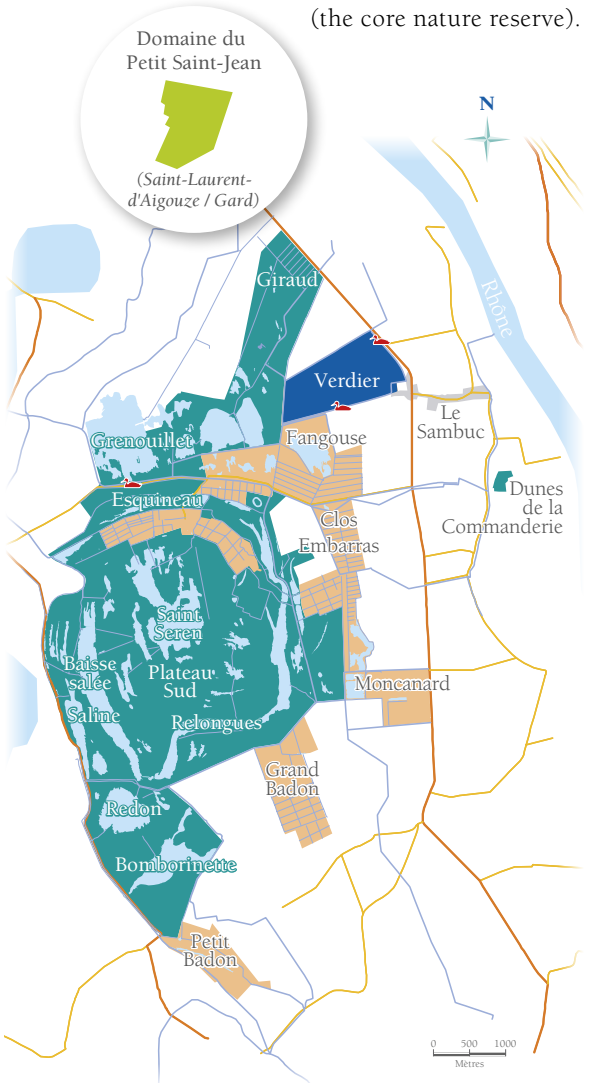
3 Maintaining traditional activities

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 2015, the livestock grazing on the site amounted to about 450 cattle and 70 horses. Other areas of land are also used for organic farming within a farming cycle that is traditional in the Camargue: rice, wheat, and hay.

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 favor 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 organization, 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 organizing drives (to which many hunters from the region are invited), arranging shoots to protect crops, and organizing hunting by bow and arrow in the most sensitive areas (the core nature reserve).



Propriété de la Fondation Tour du Valat

Zones à vocation agricole et cynégétique
Marais du Verdier (site ouvert au public)
Réserve naturelle régionale (accès réglementé)
Domaine du Petit Saint-Jean
Observatoire (accès libre)
Canaux d'irrigation ou de drainage
Route départementale
Voie communale

Ophrys tenthredinifera

Baillon's Crake

Pelobates cultripes

Biodiversity on the Estate

2015, a year of incredible biodiversity! The hydrological conditions that characterise the variability of the Mediterranean climate were particularly favourable to the natural heritage of our Reserve. Our monitoring work brought us many surprises! 2015 also marked a transition in our management of the site because we renewed the Management Plan using an innovative methodology called Open Standards, which is intended to be more adaptive. Our entire team had to work very hard to complete the project successfully.

Réserve Naturelle Régionale
TOUR DU VALAT

An excellent breeding season for waterbirds

The good hydrological conditions in the spring were favourable for breeding waterbirds. In particular, a calling Baillon's Crake (*Porzana pusilla*) was discovered in the Giraud rush beds. A nest of this species had been discovered by chance in 2003 at the same place under similar hydrological conditions. Its presence this year would therefore seem to confirm that these rushes may host this species more regularly than we had believed.

Five colonies of herons nested last year, with a total of at least 629 pairs of Little Egret, 7 of Great Egret, 66 of Grey Heron, 30 of Purple Heron, 104 of Black-crowned Night Heron, 8 of Squacco Heron, 293 of Cattle Egret, and 7 pairs of Glossy Ibis. The numbers of White Stork continued to increase, with the nesting of 28 pairs. Finally, Great Cormorant bred for the first time on the site, with 23 pairs in the tamarix thickets at the Saint Seren Marsh. Six booming male Eurasian Bittern were also observed during our annual monitoring operations.

The Montcanard site once again hosted a colony of Collared Pratincole, with at least 35 pairs. However, breeding success was relatively low with on average 0.57 chicks / pair.

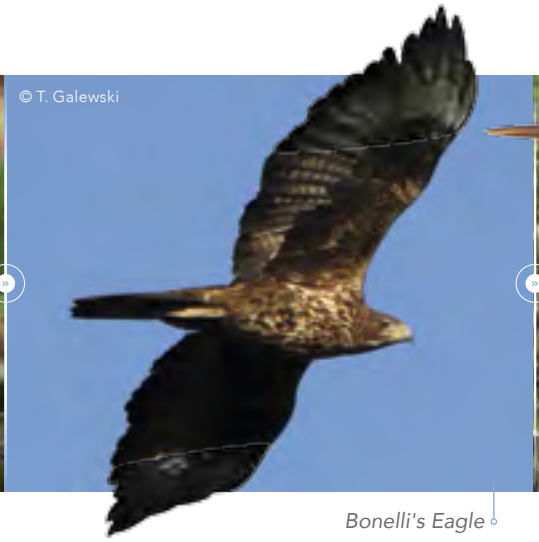
Yet more floristic discoveries

As every year, the plant world was majestic with in particular the very wonderful discovery of a Sawfly Orchid (*Ophrys tenthredinifera*). This rare and lovely orchid is protected in France and classified as vulnerable by the IUCN (International Union for Conservation of Nature).

Liverworts are little known small moss-like plants that can be found in certain temporary wetlands. Very rare in France, they are protected and listed in Annex II of the European Habitats Directive (Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora). Of the three found in the Camargue, two species had been discovered on the site in previous years: *R. helicophylla* and *R. cossoniana*. This year, the third species, *Riella notarisii* was widely observed in the vast swaths of flooded sansouires on the site.

Birdsfoot Fenugreek (*Trifolium ornithopodioides*), which had not been seen for more than 50 years, was rediscovered in 2015 at two temporary ponds on the site.

Trifolium ornithopodioides



Bonelli's Eagle

Purple Heron

Many amphibians also recorded

The good hydrological conditions also favoured the presence of amphibians. Our monitoring, based on tadpole counts, has enabled us to record good breeding success since 2004 for several species: the best for the Green Frog (*Pelophylax sp*), the second highest number for the Common Parsley Frog, and third place for the Mediterranean Tree Frog.

In addition to distance sampling along the transect, Capture-Mark-Recapture monitoring was initiated for the Western Spadefoot Toad (*Pelobates cultripes*) using photo identification. Initial results indicate a high level of turnover for the individuals captured from one count to another, which implies that we had previously underestimated the size of the population.

The roosts built for the Greater Horseshoe Bat (*Rhinolophus ferrumequinum*) are still not occupied; however, it is encouraging to note that the species has been observed on the edge of the site.

At least five Bonelli's Eagles (*Hieraaetus fasciatus*) were spotted this autumn, which confirms the importance of this site for the dispersal of young eagles.

As usual the autumn season enabled us to make new observations with in particular the capture of a Yellow-browed Warbler (*Phylloscopus inornatus*). Linked to the increased number of sightings in the Mediterranean region, this beautiful small Siberian warbler has become a regular visitor to the Tour du Valat.

Census of amphibians

Black-tailed Godwit

Our Programme

The Tour du Valat carries out its programme in the form of research and conservation projects aimed at producing concrete responses to the issues affecting Mediterranean wetlands. The Programme includes activities that contribute to enhancing knowledge of the functioning of Mediterranean wetlands, assessing the problems to be resolved, proposing and testing innovative solutions, and transferring solutions to managers and decision-makers.

2015 was a year of transition with the end of the 2011-2015 Programme and the finalisation of the ongoing Programme (2016-2020). The outcome of our actions over the last five years was highly satisfactory in terms of scientific production and fostering the knowledge and sustainable management of wetlands. The achievements of the three Departments were complementary during that five-year period, contributing to the three major aspects of the Tour du Valat's niche position: research, application in the field, and transfer. While research remains the Tour du Valat's core activity, the ultimate aim of our work is the protection of biodiversity through sustainable management of ecosystems. We are proud of the work, carried out with our partners, which we achieved over the last five years. For example, together with numerous other actions, we contributed to the restoration of thousands of hectares of wetlands in the Camargue and a major reed bed in Turkey (Gediz Delta). On the Tour du Valat Estate, by means of targeted management, we succeeded in harbouring the largest Collared Pratincole colony in France. In the Balkans we contributed to an increase in pelican colonies, and also to Marble Trout populations in Slovenia.

Together with the drawing up of the 2016-2020 Programme, the Tour du Valat Estate management plan was revised using a new methodology, the *Open Standards for the Practice of Conservation*. This method is intended to improve the taking into consideration of natural dynamics and their interactions with human activities, and more globally the evolution factors affecting ecosystems.

During the last five years, major projects such as those aimed at restoring wetlands and studying the consequences of mosquito control have led us to concentrate our activity in the Camargue, with relatively reduced investment in the rest of the Mediterranean Basin. In addition to these important projects in the Camargue, in its next Programme the Tour du Valat needs to find the means to reinvest in the whole Mediterranean Basin. The main courses of action will be working in networks, supporting partners in their research, transferring skills and knowledge, and raising awareness amongst decision-makers.

Despite a difficult economic and political context, out partners' financial backing did not falter and we remain in a relatively favourable position for embarking on our new Programme, which is largely a continuation of the previous plan in terms of research and conservation themes. On the basis of our expertise and the new Programme, networking with the other international organisations active in the Mediterranean Basin, we have fixed ourselves two new challenges: to support the local organisations working for the protection and sustainable management of wetlands, and to develop the political advocacy for these ecosystems that provide so many services to local communities.

Patrick Grillas
Programme Director

Delphine Nicolas,

Research Scientist

"Off fishing! At the Tour du Valat, in the heart of the wetlands, between wilderness and agriculture, there is everything to inspire me. I'm lucky to have a wonderful place to amuse myself and long datasets to help me to understand what's going on under water"

The Programme

our commitment

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.).

Conservation objectives rely 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 distribution and abundance of species in 5, 10 and 25 years' time, in conjunction with landscape modifications, climate changes and exploitation.

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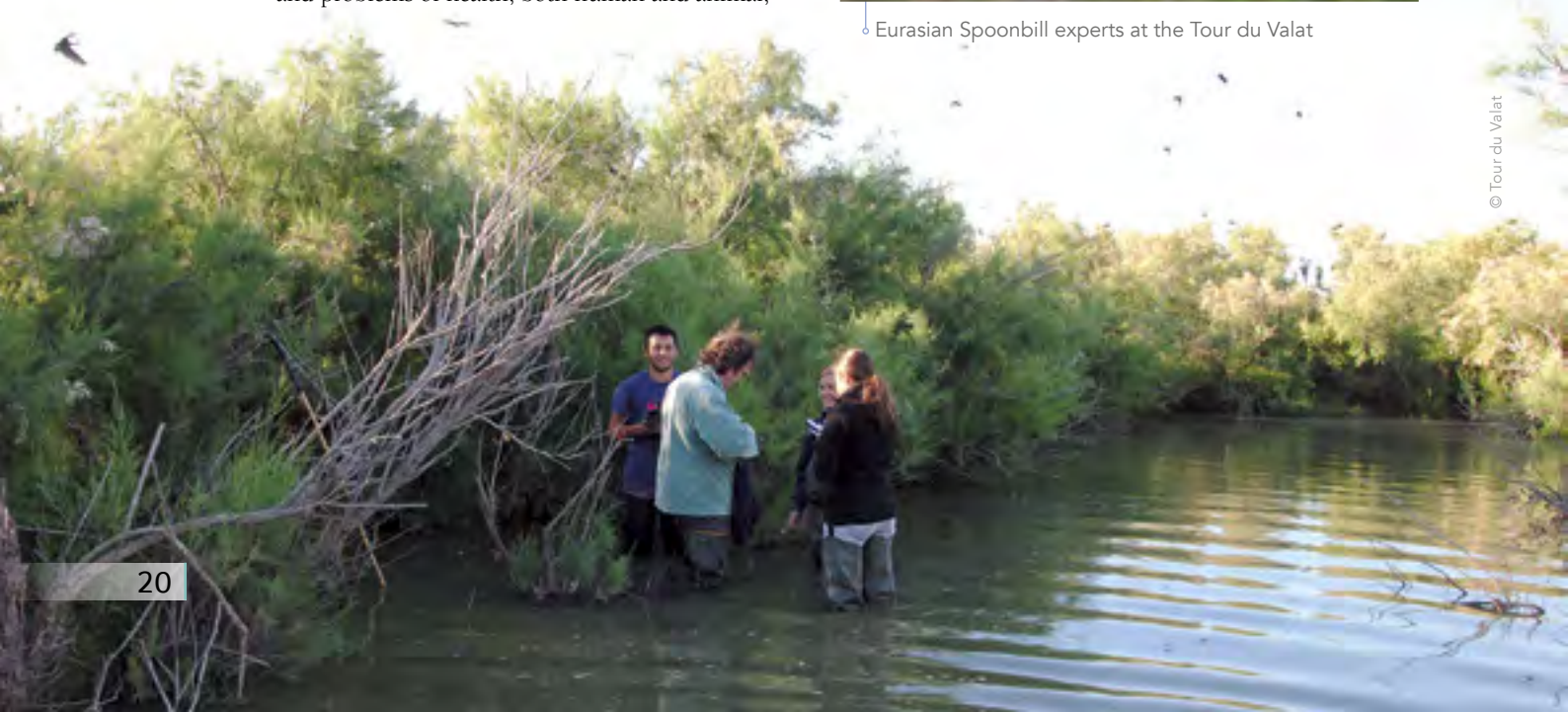
Eurasian Spoonbill experts at the Tour du Valat



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In 2015, the team was bolstered by several new arrivals.

Jocelyn Champagnon assumed responsibility for the studies of Glossy Ibis, Eurasian Spoonbill and wintering ducks. A new fish biologist, Delphine Nicolas, was hired to continue Alain Crivelli's research programme. The work on fish communities in the Fumemorte drainage canal is yielding interesting results, with the gradual restoration of the fish community after the elimination of catfish in one section of the canal. The study of the restocking of the Vigueirat marshes with eels has been completed and the results will be published in 2016. Laura Dami has taken over responsibility of the Mediterranean Waterbirds Network (previously called DIOE-MED) and organised a workshop in Tunisia with all its North African partners. A first paper stemming from this collaboration has been submitted. Work has been initiated with the Mediterranean Wetlands Observatory in order to enhance synergies between the two projects.

Claire Pernollet's thesis on the interaction between ducks and ricefields was finished in early 2016, with several excellent papers already published. Her work demonstrates that winter flooding of ricefields could increase the carrying capacity for ducks in the Camargue, while providing major agricultural benefits (the project is described in more detail in the Focus p.22).

Marion Vittecoq launched a study of variations in antibiotic resistance in rodent's community along an urbanisation gradient. Collaborations with the Ecosystems Department and the Mediterranean Wetlands Observatory were initiated in order to model the dynamics of viruses and pathogenic agents with regard to the climate, hydrological models and ground cover data.

In April 2015, Mark Gillingham (postdoc at Ulm University, Germany), obtained funding for a three-year study (2015 to 2017) on the link between gastro-intestinal bacteria communities, the genes of the Major Histocompatibility Complex (involved in the immune system), and the dispersion of Greater Flamingo.

Finally, a new islet for the flamingos was constructed between Fangassier I and II by means of funding from the European Life + MCSalt project, the Conservatoire du Littoral (Coastal Protection Agency), and the Ministry of Ecology, Sustainable Development and Energy. This work is intended to improve the flooding conditions around the islet in order to discourage terrestrial predators, and ensure sufficient long-term breeding frequency for Greater Flamingo in the Camargue.

Arnaud Béchet
Head of Department

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FOCUS

Towards inter-crop ricefield management favourable to both ducks and farmers

Cultivated land dominates the terrestrial surface of the Earth (24% worldwide, >45% in Europe) and is both a threat and an opportunity for biodiversity conservation. Rice farming is a good illustration of this ambivalence. While rice farming can be a threat to the conservation of natural wetlands (conversion of wetlands into ricefields, release of pesticides into natural habitats), ricefields are also recognised by the Ramsar Convention as important habitats for biodiversity, suitable for more than half of the world's 150 species of Anatidae (ducks, geese and swans) (Pernollet *et al.*, 2015a). In North America, inter-crop flooding of ricefields both increased their carrying capacity for wintering ducks and provided agricultural benefits to the rice farmers.

In Europe, most rice growing areas are situated close to the major wintering quarters of ducks. Appropriate management of these areas could therefore contribute to the conservation of these waterfowl. However, winter flooding is little used in the Camargue, which led us to investigate whether similar benefits could be expected. That was the subject of Claire Pernollet's doctoral thesis, co-directed by the National Office for Hunting and Wildlife (ONCFS) and the Tour du Valat. The work was carried out in collaboration with 12 farmers in order to assess the existence of 'win-win' post-harvest agricultural practices for both ducks and rice farmers (Pernollet, 2016).

› Wintering ducks: complementarity between flooded ricefields and natural wetlands

The aim of an initial phase was to check the complementarity between flooded ricefields and natural wetlands for wintering ducks. To do this, we compared five major European rice-growing landscapes (the Camargue in France, the provinces of Vercelli and Pavia in Italy, and the Ebro Delta and Valencian Albufera in Spain). The results showed a positive correlation between the average number of ducks and the total surface area of wetlands (natural areas plus winter-flooded ricefields), suggesting a complementarity between these two habitat types. While the Camargue is the region where natural wetlands are best conserved, only 9% of its ricefields are flooded in winter. This compares with 62% in the Spanish regions we studied, which receive specific European subsidies to encourage the practice (Agri-Environmental Scheme). Since these measures were put in place in the early 2000s, the wintering duck populations of both Spanish regions have increased considerably (Pernollet *et al.*, 2015b).

We then evaluated more precisely the available food resources and habitat use by ducks of 50 ricefields in the Camargue subjected to various post-crop practices (flooding, burning, ploughing). The results highlight the presence of abundant crop residues and weed seeds on the ground after the harvest, in quantities that can reach 500 kg/ha. Ploughing greatly reduces seed resources. Flooding the ricefields enables ducks to feed during the night, with average densities of 25 birds/ha, as compared with just 0.3 birds/ha in unflooded ricefields. Flooding is the main factor explaining the nocturnal frequentation of ricefields by ducks (Pernollet *et al.*, in prep).

Winter flooding of rice fields at Donana, Spain

Rice fields after straw burning in the Camargue

© M. Gauthier-Clerc / Tour du Valat

Two experimental tests showed that winter flooding of ricefields can benefit farmers due to better decomposition of the straw. The ducks significantly reduce the amount of upright stubbles. This reduction increases with the density of the ducks: -27% for 5 canards/ha, -52% for 23 canards/ha, -91% for 300 canards/ha. The presence of the ducks would seem to reduce the amount of stubble and therefore increase the decomposition of the rice straw by the joint action of water and trampling by ducks (Bird *et al.*, 2000; Brogi *et al.*, 2015). However we were not able to show any significant reduction in the weed seed bank due to flooding and the presence of ducks (Brogi *et al.*, 2015, Pernollet *et al.*, in press).

Young Mallard duck

© Tour du Valat

› Winter flooding of ricefields: cost-benefit assessment

Finally, cost-benefit analysis was carried out, taking into consideration the agronomic and environmental constraints and advantages, in order to assess the economic feasibility of the winter flooding of ricefields in the Camargue. The harvest of flooded ricefields was shown to be four times more profitable for farmers and eight times more for Camargue society than the traditional burn-and-plough method, which proved neither economically viable nor socially acceptable (benefit-cost ratio for farmers 4.15 / 1.02; for Society 6.67 / 0.78), due to the other ecosystem services provided by the presence of water. These results suggest that the practice deserves to be encouraged in the Camargue (Niang *et al.*, in press).

In this perspective, we presented these results at the annual information meetings of Camargue site managers, hunters and farmers at the Tour du Valat, and on two occasions to the Commission for "Agricultural Activity, Development and Promotion of Livestock-rearing" at the Camargue Regional Natural Park, and at the Annual Meeting of the French Rice Centre and the Rice-growers' Union in September 2015. In collaboration with J-C Mouret, Researcher at INRA–Supagro Montpellier, we were involved in writing two chapters of a book that summarises rice-growing in the Camargue. They include all the scientific knowledge acquired by the Tour du Valat and its partners over a period of almost 20 years concerning cropping and post-cropping practices in the ricefields, from the point of view of nature conservation.

Papers cited:

Bird J.A., Pettygrove G.S., Eadie J.M. 2000. The impact of waterfowl foraging on the decomposition of rice straw: Mutual benefits for rice growers and waterfowl. Journal of Applied Ecology 37: 728-741.

Brogi A., Pernollet C.A., Gauthier-Clerc M., Guillemain M. 2015. Waterfowl foraging in winter-flooded ricefields: Any agronomic benefits for farmers? Ambio, 44: 793-802. DOI : 10.1007/s13280-015-0678-0

Niang A., Pernollet C.A., Gauthier-Clerc M., Guillemain M. (accepted). A cost-benefit analysis of ricefield winter flooding for conservation purposes in Camargue, Southern France. Agriculture, Ecosystems and Environment.

Pernollet, C.A. 2016. L'utilisation des rizières par les canards hivernants: vers une gestion des rizières en interculture favorable aux canards et aux agriculteurs. Thèse de doctorat, Universités de Montpellier, Février 2016.

Pernollet C.A., Simpson D., Gauthier-Clerc M., Guillemain M. 2015a. Rice and Duck, a good combination? Identifying the incentives and triggers for joint rice farming and wild duck conservation. Agriculture, Ecosystems and Environment, 214: 118-132. DOI: http://dx.doi.org/10.1016/j.agee.2015.08.018

Pernollet C.A., Guelmami A., Green A.J., Curcó Masip A., Dies B., Bogliani G., Tesio F., Brogi A., Gauthier-Clerc M., Guillemain M. 2015b. A comparison of wintering duck numbers among European rice production areas with contrasting flooding regimes. Biological Conservation 186: 214-224. DOI : 10.1016/j.biocon.2015.03.019. I.F: 4.04.

Pernollet C.A., Cavallo F., Simpson D., Gauthier-Clerc M., Guillemain M. (on revision). Seed density and waterfowl use of rice fields in Camargue (France): the role of post-harvest practices. Journal of Wildlife Management.

Pernollet C.A., Mesléard F., Robin J-P., Hanzen C., Rutter I., Cavallo F., Gauthier-Clerc M., Guillemain M. (ready for submission). Effect of winter flooding on deterioration of rice and main rice weed seeds: a greenhouse experiment. Freshwater Biology.

Project leaders:

Claire Pernollet's thesis co-directed by Michel Gauthier-Clerc (Tour du Valat) and Matthieu Guillemain (ONCFS)

Financial partners:

National Office for Hunting and Wildlife (ONCFS)

Technical partners:

INRA-SupAgro Montpellier, French Rice Centre, Rice-growers' Syndicate.

THE PROJECTS :

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

AT A GLANCE

Dynamics of populations in response to human activities

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The aim is to understand better the variation in species' responses to the effects of global changes (land use, exploitation, etc.) in order to reveal problems of species conservation and propose more favorable management methods, or control methods for problematic species.

There are three principal activities:

Demographic analysis of populations and metapopulations by means of Capture-Mark-Recapture (CMR) and genetic studies (birds, fish, reptiles);

Long-term monitoring of biodiversity in the Camargue (in particular communities of birds, fish, amphibians and reptiles);

Development of tools for gathering, managing, analyzing, networking and presenting data.

Greater Flamingo

Charlotte Perrot (PhD student) studied the evolution of Greater Flamingo courtship displays in function of age. Annabelle Vidal (Master II) investigated the laterality of Greater Flamingo when resting, when seeking food, and during courtship display. A paper was finalised estimating the loss of rings among flamingos based on observations carried out by Alan Johnson. Finally, the genetic study of Greater Flamingo throughout its range was finalised. It suggested that there was no structuring according to mitochondrial DNA.

Goélands railleurs

Charlotte Francesiaz (PhD student) assessed the maintaining of bonds between Slender-billed Gull individuals over time. In collaboration with the University of Konstanz (Germany), isotopic analyses were carried out on feathers from Slender-billed Gull chicks sampled at 20 sites over 16 consecutive years.

Ibis and Spoonbill

We assessed the effect of ringing operations on the breeding success of Glossy Ibis and the community of tree-nesting herons. 425 Ibis chicks were ringed.

The workshop of the international Eurasian Spoonbill workgroup was held at the Tour du Valat (November 2015), with 34 participants from 12 different countries (including six North African countries). The initial results of the survival analysis of the Camargue population were presented, with the migration patterns of this population. 404 Spoonbill chicks were ringed this year.

Glossy Ibis

European Pond Terrapin

Capture-recapture monitoring of European Pond Terrapin was continued and the potential hydrological reconnection zone (Le Rendez-vous area) between Les Faïsses and L'Esquineau was sampled for the first time. An inventory was carried out of the alga species found on the terrapin shells (>50 species identified), and the results will be published.

Eel

The Eel restocking experiment came to an end after eight years. The experimental pond was emptied in order to recover all individuals. 2300 eels were taken, measured, weighed and frozen in order to analyse and determine their age by means of their otoliths. The study of the Fumemorte eels was continued, with a high level of recruitment in the canal and the marking of many individuals. Monitoring of the Vaccarès population was carried out for the 23rd consecutive year.

Medwaterbirds

Development was continued of the data management system for waterbird counts in the Mediterranean (medwaterbirds.net). A module was developed for importing the major breeding monitoring datasets in different formats. Another module was implemented for importing large files containing geographical objects such as administrative boundaries, sites, wetland complexes and biogeographical regions. Work is underway to standardise the toponymy of the names of marshes throughout the Camargue with a view to incorporating them into the database. All the flamingo breeding sites known to the Flamingo Network have been entered.

Ecology of Health and Conservation

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The scientific objective is to understand the interactions between biodiversity and public health or veterinary problems affected by global changes. The applied objectives are to help to reconcile the conservation of the biodiversity of Mediterranean wetlands with the presence and well-being of human populations; and to help conserve unfavorable status species impacted by epizootic or pollution events.

There are four axes of research:

① Studying zoonoses and the role of Mediterranean wetland species in their epidemiology;
② Analyzing the impact of different treatments (antiparasitic, antibiotic, anti-vectorial, etc.) on the fauna of Mediterranean wetlands;
③ Assessing the impact of pathogens on the dynamics of Mediterranean wetland species;
④ Analyzing the impact of pollutants on the fauna of Mediterranean wetlands.

After the readjustment that took place during the course of the five-year plan, these axes of research are addressed through four main projects, combined with support for external research teams.

Liver Fluke (Research Axes 1 and 2)

In the framework of a Master II internship, Émeline Sabourin investigated the liver flukes (*Fasciola hepatica*) of bulls slaughtered in 2015. She also started to search for the freshwater snails that act as intermediate hosts and to map their distribution at the Tour du Valat. Genetic analyses were carried out on the liver flukes and snails in order to study the structure of their populations. This research will be further developed by Émeline Sabourin during her doctoral thesis, co-directed by Sylvie Hurtrez-Boussès (French National Research Centre (CNRS) / Mixed Research Unit, Montpellier) and by Marion Vittecoq (thesis started in October 2015).

Antibiotic Resistance (Research axes 1 and 2)

In 2015, the activities of this project were divided into three parts:

- A summary of the literature concerning antibiotic resistances in wildlife (to be published in the Journal of Applied Ecology).
- In 2012, cloacal swab samples had been collected in two gull colonies. In 2015, analyses of the bacteria isolated from these samples were finalised with CNRS-MIVEGEC (Infectious Diseases and Vectors: Ecology, Genetics, Evolution and Control), Montpellier, and Montpellier University Hospital. This work is presented in three scientific papers (two published and one submitted).
- A first season of fieldwork was launched in order to study antibiotic-resistant bacteria among rodents in various Camargue habitats. The samples collected will be analysed in 2016..

Marion Vittecoq

Modelling of Pathogens (Research axes 1 and 2)

In 2015, the required data were collected for studying the potential links between the distribution of cases of West Nile Fever and the evolution of Mediterranean wetlands and their associated waterbird communities over the last years. The human and equine cases were mapped. In addition, thanks to Marianne Bernard's internship with the Mediterranean Wetlands Observatory, the waterbirds database was coupled with the database of changes in ground cover, which enabled us to study the two datasets for 160 Mediterranean wetlands. The modelling stage of this project is underway and should be finalised in 2016.

Flamingo Major Histocompatibility Complex (MHC) (Research Axes 3 and 4)

A paper on the variation in class I and II MHC genes between six flamingo species was published in the Journal of Evolutionary Biology. In the Camargue, sampling of the blood and faeces of 152 chicks and 27 adults was carried out in order to compare the microbiome of adults and chicks. Laboratory work started to analyse faeces and blood samples from 2013 and 2014. Work was finalised on the feather and sediment samples taken for the analysis of heavy metals.

Introduced species and interactions with local species

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Invasive species can threaten local species, modify their habitats, and even affect the functioning of the ecosystem. This project only covers interactions between introduced predatory fish and threatened local species. Studies concerning the negative impacts of introduced species on local species are often unconvincing, for the following reasons: (a) there are no data available prior to introduction, (b) the introduction date is unknown, (c) the studies are carried out on a short-term basis, and (d) it is difficult for the studies to differentiate between the effects due to introduced species and those caused by environmental and anthropogenic modifications. Taking into account these reservations, this project offers two opportunities to study the possible impact of introduced predatory fish on threatened local species.

THE PROJECTS:

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

AT A GLANCE

Moulding of Flamingo nests

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There are two axes of research:

Studying the interactions between Wels Catfish (introduced) and the other fish species present;

Studying the interactions between Rainbow Trout (introduced) and Marble Trout (endemic to the Mediterranean).

Catfish and other fish populations

For the seventh consecutive year, we continued the eradication of Catfish on more than 30% of the length of the Fumemorte Canal, together with the monitoring of the canal's fish communities. The restoration observed in terms of biomass and diversity of species has not yet reached the level of abundance observed before the Catfish was introduced.

Rainbow Trout and Marble Trout

Marble Trout: several publications were accepted, including the paper concerning the use of isotope data (Camille Musseau's thesis). The fieldwork carried out in June and September was exploited.

Prediction of Distribution and Population Numbers

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The objective is to predict, at timescales of 5, 10, 25 or 50 years, the evolution as a result of human activities (landscape change, climate change, over-exploitation, etc.) of species' distribution and population numbers, including parasite vectors or the parasites themselves, and their associated diseases.

There are four principal activities:

- Predicting the distribution of species in function of landscape variables;
- Predicting the distribution of species in function of climatic variables (both local and global);
- Predicting the emergence of epizooties;
- Predicting species numbers in function of their exploitation.

Vertebrates at the Tour du Valat

An excellent breeding season for Amphibians was confirmed by the monitoring of the occupation of 20 ponds on the Estate. All the other long-term monitoring operations were continued.

Wintering Ducks in the Camargue

Monthly aerial monitoring of wintering ducks was continued. A new strategy for exploiting the long-term datasets was discussed with our partners in the Camargue. The results of the monitoring operations and current research projects on waterbirds were presented at the plenary meeting between protected area managers and hunters. Three papers on the birds' use of ricefields were achieved in the framework of Claire Pernollet's thesis.

Mediterranean Waterbird Communities (IWC-MED Mediterranean waterbird network)

The five North African member countries (Algeria, Egypt, Libya, Morocco and Tunisia) strengthened their waterbird counting capacities, thus ensuring better monitoring coverage. After considerable work to improve the quality of the data, the database for North Africa is now sufficiently uniform and consistent to be studied and analysed. Discussions concerning the types of analysis to be carried out in the future were held with the African partners: analyses of trends regarding the abundance of species and the level of waterbird communities will be covered in a forthcoming paper.

AEWA's African Initiative Technical Support Unit (TSU)

In order to strengthen technical capacities in Africa, the TSU supported the carrying out of technical actions in Africa: a workshop on the implementation of management plans at key sites for migrating birds, a training course on the management of wintering waterbird census data, the creation of a robust partnership for the census of Lake Nasser (Egypt), and the setting up of a network between the three international African wildlife training institutions and the incorporation into their programmes of training kits on waterbirds. In addition, the e-learning CD on the identification and counting of waterbirds was updated in four languages, thus covering all the regions of Africa.

Modelling the dynamics of pathogen agents

We modelled the arrival of a highly pathogenic avian influenza (HPAI) virus at different periods and sites, together with the circulation of low pathogenic avian influenza (LPAI) viruses throughout the study period, in function of different persistence capacities, based on laboratory data.

Team:

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PhD students:

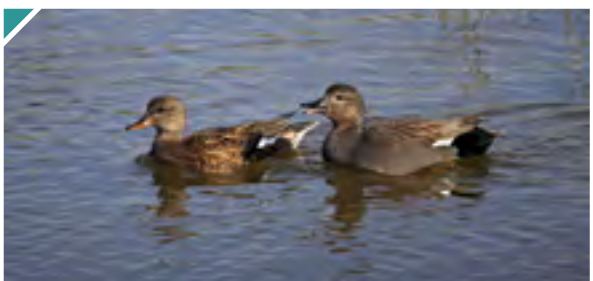
Clarisse Boulenger, Claire Pernollet, Émeline Sabourin Charlotte Francesiaz, Charlotte Perrot, Camille Musseau.

Interns:

Hugo Carré, Fanny Santucci, Eva Tankovic, Camille Moriconi.

European Voluntary Service:

Tatiana Fuentes.



“Symposium depressiusculum,

classified « vulnerable » in the Mediterranean and « in danger » in France by the IUCN, has now deserted the Camargue where it was still abundant at the end of the last century.

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Ecosystem Modelling, Restoration & Management

The Department's overall objective is to conserve biodiversity, functions, and ecosystems services in the context of global changes, based on multidisciplinary research.

To achieve this objective, the Department uses four approaches each organised in a specific project:

1. **The modelling of ecosystem dynamics for a better understanding of the interactions between the physical, biological, and social components of the functioning of the hydrosystem and the main ecosystems in the Camargue;**
2. **The restoration of degraded ecosystems, to improve their biodiversity and functionality, making use of scientific expertise to direct restoration activities and management decisions;**
3. **The adaptive and inter-sectoral management of ecosystems, integrating territorial dynamics and favouring a long-term site-based approach;**
4. **The sharing of knowledge and good practices, and awareness-raising for site managers, decision-makers, local authority and State employees, scientists, and the general public through the production of appropriate tools, particularly the actions of the Pôle-relais lagunes méditerranéennes (PRLM, Mediterranean Lagoons Transfer Unit).**

Data capture for hydrodynamic modelling
Camargue National Reserve

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A fifth project (see Focus p.30), which capitalies on these four approaches, groups together all the activities conducted by the Tour du Valat on the 6527 ha of lagoons and marshes of the former Camargue Salt Works. The Tour du Valat co-manages this site, recently purchased by the Conservatoire du littoral (French Coastal Protection Agency, CdL), with the Camargue Regional Natural Park (PNRC) and the National Society for the Protection of Nature (SNPN).

We were particularly active in 2015, with the finalisation of the 2016-2020 Program, including the development of the next management plan for the Estate (2016-2020) using the Open Standards methodology, the renewal of several annual projects (scientific monitoring of mosquito control in the Camargue, integrated management of the Gediz Delta in Turkey), and the continuation of several

partnerships in the framework of multi-annual projects up for renewal in 2015 or 2016. Some of the latter include the Biodiversa Farmland project (2011-2016) on the interactions between biodiversity and the spatial configuration of agricultural plots in the Camargue, the LIFE MCSALT project (2011-2016) on the restoration of the lagoons and marshes at the former Camargue Salt Works site, the "Ludwigia" project (2011-2015) conducted on the Vigueirat canal, which aims to quantify the impact of this invasive alien plant on vegetation and aquatic wildlife, the project to create and restore temporary Mediterranean ponds, which is funded by the National Biodiversity Strategy (2012-2016), and the DG-Environment project on the Red List of European habitats (2014-2016), which uses the IUCN (International Union for the Protection of Nature) methodology to assess the risk of ecosystem collapse in Europe according to EUNIS (European Nature Information System) nomenclature.

In addition, our ongoing efforts to obtain financial resources were rewarded with funding received for three major projects that began in 2015:

- A project funded by the Fondation de France programme "Quels littoraux pour demain?" (What coasts for tomorrow?) (2015-2018), which uses modelling and a geographic information system within a participative approach to improve the governance of wetlands in the Camargue;
- A Horizon 2020 project that combines modelling, remote sensing and ecosystem services on some twenty protected sites in Europe, including the Camargue Biosphere Reserve (ECO-Potential project, 2015-2019);
- A research and development project funded by the FUI ("Single Inter-Ministerial Fund") on the potential for the large-scale harvesting of alien plant waste, and its utilisation and ecological repurposing after microwave sterilization.

Not to mention all our transfer activities (promoting World Wetlands Day, participating in COP21…) thanks to better inter-departmental collaboration!

Brigitte Poulin

Head of Department

FOCUS

Ecological Restoration of the Camargue Salt Works Lagoons and Marshes

Between 2008 and 2012, the Salins Group sold 6500 hectares of land to the Conservatoire du Littoral (French national Coastal Protection Agency). The majority of the site (5,400 hectares) consists of lagoons developed as from the 1960s for the preconcentration of salt. This vast wetland groups together some ten salt works, strung along the French Mediterranean coast, which are no longer exploited (only five industrial salt works remain active). The biological wealth of most of these wetland sites has evolved or even increased, especially due to ecological restoration work. That is the goal fixed for the Camargue by the Conservatoire du Littoral and the site management organisations. The strategy for renaturing the site is based round re-establishing a more natural and varied hydrological regime.

Since acquisition of the site, pumping has been stopped, with the lagoons now fed by gravity flow, and the number of breaches in the dykes has multiplied, particularly at the seafront. These changes have had major effects on the site and its ecosystems. In order to assist the renaturing process, two projects have been set up, one European (LIFE+ MC-SALT), the other supported by WWF France. The LIFE+ project is headed at local level by the Camargue Regional Natural Park and the Tour du Valat. Its aim is to improve the ecological status of the lagoons, restore the sansouire salt meadow habitats, and re-establish favourable breeding conditions for colonial waterbirds including the Greater Flamingo. The project carried out in partnership with WWF France, within the framework of the Coca-Cola "Replenish*" programme (2014-2017), is headed by the Tour du Valat, together with the Conservatoire du Littoral, the Camargue Regional Natural Park and the French National Society for the Protection of Nature. Complementary to the LIFE+ project, its main aim is to re-establish hydraulic continuities with the surrounding subwatersheds, in particular by feeding back into the former salt works the volumes of water pumped from the Rhône.

The water management works carried out improved the supply of freshwater to the Fangassier lagoon in spring 2015 and ensured the successful nesting of the Greater Flamingo.

› Restoration of the lagoons

One of the priority measures for improving the ecological status and functions of the lagoon habitats is the augmenting of hydrological and biological continuities between the various lagoons of the site, and reconnection with the Camargue National Natural Reserve. The first step was for the partner management organisations to draw up a global plan defining new water-flow pathways. In order to validate the plan and make it operational, the Tour du Valat carried out two-dimensional hydrodynamic modelling, taking into account the effects of wind on the shifting of water bodies. This preliminary work enabled the definition and scaling of several hydraulic infrastructure projects, which were carried out in 2015 under the supervision of the Camargue Regional Natural Park.

› Restoration of coastal habitats

The types of natural vegetation covering considerable surface areas of the site include Mediterranean halophilous scrubs (sansouires) and Salicornia and other annuals colonizing mud and sand, which are Habitats of Community Interest. The restoration potential of these habitats was assessed, based on a broad range of information sources: the topography, the historical evolution of ecosystems established from old maps and aerial photographs, the pedological characteristics (soil analysis), and the depths and durations of flooding and the salinities observed before restoration. In the long term, more than 700 hectares of perennial sansouires and 330 hectares of annual Salicornia formations could be restored.

To achieve this restoration objective, works were carried out on the basis of the results of the hydrological modelling in order to obtain the desired water level variations.

Islet welcoming shorebirds

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© Tour du Valat

Nest moulding work on the new Flamingo islet

› Improved breeding conditions for colonial waterbirds

Sediment transport at the site is not immune to the disturbances caused by the way the Rhône and its delta have been developed. One negative consequence for colonial birds is that there are insufficient breeding sites available, due to there no longer being a natural process forming new islets to compensate for the erosion of existing islets. In order to overcome this problem, a preliminary study was conducted with a view to creating artificial islets. The potential locations were assessed on the basis of a multi-criteria analysis that included protection from terrestrial predators and human disturbance, exposure to erosion, the feasibility of carrying out the work, and compatibility with other conservation issues. The results of this preliminary study enabled two islet development projects to be selected and defined: the first, created in 2014, targets small colonial Charadriiformes (smaller gulls, terns, Slender-billed Gull, Pied Avocet). The second, created in autumn 2015, is intended as a breeding site for Greater Flamingo, replacing the former islet, which is now heavily eroded.

› Encouraging initial results

In spring 2015, i.e. less than a year after it was created, the islet targeting small Charadriiformes harboured a colony made up of 380 nesting pairs belonging to seven different species, including the rare Slender-billed Gull and Gull-billed Tern. Such numbers had not been observed on the site for 12 years. The hydraulic work carried out enabled a deep enough water level to be maintained to protect the Greater Flamingo colony, whose population reached more than 13,000 nesting pairs.

In the former saltpans, the ground cover of halophilous scrubs and annual Salicornia formations increased from 34 hectares in 2011 to 280 hectares in 2015.

These results are promising for the time being; however the success of restoration measures cannot be evaluated on the basis of just the first few years. Medium and long-term assessments, especially of the vegetation, benthic fauna (organisms living close to or inside the sediment), fish and nesting birds will be required in order to draw sound conclusions about this work. Adjustments (adaptive management) aimed at optimising the water management and developments could be envisaged.

These projects are the fruit of a close collaboration between the Conservatoire du Littoral, the Camargue Regional Natural Park (coordinating authority for the management of the site and supervising the works carried out), the Tour du Valat and the French National Society for the Protection of Nature (co-management bodies), the Friends of the Vigueirat Marshes Association (expertise concerning the developments targeting colonial birds), and WWF-France. This could not have existed without considerable financial support: the European Commission, the Conservatoire du Littoral, the Rhône-Mediterranean-Corsica Water Agency, the MAVA Foundation, the Provence-Alpes-Côte d'Azur Region, the French Ministry for Ecology, Sustainable Development and Energy (MEDDE), the Total Foundation, and the Coca Cola Foundation.

Bibliography:

Cavaillès G. 2014. Plan d'action opérationnel de restauration des habitats côtiers des sites des Etangs et marais des salins de Camargue - secteur des anciens salins. Rapport LIFE+10NATIT000256 - LIFE+ MC-SALT, Tour du Valat, SupAgro Montpellier, 161 p. + annexes.

Parc naturel régional de Camargue, Tour du Valat, Société Nationale de Protection de la Nature 2013. Notice de gestion 2013-2016 des Etangs et marais des salins de Camargue. 124 p. + annexes.

Parc naturel régional de Camargue, Tour du Valat, Société Nationale de Protection de la Nature 2016. Rapport d'activité 2015 des Etangs et marais des salins de Camargue.

Tour du Valat 2014. Note technique du projet d'aménagement d'un îlot de reproduction des flamants roses sur les Etangs et marais des salins de Camargue. Projet européen LIFE10NAT/IT/256MC-SALT Gestion Environnementale et Conservation des Marais Salants et des lagunes Côtières en Méditerranée. Rapport Tour du Valat, 11 p.

Tour du Valat 2014. Note technique du projet d'aménagement d'un îlot de reproduction des laro-limicoles coloniaux sur les Etangs et marais des salins de Camargue. Projet européen LIFE10NAT/IT/256MC-SALT Gestion Environnementale et Conservation des Marais Salants et des lagunes Côtières en Méditerranée. Rapport Tour du Valat, 7 p.

Project leaders:

Marc Thibault and Brigitte Poulin

Team:

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** "Replenish": Programme in which Coca Cola commits to replenishing 100 % of the water it uses for production worldwide.*

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Construction of the new "Flamingo islet"

THE PROJECTS :

"Modelling, Restoration and Management of Ecosystems"

AT A GLANCE

Modelling the dynamics of ecosystems

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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, 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 this type of approach.

Hydraulic monitoring

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Hydrology, management and climate

Climate scenarios in the Mediterranean area predict an increase in temperature and a decrease in rainfall during the summer period, with less frequent but more intense rainfall events in autumn. Sea level rise and climate changes make the joint management of water level, salinity levels and biological exchanges in the Vaccarès system more difficult. A simulation tool based on the hydrological modelling of the Rhône delta can now be used to assist decision-making by the Executive Water Commission. This tool can also be used to define a new water management regime for the delta (new rules for managing, creating or restoring hydraulic structures etc...). Hydrodynamic modelling of the lagoons also enables the specific influence of each stressor affecting the runoff (wind, operation of the infrastructure, drainage) to be determined for each lagoon, together with the associated retention time. This work is now being used to develop predictive models of the dynamics of Zostera seagrass beds (in collaboration with Paul Sabatier University, Toulouse) and the influenza A virus (together with the Species Department).

Regarding low-salt-level lagoons (oligo- and mesohaline), work was continued on adapting and testing indicators and assessment grids for the status of these ecosystems, together with the French Research Institute for Exploitation of the Sea (IFREMER), the National Office for Water and Aquatic Environments (ONEMA) and the Rhône-Mediterranean-Corsica Water Agency. We also carried out the water-quality monitoring of the nine French lagoons concerned.

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Mosquito traps (BAM) installed in Le Sambuc

Mosquito control & scientific monitoring in the Camargue

Since 2012, the Tour du Valat has been coordinating the ecological and sociological monitoring of Bti mosquito control in the Salin-de-Giraud, Port Saint-Louis and Brasinvert areas of the Camargue. Given the proven impacts on non-target wildlife (Chironomids, Dragonflies, reed-bed invertebrates, House Martin, and several species of waterbirds and passerines) together with the proliferation of Bti in sediments, monitoring has increasingly been oriented toward effects and efficiency of alternative methods to traditional insecticide spraying for mosquito control. The key activity in 2015 was the setting up of 10 mosquito traps, designed by the Techno-BAM company (http://techno-bam.net/en/), in the hamlet of Le Sambuc, with logistical support from the municipality of Arles. Backed by local elected representatives and well covered by the media, this full-scale experiment in which mosquito traps are incorporated into street furniture reduced the nuisance level by 88%.

Modelling to benefit a participative approach (Foundation of France project 2015-2017)

Based on the setting up of a participative mapping process and the modelling of hydrology and the spatial distribution of the Greater Flamingo in the Camargue, the objective of this project, carried out with the support of the Camargue Regional Natural Park (PNRC), is to improve the governance of the current and future management of wetlands by establishing participative dialogue with the local population. In addition to considering the probable impact of global and local changes on the distribution of flamingos in the Camargue, the project aims to include landscape values in management decisions. It is supported by a scientific partnership with the Montpellier Center for Evolutive and Functional Ecology (CNRS-CEFE) and the Curtin University in Australia.

Quantification and preservation of ecosystem services (Horizon 2020, ECO-Potential Project 2015-2019)

Bringing together a consortium of 40 research institutes, the aim of this European project is to monitor and model the status and trends of ecosystems and the services they provide using 20 pilot sites, including the Camargue Biosphere Reserve. The methodology is based on the utilisation/acquisition of field and airborne data exploited using innovative approaches to geostatistics and macrosystems ecology (www.ecopotential-project.eu)

Restoration of ecosystems

François Mesléard / mesleard@tourduvalat.org,
Olivier Boutron, Philippe Chauvelon, Damien Cohez, Philippe Lambret, Loïc Willm, Nicole Yavercovski.
PhD student: Solène Masson.

The needs for the restoration of Mediterranean wetlands and the development of appropriate restoration techniques are important. Local changes in land-use allocation offer opportunities for ecological rehabilitation projects.

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 organization of ecosystems to predict and shape how they will evolve. Developed through partnerships, it consists of three sub-projects:

Rehabilitation of the Cassaïre Estate

The Cassaïre Estate (70 ha belonging to the French Coastal Protection Agency, Conservatoire du Littoral) consists mainly of formerly cultivated areas. We are using it to test our capacity to rehabilitate a wetland for several uses. Based on development (ecological engineering) and management scenarios, which vary according to the target ecosystems, techniques for the reintroduction and/or building up of communities have been set up, with long-term management and monitoring of the evolution of habitats. In 2015, we carried out preliminary studies for the second and third pond digging phases. Adjustments to the water and grazing management system proved necessary in order to favour the sustainability of restored plant communities.

The creation of temporary ponds

The heritage value and continual regression of temporary ponds require a strategy of restoration and connectivity creation to enable exchanges between populations. To this effect, a project initiated by les Amis des Marais du Vigueirat (the Friends of the Vigueirat Marshes) and involving numerous other partners (CPIE – Permanent Centre for Environmental Initiative, DESMID, IMBE-Mediterranean Institute for Ecology and Biodiversity, PNRC – Camargue Natural Regional Park) was implemented to create ponds on former agricultural land that had previously been levelled. We are particularly involved in hydrological diagnosis and the colonization mechanisms of plant communities.

Experimental control of undesirable/unpalatable species

In 2015 we were able to publish scientific papers disseminating the results of various experiments concerning the Elmleaf Blackberry (*Rubus ulmifolius*) and two rush species (Juncus acutus and Juncus maritimus). A project aimed at destroying the seed bank of invasive species using a prototype microwave system also got underway in 2015. Its objective is to assess the ability of microwaves to destroy the germinative potential of seeds, in function of power output, exposure time, and ex- and in-situ humidity.

Implementation of the horse grazing area on the Cassaïre marshes

Ladder Snake

Management of sites

Lisa Ernoul / ernoul@tourduvalat.org,
Arnaud Béchet, Nicolas Beck, Coralie Beltrame, Olivier Boutron, Damien Cohez, Patrick Grillas, François Mesléard, Anthony Olivier, Lisa Paix, Olivier Pineau, Brigitte Poulin, Alain Sandoz, Marc Thibault, Nicole Yavercovski, Loïc Willm, Yves Kayser.

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.

On-site mission in the Gediz Delta

International pilot site: the Gediz Delta, Turkey

We continued our involvement with local stakeholders concerned by research and integrated management in the Gediz Delta through nine field missions to Izmir involving four experts from the Tour du Valat (45 days/person) In addition, a convention with the Ege University was signed in 2015, enabling the co-direction of a Master student and the visit of a Turkish trainee to the Tour du Valat. The main actions concerned the evolution of land cover, monitoring the Spur-thighed Tortoise, Testudo graeca, continuing the surveys of amphibians and reptiles, and raising awareness among the local population.

Tour du Valat Estate

The principal activity in 2015 was drawing up the sixth management plan for the Estate (2016-2020) using the Open Standards (OS) for the Practice of Conservation methodology. Created in 2004 by an international consortium of conservation stakeholders, the OS method had not yet been used in France. It differs from traditional methods (Natural Areas Documentation and Training Centre, ATEN / French National Nature Reserves, RNF) in that its starting point is the identification of the anthropic pressures that threaten the natural habit and raise conservation issues. The actions to be set up and resources to be mobilised to eliminate or at least reduce these threats are then identified. On the basis of the elements that make up the natural heritage, combined with status indicators, conservation objectives to be achieved are defined for the period of the management plan, using an adaptive approach (rather than fixing long-term objectives that are too vague to be concretely assessed). Five thematic meetings were organised during the course of 2015 to develop conceptual models and share ideas concerning the threats and factors affecting the five conservation targets: (1) diversity of temporary ponds and marshlands, grass meadows, (2) rush beds and Salicornia salt meadows (sansouires); (3) waterbird communities; (4) natural heritage of riverine origin, and (5) the la Commanderie dunes. By bringing together managers, scientists and local decision-makers during the various phases of the concertation process, this participative approach was able quickly to identify the knowledge gaps that needed to be filled. In addition to these elements of the natural heritage that present the greatest conservation issues, there are also the Estate's other functions, i.e. livestock raising and organic farming, sustainable hunting, scientific research, knowledge/skills transfer, and receiving visitors.

Bird Paradise Reserve (Turkey)

After validation of its second participative management plan, the Verdier Marshes Association continued the initiatives set up more than 10 years ago, thanks to the involvement and increasing responsibility of the inhabitants of Le Sambuc village. The educational activities, carried out in partnership with the local school and the Rhône-Pays d'Arles Permanent Centre for Environmental Initiatives (CPIE), were continued in 2015.

Management actions also concerned the Petit Saint-Jean Estate, a property situated in the Gard department that the Tour du Valat inherited in 2012. The site covers a total area of 101 hectares, including a remarkable pine wood (50 ha), marshes (24 ha), and agricultural land (26 ha with 5 ha of vineyard). A pilot agroecology project, building upon innovative agricultural practices acting synergistically with natural heritage conservation management, is currently being implemented through the development of a partnership backed by the Foundation of France.

Finally, the Tour du Valat carried out an expert assessment of the Sainte Cécile site (in the municipality of Arles), which was recently assigned to the Coastal Protection Agency (Conservatoire du littoral). The study identified the main fauna and flora issues found on the 15-hectare property and provided grazing management recommendations aimed at favouring the conservation of xeric grasslands (pelouses) and recolonization by Collared Pratincole.

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Former saltworks
Enfores de la Vignolle

Adaptive Management of former saltworks

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, Elvin Miller, Anthony Olivier, Marc Thibault, Loïc Willm, Nicole Yavercovski. Doctorante : Julie Campagna.

This project capitalises on the expertise of the Species and Ecosystem Departments to guide the rehabilitation of an exceptional site by encouraging a transdisciplinary approach that includes different spatial and temporal scales. Focus section p.30 presents the main activities linked to the ecological restoration of the site

The monitoring of waterbirds (monthly counts) and nesting birds (100 listening points) was continued in 2015. The monitoring of 50 coastal ponds was initiated in partnership with the Camargue Regional Natural Park (PNRC) to assess their vulnerability to global changes, using the Natterjack Toad as indicator species. Vegetation monitoring was mainly based on the development of remote sensing tools using high-resolution satellite images combined with field surveys from previous years in order to measure its evolution. Since September 2015, this work has been continued in the framework of Julie Campana's doctoral thesis at the University of Angers.

The Tour du Valat also participated in the concertation meetings involving the inhabitants of Salin-de-Giraud that were organised by the PNRC in the context of the Foundation of France project "Gérons ensemble notre territoire" (Let's manage our local area together). The project led to the creation of a village discovery trail and two proposals for paths on the site, validated by the Coastal Protection Agency Conservatoire du Littoral and the co-management organisations.

An action-research initiative on the site was launched in 2015 subsequent to a first day of discussion held at the Tour du Valat in May, bringing together the owner of the site, the co-management organisations and researchers in various disciplines (hydrology, ecology, geomorphology, sociology, geography, etc.). After this event, a CNRS 2015 "Défi Littoral" (Coastal Challenge) grant was obtained in order to formalise a conceptual framework to optimise the orientation of the research activities carried out on this rapidly evolving site. The methodology, which resulted in a two-day workshop at the end of the year, is based on the setting up of a strategy unit made of researchers and site managers who use prospective analysis to identify the priority research areas to be developed, which are subsequently reassessed and if necessary readjusted with accordance with an adaptive management approach.

Mediterranean Lagoons Transfer Unit

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Nathalie Barré, Nathalie Chokier.

The Mediterranean Lagoons Transfer Unit is part of the Wetlands Transfer Units network, which was set up in 2001 in the framework of the National Wetlands Plan and has been coordinated by the National Office for Water and Aquatic Environments (ONEMA) since 2008. Since 2014, the Transfer Units have been granted a national label, inscribed in a charter, which testifies to their promotion of sustainable management, and their knowledge sharing and dissemination activities.

In compliance with this charter, in 2015 the partnership involved in the Mediterranean Lagoons Transfer Unit was formalised as a consortium, coordinated by the Tour du Valat in the Provence-Alpes-Côte d'Azur Region in partnership with the Languedoc-Roussillon Conservatory for Natural Areas (CEN LR) and the Corsican Environment Office (OEC).

This innovative initiative, aimed at assisting lagoon habitat stakeholders, encourages better management practices and more positive recognition of these habitats, acting in three areas:

Knowledge sharing and good practice

The website was considerably developed and now features 1250 pages of content, with 220,000 visits since it went online in 2012. Nine issues of the Lagoons Newsletter have been disseminated to 2,750 stakeholders, including two special issues on the topics "Coastal Wetlands and climate change", tying in with the holding of the COP 21 on Climate Change in Paris in 2015. Finally, there are more than 6,500 bibliographical entries available, some of which are also accessible through the "Technical Documents on Water" national portal.

Facilitating an exchange network

In 2015, a day of discussion concerning the management of wetlands was co-organised with the Rhône-Mediterranean-Corsica Water Agency, the Regional Direction for Environment, the Planning and Housing (DREAL PACA), the Regional Network of Aquatic Ecosystem Managers (RRGMA), the Regional Network of Natural Area Managers (RREN PACA), and the Coastal Protection Agency Conservatoire du littoral. It brought together about sixty participants, for the most part managers of Mediterranean wetlands. We continued to facilitate the Interregional Mediterranean Lagoons Forum (FILMED), with the simplified physicochemical monitoring of some twenty lagoons in the Languedoc-Roussillon and Provence-Alpes-Côte d'Azur Regions. Finally, an event organised about the use of remote sensing for wetlands, targeting site managers and researchers, brought together about 50 participants.

© N. Barre

Meeting of the Research and Management platform on the topic : « Remote-sensing supporting wetlands »

Key awareness-raising events

The coordination of World Wetlands Day in the Mediterranean was continued, with a total of 5,800 participants counted in 2015, including 80 at the Tour du Valat – elected representatives, state services and public institutions, associations, lagoon managers, experts, young people …- came from all over France in response to our invitation for this national launch day on 2nd February. In addition, the European Heritage Days once again attracted the crowds to lagoon sites, with a record participation of 16,000 visitors.

In 2015 the ERDF project for promoting lagoon landscapes was finalised and two films made by Océanides were released: a six-minute educational film called "Lag'Une… Découverte! "for younger audiences and a 20-minute documentary "Etang de Berre, en quête d'une lagune cachée" (Berre, in search of a hidden lagoon), in combination with a sketchbook intended for elected representatives, site management and land-use planning stakeholders, and the general public. These productions were very broadly disseminated and led to an event bringing together local representatives around the theme "Lagoon landscapes, an asset for the local area".

In the year of the United Nations Conference on Climate Change in Paris, the Mediterranean Lagoons Transfer Unit Prize for 2015 highlighted an exemplary and innovative initiative on the theme of adapting to climate change. The winning choice was for the management of the Camargue Salt Works Lagoons and Marshes, coordinated by the Camargue Natural Regional Park (PNRC). The prize was handed over to its president, David Grzyb, by the Director General of the Rhône-Mediterranean-Corsica Water Agency on the occasion of the "Refaisons le climat" (Let's re-do the climate) Festival in Montpellier. The reward was an invitation to present the project at COP21 through two talks that were opened to the general public.

Presentation of the Lagoon Transfer Unit Award to the co-managers of the Ponds and Saltworks of the Camargue site

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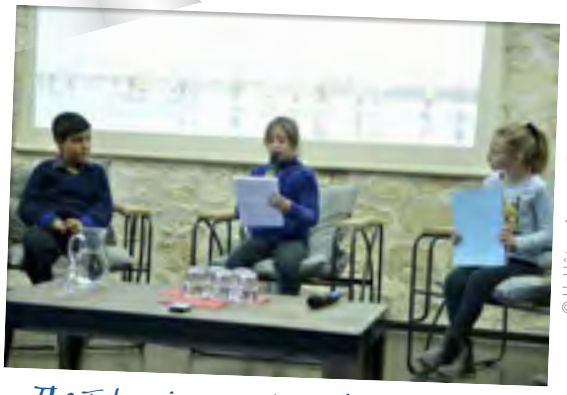
Woodcock bee-orchid,

present on the Petit Saint-Jean Estate is a beautiful orchid of Mediterranean grasslands".

2015

Rétrospective en images



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The Future is assured, pupils of Le Sambuc questionning Madam Ecology Minister

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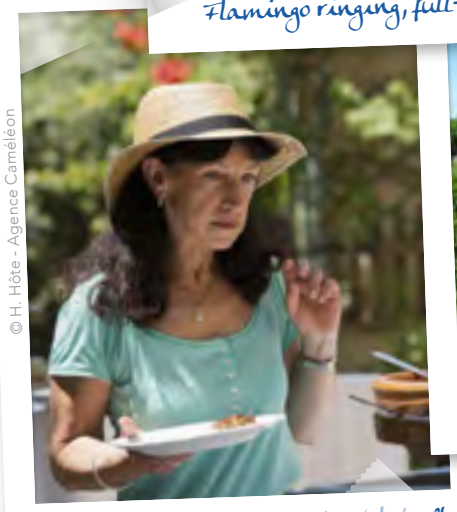
Flamingo ringing, full-colour family picture

© Tour du Valat

A captivated audience, despite the cold, during the Open House Day



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Josiane Xuereb left the Tour du Valat after forty years of a rich collaboration

© Tour du Valat

Harvesting at the Petit Saint-Jean Estate: at the Tour du Valat we are indeed multi-disciplinary!

© M. Renaudin

In June 2015, the Tour du Valat received the Ramsar Merit Award

Prison work ?

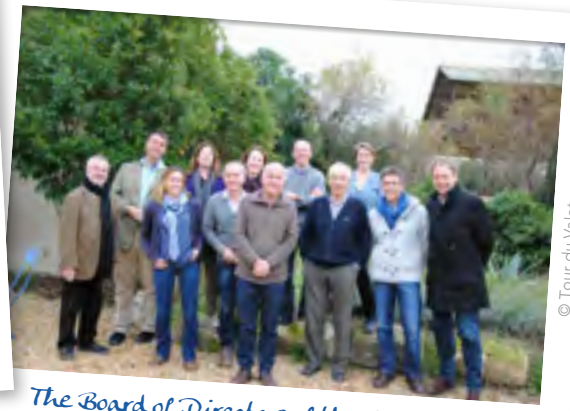
© Jean E. Roché

Rather nest making for Flamingoes!

Who said scientists were high in the sky ?

© Tour du Valat

The Tour du Valat Bulls on the track



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The Board of Directors of the Association Friends of Tour du Valat

© Jean E. Roché

Iris ringing, be careful, we're watching !

© Tour du Valat

Well-deserved retirement for Vincent Boy after 38 years of good and loyal service

Information and awareness-raising actions on the occasion of the Fishing Day celebration in Izmir, Gediz Delta

Envies rhônements, some unexpected meetings !

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Signature of four Ramsar Site management charters in the mediterranean

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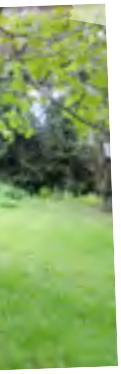
ARJ (Alan Roy Johnson) ready for his next flight



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Tour du Valat was at the COP21

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Jean-Paul, we are keeping a memory of your dynamism and your joie de vivre

Monitoring, evaluation and 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.

To achieve these objectives, a participative, interdisciplinary and targeted approach was adopted, working together with the partners in the countries concerned

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 last year of the 2011-2015 five-year programme, we essentially worked on organising the next five-year programme (2016-2020), strengthening synergies with the MedWet Secretariat, consolidating the results of the MWO and its partnerships, and launching two H2020 European projects in which the department is a partner.

© Hellio & Van ingen

Fishing activities in the Gediz Delta, Turkey

The partnership with the MedWet Secretariat was developed, with a clearer definition of roles between the two organisations. Several joint projects and transfer or advocacy activities were carried out, in particular on the occasion of the 12th meeting of the contracting parties (COP) to the Ramsar Convention at Punta del Este (Uruguay), and in the framework of the Mediterranean Agora. The MWO was very active at this event, with a number of presentations of summarised results and thematic workshops. Together with the MedWet Secretariat, the Observatory also attended the United Nations Conference on Climate Change - COP21- in Paris.

Scientific and technical partnerships were reinforced both within the Tour du Valat and outside. In collaboration with the French National Hunting and Wildlife Agency (ONCFS), Wetlands International and the Tour du Valat's "Species" department, we continued to consolidate the waterbird databases. In particular, the agreement with Wetlands International was renewed and the partnerships with North African countries continued (in the framework of the AEWA agreement on the conservation of African-Eurasian migratory waterbirds).

The work on biodiversity indicators was aimed at building up and enriching the database for calculating and improving the Living Planet Index (LPI). Work was also initiated on cross-matching the bird data with the land cover databases recently produced for more than 200 sites in the Mediterranean Basin.

A meeting was held at the Tour du Valat attended by the partners contributing to the "water indicators" in order to develop an action plan and rank priorities in function of resources. Several approaches, based respectively on the Global Footprint Network and the use of remote sensing, were drawn up to be discussed at the meeting of the Mediterranean Wetlands Committee (MedWet/Com) in February 2016.

The study programme started in 2012 concerning the cultural services provided by wetlands was continued, compiling the results obtained at nine sites and seeking to develop an indicator. Monitoring method files were created to facilitate the updating of this indicator.

The MWO's strategic priorities for 2016-2020 were revised. The strengthening of the MedWet Secretariat enables us to concentrate more on technical and scientific production to be included in the international forums that have the most influence on decision-makers, such as those of the IPCC or the Convention on Biological Diversity. In this perspective, the scientific production of the department was augmented, with three papers published in 2015. Several other papers are being prepared.

Two new H2020 European projects

1. The SWOS project aims to develop wetland monitoring capacities by means of remote sensing in order to facilitate the implementation of environmental policies. The MWO contributes to the project through participation in Mediterranean case studies and skills transfer.
2. The goal of the Ecopotential project is to use remote sensing on 22 pilot sites to assess the benefits and services provided by various ecosystems. The Observatory, and the Tour du Valat in general, are responsible for communication activities and transfer to decision-makers, and also for stakeholder capacity building. The Tour du Valat is particularly involved in field work for the "Camargue" site.

Towards a strengthened transfer component in the new strategy of the department

The transfer of knowledge about the importance of wetlands, and their status and trends, is a major issue for the department and an important aspect of the team's work. At the national level (France), the department produced overview documents on the evolution of land cover on French Ramsar sites.

The department's support for the capacity building of associations in North Africa was materialised in 2015, with training sessions and workshops on wetland monitoring indicators. The aim of these actions, which will be continued until 2017, is to improve the professionalism and governance of a network of 18 associations, together with their communication and knowledge transfer capacities.

In 2016, the MWO is set to have its transfer and advocacy role augmented in the Tour du Valat's new strategic plan, in the perspective of the future Wetlands Platform

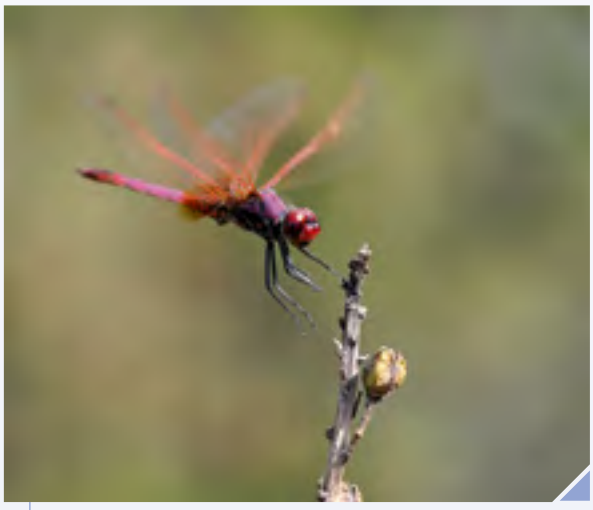
Laurent Chazée
Head of Department

FOCUS

Biodiversity and climate change in Mediterranean wetlands

› A review of the current situation by the Mediterranean Wetlands Observatory

The effects of climate change are a threat to human societies and a serious upheaval for ecosystems. By 2100, if nothing is done to curb greenhouse gas emissions, the mean temperature of the Earth's surface could increase by 4.8°C and the mean sea level rise by 1.6 cm/year. By increasing the variability of precipitation, climate change is set to make extreme climatic phenomena (such as storms, droughts and floods) more extreme and more frequent. In the Mediterranean region, the consequences for biodiversity could be irremediable, especially due to the high level of endemism among its flora and fauna.



Trithemis annulata which distribution area is taking up north

For COP 21, the MWO summarised the expected impacts of climate change on the biodiversity of Mediterranean wetlands in the form of maps, based on the species extinction risk assessments carried out by the International Union for the Conservation of Nature - IUCN (Red List of Threatened Species). These assessments show that the species directly threatened with extinction due to climate change are not homogenously distributed around the Mediterranean Basin. For instance, the majority of freshwater fish species – which count for many of the species threatened – are concentrated in the centre and south of the Iberian Peninsula, the Western Balkans, Southern Turkey, and the Near East (see map). The distinctive feature of these "hotspots" is the high number of species endemic to micro-regions – sometimes a single water course a few kilometres long – which makes them particularly sensitive to disturbances that may have an impact on their habitat.

Climate changes affect species in various ways. For wetland species, the most damaging change would be the drying out of rivers, lakes and springs due to decreased quantities and greater irregularity of precipitation. The absence of water, even for a short time, in ecosystems until now characterised by a regime of permanent flooding, will lead to the disappearance of strictly aquatic species such as fish. Freshwater is a highly coveted resource in the Mediterranean Region, and many water courses and other wetlands already have abnormally low water levels due to abstraction. Climate change will act as an exacerbating factor by further accentuating the water deficit, and the demand for water linked to human activities.

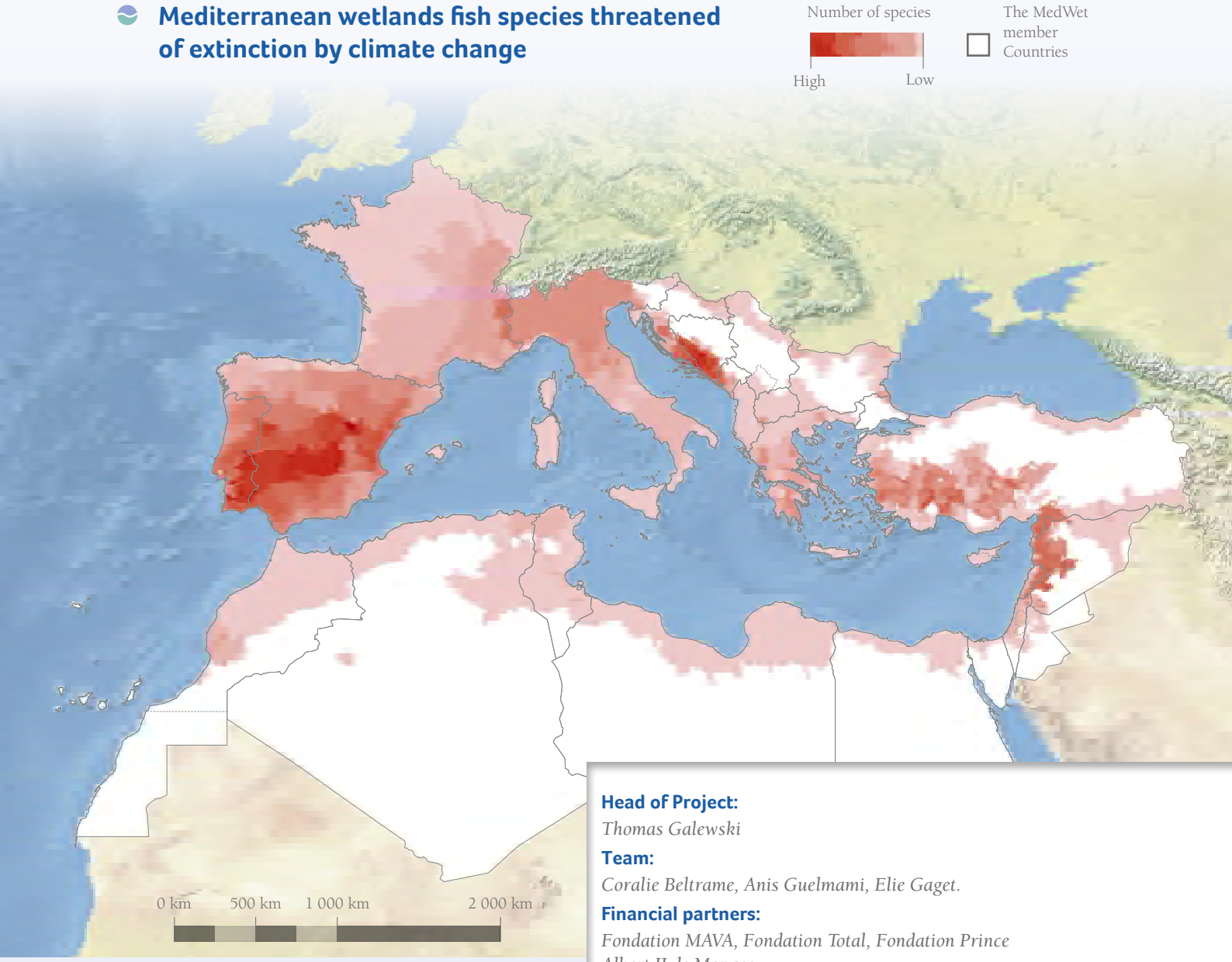
Another consequence of climate change is the displacement of the habitats required by species. Ecosystems tend to move northwards or to higher altitudes. Animal and plant populations therefore need to move in order to follow their habitats, and those that cannot do so risk extinction. Among the Dragonflies, Amphibians, Reptiles and Mammals linked to wetlands, it is particularly the species endemic to high-altitude wetlands, on certain islands (Crete, Sardinia) and mountain massifs (Pyrenees, Cantabrian Mountains), that are most threatened as their habitat is in danger of quite simply disappearing due to the rise in temperatures. The endemic species of North Africa and the Near East also face the risk of desertification.

Finally, a major impact on coastal wetlands is expected due to the risks of increased erosion and a rise in seawater level that could lead to the submersion of these ecosystems. Mediterranean lagoons and deltas harbour fewer species in imminent danger of extinction than rivers and lakes, but they are highly productive ecosystems that host very high populations of numerous species. This is particularly the case of the waterbirds that breed in these wetlands, stop over on migration, or winter in large numbers. The major waterbird sites can be identified through the bird count network coordinated by Wetlands International. 48 of the 55 wetlands in the Mediterranean Basin that on average host more than 50,000 waterbirds in January (counted for the period 1990-2010) are coastal sites, and therefore potentially threatened by the receding

coastline. There is thus a risk that climate change will lead to a considerable reduction in waterbird numbers before the end of the century.

Are we doomed to see the biodiversity of our wetlands eroded? No, if corrective measures are taken straight away. Above and beyond the salutary commitments undertaken by the Parties to the Convention on Climate Change at COP21 in Paris, it is crucial that decision-makers recognise the key role of wetlands in adapting to climate disruptions and more globally the services they provide to society. In particular, they play an essential role crucial in the water cycle. For example, wetlands can alleviate the impacts of coastal storms or limit the effects of drought by storing water during wet periods then releasing it later. Moreover, some wetlands have a direct climate regulation function by storing carbon. These services are not systematically delivered by all wetlands: they depend on the characteristics and ecological status of each site. For all these reasons, one of the environmental priorities of the next few decades should be the conservation of existing wetlands and the restoration of those damaged in the past.

Mediterranean wetlands fish species threatened of extinction by climate change



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Team:
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Financial partners:
Fondation MAVA, Fondation Total, Fondation Prince Albert II de Monaco

Technical partners:
UICN, Wetlands International, Plan Bleu.

THE PROJECTS :

"Monitoring, evaluation and wetlands policies"

AT A GLANCE

Wetland Observatories and Policies

Laurent Chazée / chazee@tourduvalat.org
Coralie Beltrame, Thomas Galewski, Christian Perennou

This project is divided into two areas: the Mediterranean Wetlands Observatory (MWO) and institutional support for wetland policies. The Observatory is a scientific monitoring tool that acts as a major management and communication instrument for monitoring the conservation status of these ecosystems.

Through the MWO, we continued our scientific monitoring operations in 2015, and also to summarise our results into the form of briefing notes targeted at decision-makers. The third note in this series, concerning the evolution in land cover of Mediterranean coastal wetlands from 1975 to 2005, has been published

Through the MWO, we continued our scientific monitoring operations in 2015, and also to summarise our results into the form of briefing notes targeted at decision-makers. The third note in this series, concerning the evolution in land cover of Mediterranean coastal wetlands from 1975 to 2005, has been published.

The Tour du Valat and MWO also attended COP 21 on Climate Change in the framework of the France-IUCN partnership "Nature and Development" in the Nature Solutions Pavilion. Two talks were given on this occasion: one on the services provided by wetlands, and the other on the most endangered species in a context of climate change.

The moving of the MedWet Secretariat to the Tour du Valat enables better development of synergies between the two organisations and provides the MWO, amongst others, with considerable support for disseminating all its products in a more substantial and targeted way. In 2015, for example, this was shown in the organisation of a series of events for Ramsar COP12 in Uruguay and COP21 on Climate Change.

In France, the Department maintained its support for the National Wetlands Observatory, in particular for developing indicators and producing a publication on trends with regard to wetlands on Ramsar sites in Metropolitan France from 1975 to 2005. The collaboration with the Provence-Alpes-Côte d'Azur Region was continued through our participation in the Regional Biodiversity Observatory (ORB PACA).

COP 21 in Paris

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At international level, the MWO took part in the 12th Meeting of the Conference of the Contracting Parties to the Ramsar Convention in Uruguay, and in preparing the Conference (meeting of the Africa Group in Tunisia). The MWO is also involved as an observer for the Ramsar Convention Scientific and Technical Review Panel (GEST/STRP).

Regarding the second aspect of the project, the Department participated in the review of the Algerian National Wetlands Strategy and in the latest version of that of Morocco. Institutional support was also provided at the request of organisations responsible for wetlands in Algeria.

In partnership with WWF-MedPO and Wetlands International, the Department began the capacity building programme for 18 North African associations to help them better monitor, manage and communicate about wetlands.

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 wetland monitoring indicators before they are validated and implemented on a routine basis within the framework of the Observatories and wetlands policies project. It also involves prospect oriented research in new areas, for which indicators have not yet been developed.

In 2015, five major actions were completed:

1 Initial studies of the links between biodiversity and pressures on wetlands

- **Advancement of our knowledge concerning the biodiversity status of Mediterranean wetlands**

The enrichment of the database about vertebrate populations and various improvements to the design of the Living Wetlands Index (derived from the Living Planet Index) confirmed the previously observed increase in vertebrate populations (Galewski *et al.* 2011), by approximately 60% since 1970. Birds and fish show a generally increasing trend. However, the species threatened with extinction – essentially endemic species - present a generally decreasing trend, proving that further efforts must be made to preserve the particular characteristics of Mediterranean biodiversity. While the Living Wetlands Index is proving to be a relevant indicator of biodiversity trends in permanent wetlands, it is less effective for assessing the biodiversity of temporary wetlands, where vertebrates are relatively uncommon.

In parallel, the Living Wetlands Index has been chosen as one of the indicators of the PACA Regional Biodiversity Observatory, and a first version of the index will be delivered in 2016.

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The Tour du Valat, the MWO and MedWet were on the « Nature Solutions Pavilion » at the COP 21

- **Assessment of the impact of land cover changes on waterbirds**

In 2014 the MWO presented a report on the evolution of land cover in the coastal wetlands of the Mediterranean Basin derived from the analysis of satellite images of 200 sites. The main results show a continuous reduction in the surface area of wetlands between 1975 and 2005, even on the Northern shore, and a growing proportion of artificial wetlands (reservoirs, flooded fields). Agriculture and urbanisation are the major causes of the loss of natural wetlands. These data were used to analyse the impact of these changes on the population dynamics of wintering waterbirds. The waterbird populations did not seem to react to the land cover modification. However, we can note an increase over time in the populations of species with an affinity for higher temperatures, suggesting a greater role of climate change in the structuring of populations. This very promising work is being continued through a doctoral thesis that started in November 2015.

- **Development of an indicator of changes surface area and land cover**

In 2015 the MWO participated in work carried out together with the United Nations Environment Programme (UNEP), the World Conservation Monitoring Centre and the School of Anthropology and Conservation in Canterbury to develop and validate an indicator of changes in the surface area of wetlands, the WET Index, capable of integrating disparate data.

THE PROJECTS:

"Monitoring, evaluation and wetlands policies"

AT A GLANCE

2 Further development of the Mediterranean Wetlands Observatory (MWO) water indicators

Subsequent to the "MWO Water Indicators" workshop organised in late 2013, a preliminary feasibility study was carried out with the Water Footprint Network aimed at setting up a more substantial project. A final workshop for the presentation and joint planning of this second phase was organised with the intended partners. In addition, we continued the analysis of the flooding level data for wetlands measured by means of remote sensing (continuation of the GlobWetlandII project).

A new European Horizon 2020 project, SWOS, got underway in mid-2015. Its aim is to use satellite images to monitor the surface areas, water quality and certain ecological service indicators of wetlands. In the framework of this project 45 test sites were selected (including the Camargue) for which maps and indicators will be produced.

Urbanization of Wetlands, Turkey

3 Support for the National Wetlands Observatory (France)

In 2015, a technical dossier was compiled concerning the evolution of land cover in the Ramsar sites of metropolitan France. A four-page summary leaflet is planned for 2016. In addition, an indicator of the evolution in the frequentation of "Wetlands" visitor centres in France was developed, and validated by the National Wetlands Observatory (France).

4 Work on Ecosystem Services

The Ecopotential project got underway in 2015, in the framework of the European Horizon 2020 programme. The aim of this project is to improve the integrated use of satellite and field data to monitor and manage biodiversity and ecological services in protected areas. Twenty-two protected areas, including the Camargue, will be used as case studies. The Tour du Valat, in particular, is responsible for coordinating training and communication activities.

The Med-ESCWET project on the role of Mediterranean wetlands in attenuating and adapting to climate change was continued. Project launch workshops were held in three of the four pilot sites, the Vic-la-Gardiole Lagoon (France), Lake Burullus (Egypt) and the Yenicaga peatland (Turkey). The bio-physical assessments of the services provided are currently being carried out.

The collaboration was also continued with the "Health Ecology" Project (Species Department) and a laboratory of the French Research Institute for Development (IRD) regarding the link between biodiversity status and human epidemics. During the year the required data were grouped together (cases of human and equine epidemics, and databases about waterbirds and land cover changes in a selection of wetlands). In addition, phylogenetic indices were calculated for bird communities.

Woman collecting Salicornia, Gediz Delta, Turkey

5 Local planning and wetlands and Cultural Services indicators

The preparatory work carried out at various sites between 2011 and 2014 to develop these two indicators resulted in an initial summary for the Mediterranean. In 2015, we monitored local planning and wetlands, especially in North Africa. A complete summary of the results for the nine Cultural Services of Wetlands study sites was drawn up thanks to a Masters internship with the Montpellier Mediterranean Agronomic Institute (IAMM). This work will be continued in 2016 in order to develop an indicator.

Squacco Heron,
Ardeola ralloides

this small migratory heron has increased its presence in the Camargue over the last decades, with however large inter-annual fluctuations correlated to rainfall in wintering areas located in sub-Saharan Africa."

François Mesléard

Research Director

"Ecological restoration, like all forms of cooking, can be particular but must be based on knowledge and tests to produce menus that are appropriate to restoring the patient's functions. In Mediterranean wetlands, the main ingredients are water and herbivores, with the possible addition of plants and seeds. Salt levels need to be taken into consideration but watch out for chemicals!"

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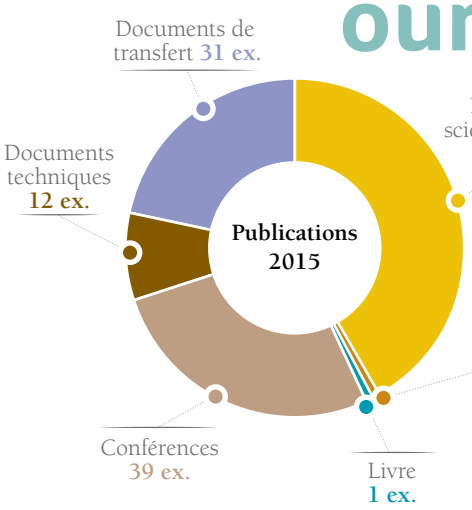
The publications

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 our team.

An increase in scientific and technical production during 2015

With 45 papers published in international scientific journals, scientific production went up in terms of both the number of papers published and their importance (for which the Impact Factor is a standardised unit of measurement). Health Ecology, which is an emerging discipline, made a major contribution to the Tour du Valat's publications in 2015

In addition to scientific papers, the Tour du Valat also targets students, for example with the book "Santé, médecine et sciences de l'évolution - Les maladies infectieuses (Health, medicine and evolution sciences – Infectious Diseases) published in 2015 by De Boeck Solal (Vittecoq M. *et al.*); a reference work coordinated by Marion Vittecoq with the MIVEGEC team in Montpellier. The Tour du Valat also produced more technical publications and awareness raising documents, which are just aws indispensable for the conservation of Mediterranean wetlands.

Among the wide range of Tour du Valat publications illustrating the variety of fields in which we work, we could draw attention to the following:

- **Scientific publications:**

A paper advocating a synergy between rice farming and wintering duck populations, particularly in the Camargue.
Pernollet C.A., Simpson D., Gauthier-Clerc M., Guillemain M. 2015. Rice and duck, a good combination? Identifying the incentives and triggers for joint rice farming and wild duck conservation. Agriculture, Ecosystems & Environment 214:118-132. doi: 10.1016/j.agee.2015.08.018

A paper proposing an indicator for monitoring the surface area and status of Mediterranean wetlands by remote sensing.
Sanchez A., Abdul Malak D., Guelmami A., Perennou C. 2015. Development of an Indicator to Monitor Mediterranean Wetlands. PLOS ONE 10:e0122694. doi: 10.1371/journal.pone.0122694

An article proposing a simulation tool to assist managers' decision-making for the water management of lagoons and marshes.
Lefebvre G., Germain C., Poulin B. 2015. Contribution of rainfall vs. water management to Mediterranean wetland hydrology: Development of an interactive simulation tool to foster adaptation to climate variability. Environmental Modelling & Software 74:39-47. doi: 10.1016/j.envsoft.2015.08.004

- **Technical reports:**

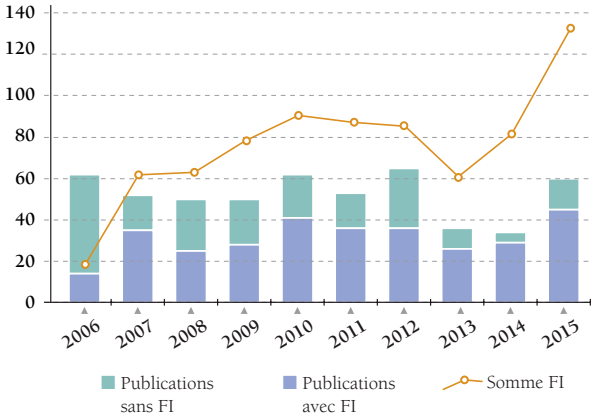
The management plan of the Tour du Valat Estate, developed using an innovative method: Open Standards for Conservation".
Cohez D. & Paix L., 2015 - Plan de gestion 2016-2020 de la Réserve Naturelle Régionale de la Tour du Valat. Tour du Valat, Arles, France. 92p.

A report on the impacts of Bti and the testing of an alternative method, presented to the Camargue Regional Natural Park.
Poulin B. 2015. Rapport final sur le suivi scientifique annuel mené en 2014 en parallèle aux opérations de démoustication au Bti sur le périmètre du Parc Naturel Régional de Camargue. 126 pp.

- **Knowledge transfer documents:**

A paper on methodological developments for drawing up protected area management plans:
Ernoul L., Beck N., Cohez D., Perennou C., Thibault M., Willm L., Poulin B. 2015. Trends in management plans and guides: 25 years of experience from Southern France. Journal of Environmental Planning and Management 58:1096-1112. doi: 10.1080/09640568.2014.914021

Publications



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

- Aberkane S., Compain F., Barraud O., Ouédraogo A.-S., Bouzinbi N., Vittecoq M., Jean-Pierre H., Decré D., Godreuil S. 2015. *Non-O1/Non-O139 Vibrio cholerae Avian Isolate from France Cocarrying the* bla *VIM-1 and* bla *VIM-4 Genes*. Antimicrobial Agents and Chemotherapy 59:6594-6596. doi: 10.1128/AAC.00400-15
- Arnal A., Droit A., Elguero E., Ducasse H., Sánchez M.I., Lefevre T., Misse D., Bédèrina M., Vittecoq M., Daoust S., Thomas F. 2015. *Activity level and aggregation behavior in the crustacean gammarid Gammarus insensibilis parasitized by the manipulative trematode Microphallus papillorobustus*. Frontiers in Ecology and Evolution [Internet] [cited 2016 Jan 22]; 3. doi: 10.3389/fevo.2015.00109
- Arnal A., Tissot T., Ujvari B., Nunney L., Solary E., Laplane L., Bonhomme F., Vittecoq M., Tasiemski A., Renaud F., Pujol P., Roche B., Thomas F. 2016. *The guardians of inherited oncogenic vulnerabilities: PERSPECTIVE*. Evolution 70:1-6. doi: 10.1111/evo.12809
- Arnal A., Ujvari B., Crespi B., Gatenby R.A., Tissot T., Vittecoq M., Ewald P.W., Casali A., Ducasse H., Jacqueline C., Missé D., Renaud F., Roche B., Thomas F. 2015. *Evolutionary perspective of cancer: myth, metaphors, and reality*. Evolutionary Applications 8:541-544. doi: 10.1111/eva.12265
- Balkız Ö., Onmuş O., Sıkı M., Döndürenc Ö., Gül O., Arnaud A., Germain C., İsfendiyaroİlu S., Özbek M., Çaİlayan E., Araç N., Parmak B., Özesmi U., Béchet A. 2015. *Turkey as a crossroad for Greater Flamingos* Phoenicopterus roseus *: evidence from population trends and ring-resightings (Aves: Phoenicopteridae)*. Zoology in the Middle East 61:201-214. doi: 10.1080/09397140.2015.1058452
- Barbaro L., Blache S., Trochard G., Arlaud C., de Lacoste N., Kayser Y. 2016. *Hierarchical habitat selection by Eurasian Pygmy Owls Glaucidium passerinum in old-growth forests of the southern French Prealps*. Journal of Ornithology 157:333-342. doi: 10.1007/s10336-015-1285-3
- Bouahim S., Rhazi L., Ernoul L., Mathevet R., Amami B., Er-Riyahi S., Muller S.D., Grillas P. 2015. *Combining vulnerability analysis and perceptions of ecosystem services in sensitive landscapes: A case from western Moroccan temporary wetlands*. Journal for Nature Conservation 27:1-9. doi: 10.1016/j.jnc.2015.05.003
- Boulenger C., Acou A., Trancart T., Crivelli A.J., Feunteun E. 2015. *Length-weight relationships of the silver European eel,* Anguilla anguilla *(Linnaeus, 1758), across its geographic range*. Journal of Applied Ichthyology 31:427-430. doi: 10.1111/jai.12685
- Boutron O., Bertrand O., Fiandrino A., Höhener P., Sandoz A., Chérain Y., Coulet E., Chauvelon P. 2015. *An Unstructured Numerical Model to Study Wind-Driven Circulation Patterns in a Managed Coastal Mediterranean Wetland: The Vaccarès Lagoon System*. Water 7:5986-6016. doi: 10.3390/w7115986
- Brogi A., Pernollet C.A., Gauthier-Clerc M., Guillemain M. 2015. *Waterfowl foraging in winter-flooded ricefields: Any agronomic benefits for farmers?* Ambio 44:793-802. doi: 10.1007/s13280-015-0678-0
- Catsadorakis G., Onmus¸ O., Bugariu S., Gül O., Hatzilacou D., Hatzofe O., Malakou M., Michev T., Naziridis T., Nikolaou H., Rudenko A., Saveljic D., Shumka S., Sıkı M., Crivelli A. 2015. *Current status of the Dalmatian pelican and the great white pelican populations of the Black Sea/Mediterranean flyway*. Endangered Species Research 27:119-130. doi: 10.3354/esr00659
- Cohen-Shacham E., Dayan T., de Groot R., Beltrame C., Guillet F., Feitelson E. 2015. *Using the ecosystem services concept to analyse stakeholder involvement in wetland management*. Wetlands Ecology and Management 23:241-256. doi: 10.1007/s11273-014-9375-1
- Demnati F., Allache F., Ernoul L. 2015. *Population typology to better target environmental education: a case from Algeria*. Environment, Development and Sustainability 17:331-339. doi: 10.1007/s10668-015-9647-9
- Ducasse H., Arnal A., Vittecoq M., Daoust S.P., Ujvari B., Jacqueline C., Tissot T., Ewald P., Gatenby R.A., King K.C., Bonhomme F., Brodeur J., Renaud F., Solary E., Roche B., Thomas F. 2015. *Cancer: an emergent property of disturbed resource-rich environments? Ecology meets personalized medicine*. Evolutionary Applications 8:527-540. doi: 10.1111/eva.12232
- Ducasse H., Ujvari B., Solary E., Vittecoq M., Arnal A., Bernex F., Pirot N., Misse D., Bonhomme F., Renaud F., Thomas F., Roche B. 2015. *Can Peto's paradox be used as the null hypothesis to identify the role of evolution in natural resistance to cancer? A critical review*. BMC Cancer [Internet] [cited 2016 Jan 22]; 15. doi: 10.1186/s12885-015-1782-z
- Ernoul L., Beck N., Cohez D., Perennou C., Thibault M., Willm L., Poulin B. 2015. *Trends in management plans and guides: 25 years of experience from Southern France*. Journal of Environmental Planning and Management 58:1096-1112. doi: 10.1080/09640568.2014.914021

- Ezenwa V.O., Prieur-Richard A.-H., Roche B., Bailly X., Becquart P., García-Peña G.E., Hosseini P.R., Keesing F., Rizzoli A., Suzán G., Vignuzzi M., Vittecoq M., Mills J.N., Guégan J.-F. 2015. *Interdisciplinarity and Infectious Diseases: An Ebola Case Study.*Rall GF, editor. PLOS Pathogens 11:e1004992. doi: 10.1371/journal.ppat.1004992
- Faverjon C., Andresson M., Decours A., Tapprest J., Tritz P., Sandoz A., Kutasi O., Sala C., Leblond A. 2015. *Evaluation of a multivariate syndromic surveillance system for West Nile virus.* Vector-Borne and Zoonotic Diseases [Internet] [cited 2016 Jan 22].
- Guillemain M., Champagnon J., Gourlay-Larour M.-L., Cavallo F., Brochet A.-L., Hars J., Massez G., George T., Perroi P.-Y., Jestin V., others. 2015. *Blood and cloacal swab sampling for avian influenza monitoring has no effect on survival rates of free-ranging ducks.* Ibis 157:743-753.
- Guillemain M., Pernollet C.A., Massez G., Cavallo F., Simon G., Champagnon J. 2015. *Disentangling the drivers of change in Common Teal migration phenology over 50 years: land use vs. climate change effects.* Journal of Ornithology 156:647-655. doi: 10.1007/s10336-015-1171-z
- Kraberger S., Farkas K., Bernardo P., Booker C., Argüello-Astorga G.R., Mesléard F., Martin D.P., Roumagnac P., Varsani A. 2015. *Identification of novel Bromus-and Trifolium-associated circular DNA viruses.* Archives of Virology 160:1303-1311.
- Lambret P., Besnard A., Matushkina N. 2015a. *Initial preference for plant species and state during oviposition site selection by an odonate: Odonate initial preference for plant.* Entomological Science 18:377-382. doi: 10.1111/ens.12130
- Lambret P., Besnard A., Matushkina N. 2015b. *Plant preference during oviposition in the endangered dragonfly Lestes macrostigma (Odonata: Zygoptera) and consequences for its conservation.* Journal of Insect Conservation 19:741-752. doi: 10.1007/s10841-015-9796-z
- Larcombe S.D., Gauthier-Clerc M. 2015. *Avian Malaria is Absent in Juvenile Colonial Herons (* Ardeidae *) but not* Culex pipiens *Mosquitoes in the Camargue, Southern France.* Waterbirds 38:387-395. doi: 10.1675/063.038.0415
- Lefebvre G., Germain C., Poulin B. 2015. *Contribution of rainfall vs. water management to Mediterranean wetland hydrology: Development of an interactive simulation tool to foster adaptation to climate variability.* Environmental Modelling & Software 74:39-47. doi: 10.1016/j.envsoft.2015.08.004
- Masson S., Gauvain M., Mesléard F., Dutoit T. 2015. *Impacts of water stress removal and disturbance regimes on Mediterranean dry grasslands diversity and succession.* Plant Ecology 216:1351-1369. doi: 10.1007/s11258-015-0513-5
- Masson S., Mesléard F., Dutoit T. 2015. *Using Shrub Clearing, Draining, and Herbivory to Control Bramble Invasion in Mediterranean Dry Grasslands.* Environmental Management 56:933-945. doi: 10.1007/s00267-015-0541-x
- Merlin A., Bonis A., Damgaard C.F., Mesléard F. 2015. *Competition is a strong driving factor in wetlands, peaking during drying out periods.* PloS one 10:e0130152.
- Mesleard F., Yavercovski N., Dutoit T. 2015. *Photoperiod buffers responses to salt and temperature during germination of two coastal salt marsh colonizers* Juncus acutus *and* Juncus maritimus. Plant Biosystems 1-9. doi: 10.1080/11263504.2015.1007898
- Mondain-Monval J.-Y., Defos du Rau P., Guillemain M., Olivier A. 2015. *Switch to non-toxic shot in the Camargue, France: effect on waterbird contamination and hunter effectiveness.* European Journal of Wildlife Research 61:271-283. doi: 10.1007/s10344-014-0897-x
- Moreno-Mateos D., Maris V., Béchet A., Curran M. 2015. *The true loss caused by biodiversity offsets.* Biological Conservation 192:552-559. doi: 10.1016/j.biocon.2015.08.016
- Musseau C., Boulenger C., Crivelli A.J., Lebel I., Pascal M., Boulêtreau S., Santoul F. 2015. *Native European eels as a potential biological control for invasive crayfish.* Freshwater Biology 60:636-645. doi: 10.1111/fwb.12510
- Musseau C., Vincenzi S., Jesenšek D., Cantera I., Boulêtreau S., Santoul F., Crivelli A.J. 2015. *Direct and indirect effects of environmental factors on dietary niches in size-structured populations of a wild salmonid.* Ecosphere 6:art256. doi: 10.1890/ES15-00109.1
- Pernollet C.A., Guelmami A., Green A.J., Curcó Masip A., Dies B., Bogliani G., Tesio F., Brogi A., Gauthier-Clerc M., Guillemain M. 2015. *A comparison of wintering duck numbers among European rice production areas with contrasting flooding regimes.* Biological Conservation 186:214-224. doi: 10.1016/j.biocon.2015.03.019
- Pernollet C.A., Simpson D., Gauthier-Clerc M., Guillemain M. 2015. *Rice and duck, a good combination? Identifying the incentives and triggers for joint rice farming and wild duck conservation.* Agriculture, Ecosystems & Environment 214:118-132. doi: 10.1016/j.agee.2015.08.018
- Rodríguez-Pérez H., Hilaire S., Mesléard F. 2016. *Temporary pond ecosystem functioning shifts mediated by the exotic red swamp crayfish (Procambarus clarkii): a mesocosm study.* Hydrobiologia 767:333-345. doi: 10.1007/s10750-015-2523-7
- Roumagnac P., Granier M., Bernardo P., Deshoux M., Ferdinand R., Galzi S., Fernandez E., Julian C., Abt I., Filloux D., Mesléard F., Varsani A., Blanc S., Martin D.P., Peterschmitt M. 2015. *Alfalfa Leaf Curl Virus: an Aphid-Transmitted Geminivirus.* Journal of Virology 89:9683-9688. doi: 10.1128/JVI.00453-15
- Sanchez A., Abdul Malak D., Guelmami A., Perennou C. 2015. *Development of an Indicator to Monitor Mediterranean Wetlands.* PLOS ONE 10:e0122694. doi: 10.1371/journal.pone.0122694
- Schiavina M., Bevacqua D., Melià P., Crivelli A.J., Gatto M., De Leo G.A. 2015. *A user-friendly tool to assess management plans for European eel fishery and conservation.* Environmental Modelling & Software 64:9-17. doi: 10.1016/j.envsoft.2014.10.008
- Stankoviİ D., Crivelli A.J., Snoj A. 2015. *Rainbow Trout in Europe: Introduction, Naturalization, and Impacts.* Reviews in Fisheries Science & Aquaculture 23:39-71. doi: 10.1080/23308249.2015.1024825

- Suzán G., García-Peña G.E., Castro-Arellano I., Rico O., Rubio A.V., Tolsá M.J., Roche B., Hosseini P.R., Rizzoli A., Murray K.A., others. 2015. *Metacommunity and phylogenetic structure determine wildlife and zoonotic infectious disease patterns in time and space.* Ecology and evolution 5:865-873.
- Van den Broeck M., Waterkeyn A., Rhazi L., Grillas P., Brendonck L. 2015. *Assessing the ecological integrity of endorheic wetlands, with focus on Mediterranean temporary ponds.* Ecological Indicators 54:1-11. doi: 10.1016/j.ecolind.2015.02.016
- Vittecoq M., Ducasse H., Arnal A., Møller A.P., Ujvari B., Jacqueline C.B., Tissot T., Missé D., Bernex F., Pirot N., Lemberger K., Abadie J., Labrut S., Bonhomme F., Renaud F., Roche B., Thomas F. 2015. *Animal behaviour and cancer.* Animal Behaviour 101:19-26. doi: 10.1016/j.anbehav.2014.12.001
- Vittecoq M., Roche B., Cohen J.-M., Renaud F., Thomas F., Gauthier-Clerc M. 2015. *Does the weather play a role in the spread of pandemic influenza? A study of H1N1pdm09 infections in France during 2009-2010.* Epidemiology and Infection 143:3384-3393. doi: 10.1017/S0950268815000941
- Wyss F., Schumacher V., Wenker C., Hoby S., Gobeli S., Arnaud A., Engels M., Friess M., Lange C.E., Stoffel M.H., Robert N. 2015. *Pododermatitis in Captive and Free-Ranging Greater Flamingos (Phoenicopterus roseus).* Veterinary Pathology 52:1235-1242. doi: 10.1177/0300985814568359

Selected technical documents

- Ernoul L., Beck N., Oliver A. & Bechet A. 2015. Rapport final pour le projet Gestion Intégrée du Delta du Gediz. Rapport Tour du Valat présenté à la Région PACA.
- Galewski T., Berger J., Rufray X. 2015. Field protocol for monitoring waterbirds on Kangping Wolong Lake. Biotope / Tour du Valat.
- Gardner R.C., Barchiesi S., Beltrame C., Finlayson C.M., Galewski T., Harrison I., Paganini M., Perennou C., Pritchard D.E., Rosenqvist A., Walpole M. 2015. State of the World's Wetlands and their Services to People: A compilation of recent analyses. Ramsar Briefing Note n°7, COP 12. Ramsar STRP & Secretariat, Gland (CH), 20p.
- Poulin B. 2015. Rapport final sur le suivi scientifique annuel mené en 2014 en parallèle aux opérations de démoustication au Bti sur le périmètre du Parc Naturel Régional de Camargue. Rapport Tour du Valat présenté au PNRC. 126 pp.
- Tour du Valat. 2015. Site de Sainte Cécile, Commune d'Arles (13), Expertise floristique et faunistique, recommandations de gestion.
- Cohez D. & Paix L., 2015 - Plan de gestion 2016-2020 de la Réserve Naturelle Régionale de la Tour du Valat. Tour du Valat, Arles, France. 92p.

Thesis

- BOULENGER C. 2014. *Ajustements dynamiques des sous-populations d'anguilles européennes et traits d'histoire de vie : apport du marquage individuel par PIT-tag pour la conservation.* Thèse doctorat : Physiologie et biologie des Organismes - Populations - Interactions : Muséum national d'histoire naturelle (2014) 264p.

Selected awareness-raising documents

- Thibault M. 2015. *Working internationally with wetlands to adapt to and mitigate the effects of climate change for the benefit of human wellbeing.* In: Eurosite (Thibault M. contributing editor).
- Ernoul L. & Béchet A. 2015. *Valeurs d'une espèce emblématique face aux changements globaux : approche par Système d'Information Géographique participatif pour une meilleure gouvernance des zones humides côtières.* Paris. Fondation de France.
- Beltrame C., 2015. *Les zones humides littorales du bassin méditerranéen : quels enjeux, quelles évolutions et quelles actions pour les préserver ?* Journées mondiales des zones humides, Tour du Valat, Février 2015.

Brochures/Posters

- Dernegi D. & Tour du Valat. 2015. *Fishing practices in the Gediz Delta.*
- Pôle-relais lagunes méditerranéennes. 2015. *Plaquette de présentation des Pôles-relais zones humides.*
- Pôle-relais lagunes méditerranéennes & Plessis V. 2015. *Plaquette informative sur l'exposition "Milieux humides lagunaires de l'étang de Berre".*
- Observatoire des Zones Humides Méditerranéennes. 2015. *Les zones humides méditerranéennes. Etat des lieux au début du 21ème siècle.* Synthèse (FRA + ENG + ARA).
- Observatoire des Zones Humides Méditerranéennes. 2015. *L'occupation du sol dans les zones humides méditerranéennes.* Synthèse.

Newsletter

- Parc de Camargue, Tour du Valat & SNPN. 2015. *Lettre d'information N°1 du site des Etangs et marais des salins de Camargue.*
- Pôle-relais lagunes méditerranéennes. 2014. *Hors-série n°5 « Les pesticides et nos lagunes ».*

DVD/CD-ROM

- Pôle-relais lagunes méditerranéennes & Océanides Production. 2015. *Film "Etang de Berre, en quête d'une lagune cachée".*
- Pôle-relais lagunes méditerranéennes & Océanides Production. 2015. *Film "LAG'UNE. Découverte!".*

Participants of the "Spoonbill workshop"

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 Heinz Hafner's work on waterbirds conservation.

This year, we welcomed Ms. Hanna Kokko, Professor at the University of Zurich, Switzerland, who presented her work on *Natural selection: a friend or foe when it comes to conservation?*

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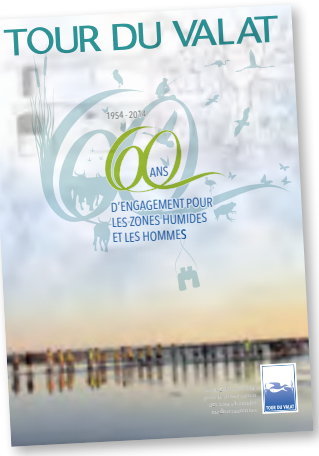
Conference during the Ramsar COP at the Mediterranean Agora - MedWet

Seminars

These seminars generally 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 program of these 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

- **Variabilité hydrologique du bassin-versant à la zone côtière en Méditerranée**
  Gil Mahe (Institut de Recherche pour le Développement. Laboratoire HydroSciences Montpellier)
- **Ajustements dynamiques des sous-populations d'anguilles européennes et traits d'histoire de vie : apport du marquage individuel par PIT-tag pour la conservation**
  Clarisse Boulenger (Muséum National d'Histoire Naturelle, Station Marine de Dinard, CRESCO)
- **New insights about eutrophication problems in Lake Prespa (Greece)**
  Valentini Maliaka (Society for the Protection of Prespa Greece), Radboud University Nijmegen - Institute for Water Research (The Netherlands)
- **Gérer les invasions biologiques : comment établir des priorités ?**
  Pierre Courtois (INRA Montpellier)
- **L'Etang de Berre, en quête d'une lagune cachée**
  Pôle-relais lagunes méditerranéennes (Tour du Valat)
- **Delta du Nil, Visages en Paysages**
  Joël Yvon (Réalisateur de documentaire)
- **The conservation and ecology of birds in rice fields**
  Christopher Elphick (University of Connecticut)
- **Association les Amis de la Tour du Valat : pourquoi et comment en devenir acteur ?**
  Muriel Arcaute-Gevrey (Association les Amis de Tour du Valat)
- **Création d'une vitrine agro-écologique sur le domaine du Petit Saint-Jean**
  Camille Aneris (Tour du Valat)
- **Réhabilitation énergétique et fonctionnelle des bureaux de la Tour du Valat**
  Ha Hoang Tran et Louise Briaut (Ecole nationale supérieure de Montpellier)
- **Le plan Rhône, analyse critique et alternatives**
  Bernard Giral et Bertrand Hanauer (association les Flamants Roses du Trébon)
- **La Sibérie, de la magie des glaces du Lac Baïkal aux conséquences désastreuses de l'orpaillage intense à Kolyma**
  Tadeusz Michalski (association des Amis de la Tour du Valat)
- **Analyse couts-bénéfices de l'inondation hivernale des rizières en Camargue**
  Amadou Niang (Université de Montpellier, Master 2 Economie rurale et stratégies des entreprises agroalimentaires)



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/documentation

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
- La Glaréole à collier en Camargue
- L'Anguille européenne

MWO documents

- Thematic documents and reports are available on line.

Medias

The Tour du Valat enjoyed a good media coverage in 2015, with more than 160 articles publish in the written press and three television reports.

In 2015, the most covered topics were:

- The new mosquito control method in the Camargue, thanks to the "mosquito vaccums". This topic generated an AFP dispatch and was then broadly covered in the whole country.
- Camargue, Wetlands and climate change, on the occasion of the COP21 Conference on Climate in Paris. Within the frame of the IUCN-France "Nature and Development" partnership, the Tour du Valat presented several of her works at the "Nature Solution" Pavilion.
- The launching of World Wetlands day at the Tour du Valat in the presence of numerous elected representatives and managers.
- The international recognition of the Tour du Valat, following to the attribution of the Ramsar Merit Award.
- The signature of a framework agreement between the Tour du Valat Foundation and the Water Agency (agence de l'eau) for the protection of Mediterranean wetlands.
- The project « Adaptive management of the former Camargue saltworks", which was awarded the 2015 Lagoon Transfer Unit Award, so highlighting an exemplary and innovative initiative on the topic of the adaptation to climate change.

© H. Hôte - Agence Caméléon

Launching of World Wetlands Day at the Tour du Valat

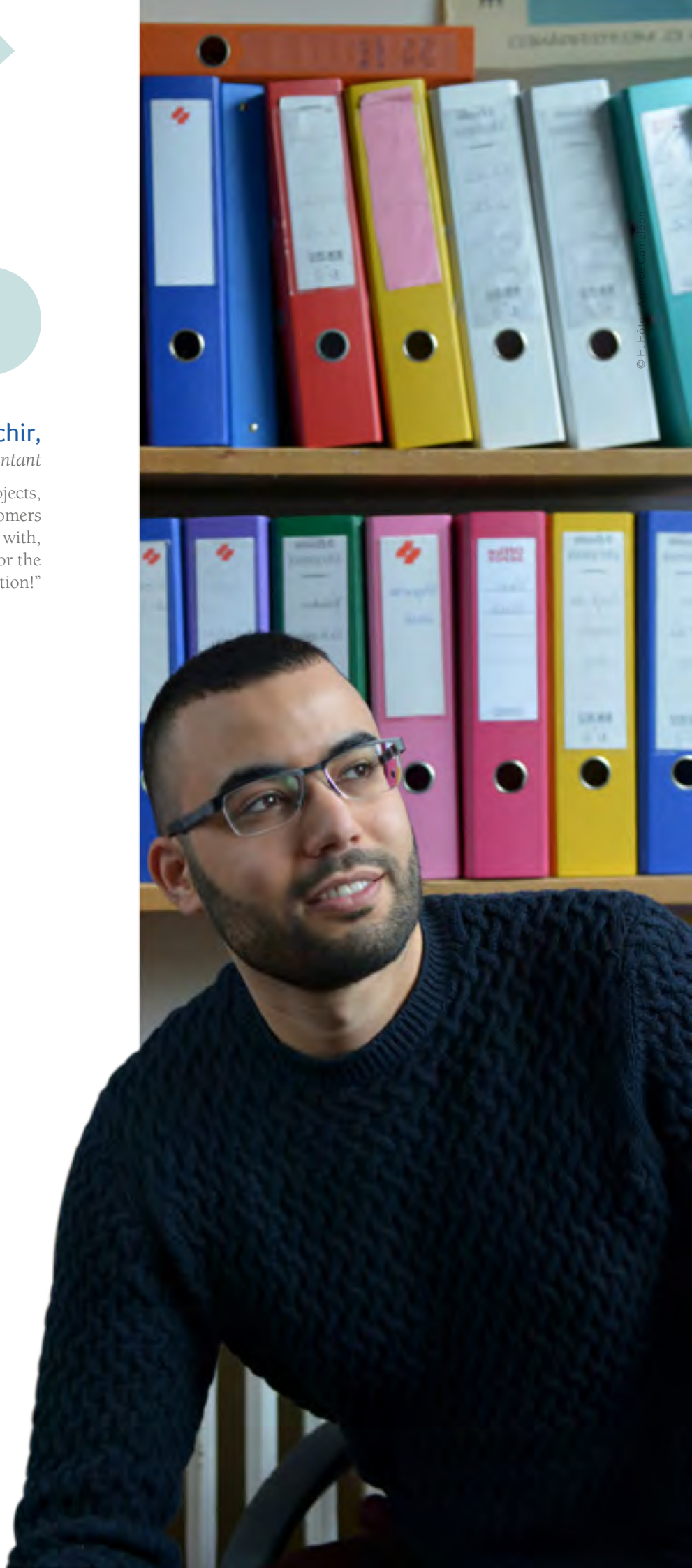
- The agro ecological project on the Petit Saint-Jean Estate
- Events organized by the Tour du Valat (Open House Day, Envies Rhônement Festival, Camargue Festival…) and… arena games in which our bulls participate.

Petit Saint-Jean Estate

Kamal El Bachir,

Accountant

"The analytical monitoring of European projects, drawing up balance sheets, managing customers and suppliers are all the tasks that I deal with, and which mean a lot for the Tour du Valat Foundation!"



The structure

our fondations

The Tour du Valat is a Non-profit Public Benefit organisation. Its governance is handled by two official administrative bodies: the Board, made up of three committees: the Founders, the ex officio members, and the experts; and the Science 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 Science Council

2015 was a year of great change for our governing bodies.
The Foundation lost its President with the demise of Jean-Paul Taris, an emblematic figure at the Tour du Valat who had been President since 2004 after having been Director for nearly fifteen years.

Isabel Hoffmann, the daughter of André and Rosalie Hoffmann, was co-opted by her peers to take up her seat in the College of Founders. Isabel Hoffmann, who is 21 years old, is studying for a BSc in Ecological and Environmental Sciences at Edinburgh University in Scotland. We welcome her to the Board..

As Vice-President, André Hoffmann took over for the interim period after the death of Jean-Paul Taris, until he was elected by the December meeting of the Board. He thus becomes the third President of the Tour du Valat Foundation since it was founded twenty-seven years ago, following Luc Hoffmann and Jean-Paul Taris

The Science Council also underwent some changes: Laurent Mermet and William Sutherland were both reappointed for a second mandate. Patrick Duncan, a well-known figure at the Tour du Valat, took over the seat of Tim Clutton-Brock, who had reached the end of his second mandate having helped and guided the Tour du Valat for many years. We would like to express our deepest thanks to him.

Finally, the year ended with the holding of a joint meeting of the two governing bodies. These meetings take place every two years, mid-term and at the end of each five-year plan. The aim of these joint meetings between the Board and the Science Council is to bring together the two bodies to discuss fundamental subjects with an impact on strategy. The subject on people's minds this time around was centred on the next strategic plan, together with how the Tour du Valat Foundation should adapt to the current Mediterranean context of economic, institutional and political upheaval.

Science Council

Governance

© Tour du Valat

Board of Directors– June 2015

Board

- **(Dr) Luc Hoffmann** . . . . . *Honorary president*

COLLEGE OF FOUNDERS

- **André Hoffmann** . . . . . *President*
- **Maja Hoffmann** . . . . . *Vice-presidente*
- **Vera Michalski**
- **Isabel Hoffmann**

COLLEGE OF EX OFFICIO MEMBERS

- **Pierre Castoldi** . . . . . *Sub-Prefect of Arles, representing the Home Office*
- **Jean-Philippe Nabot** . . . . . *Regional representative for Research and Technology, representing the Ministry of Higher Education and Research*
- **Pending appointment** . . . . . *PACA Regional Director for Environment, Planning and Housing,, representing the Ministry of Ecology, Sustainable Development and Energy*
- **Hervé Schiavetti** . . . . . *Mayor of Arles, representing the Town Council of Arles*

COLLEGE OF EXPERTS

- **Lucien Chabason** . . . . . *Deputy Director of the "Institut du développement durable et des relations internationales"*
- **Antonio Troya** . . . . . *Treasurer, Director of the IUCN Centre for Mediterranean Cooperation in Malaga (Spain)*
- **Dr Tobias Salathé** . . . . . *Ramsar Senior Advisor for Europ in Gland (Switzerland)*
- **Thymio Papayannis** . . . . . *Secretary - MedWet Senior Advisor, President of MedINA*

SCIENCE COUNCIL

- **Dr Patrick Dugan** . . . . . *President - WorldFish Centre, Penang, Malaysia*
- **Dr Patrick Duncan** . . . . . *CNRS, Chizé, France*
- **Dr Jean-Dominique Lebreton** . . . *Vice-President - Centre d'Écologie Fonctionnelle et 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 Science Council, a high level of expertise will be provided by six thematic experts, two for each of the three Tour du Valat programs, for the duration of the five-year plan.

- **Dr Jacques Blondel** . . . . . *Centre d'Ecologie Fonctionnelle Evolutive/CNRS, Montpellier*
- **Dr Pierre Chevallier** . . . . . *Institut de Recherche pour le Développement/CNRS, Laboratoire d'Hydrosciences, Montpellier*
- **Dr Luis Costa** . . . . . *SPEA/Birdlife, Portugal*
- **Dr Jonathan Loh** . . . . . *Institute of Zoology, Zoological Society of London, Royaume Uni- WWF International*
- **Dr François Renaud** . . . . . *Institut de Recherche pour le Développement/CNRS, Montpellier*
- **Dr Sophie Thoyer** . . . . . *Supagro-Lameta, Montpellier*

Budget

The budget for the year 2015 amounts to 5,347,000 Euros.

En dépenses :

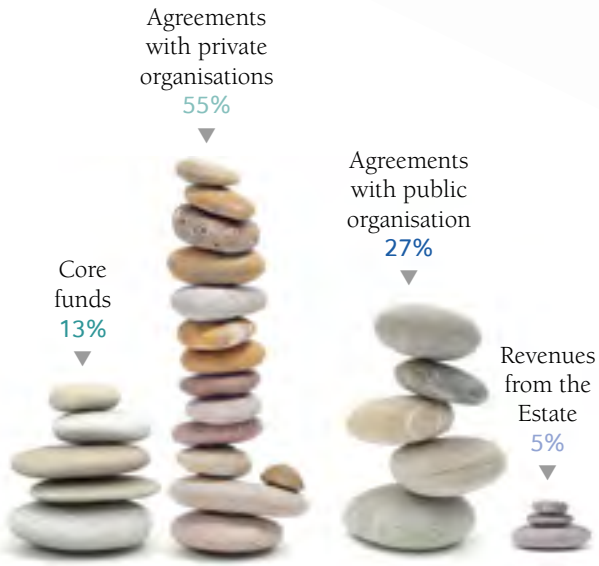
- 3,327,000 Euros have been allocated to the scientific programmes, including 966,000 euros for the "Conservation of Species and their Populations in the context of Global Changes" Department, 1,307,000 Euros for the "Ecosystem Modelling, Restoration and Management" Department, 331,000 Euros for the "Monitoring and Evaluation & Wetlands Policies" Department, 368,000 Euros for the management of the Estate, and 355,000 Euros for shared scientific activities (scientific management, conferences.
- 337,000 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.).
- 130,000 Euros have been allocated to managing the Tour du Valat Library, principally the purchase of books and scientific journals.
- 1,553,000 Euros have been allocated to ancillary services, which include financial and administrative services, the canteen, building maintenance, and the repairs workshop.

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

- 13 % of its receipts come from its own funds, held by the Pro Valat Foundation (684,000 €).
- 48 % of its receipts come from the MAVA Foundation (2,585,000 €).
- 27 % of its receipts come from agreements with public organisations (1,438,000 €).
- 7 % of its receipts come from agreements with private organisations (345,000 €).
- 5 % of its receipts are revenues from the Estate (295,000 €).

Expenditures in Euros

Scientific programs	3,327,000
General management / Communication	337,000
Library	130,000
Ancillary services	1,553,000
Total:	**5,347,000**



Receipts in Euros

Core funds	684,000
Agreements with private organisations	2,930,000
Agreements with public organisations	1,438,000
Revenues from the Estate	295,000
Total:	**5,347,000**

Eco-responsibility, an ongoing process

Testing and implementing the solutions of the future for a sustainable world; developing concrete, operational responses appropriate to the Mediterranean context, and disseminating them extensively. That is the guiding principle of our eco-responsible process, developed in several areas:

- *Managing our infrastructures with respect to the use of renewable energies and the management / repurposing of our waste;*
- *Adapting our transport methods to reduce our ecological footprint;*
- *Adopting an agro-ecological approach to our agricultural production;*
- *Optimising our consumption habits and behaviour.*

How are we doing?

100 % of our wastewater is treated by our reed bed water treatment plant;

100 % of our waste is sorted, with fermentable waste repurposed on-site (compost) and the rest recycled via specialised processing chains.

- The energy consumption of our buildings has been halved after the work carried out to insulate them with rice straw and cellulose insulation, and to replace some window units by efficient double-glazing;

The Tour du Valat's herd in extensive grazing

© Tour du Valat

- Our CO2 emissions have been divided by six thanks to our wood-fired heating system – with the wood partly produced at the Tour du Valat – and the installation of a 160 kW multi-fuel biomass boiler (replacing five fuel oil or gas-fired boilers that totalled 580 kW), combined with a 590-metre heating network and seven substations at the inlet to each building;
- Our herd of 350 Camargue cattle has grazed extensively, in compliance with the specifications of organic agriculture and without additional feeding or anti-parasite treatment, for 11 years; the high-quality meat produced is commercialised on a local supply chain basis;
- We are developing an innovative agro-ecological pilot project aimed at optimising synergies between agricultural and natural habitats, limiting the consumption of water, farming inputs and fossil energies, and testing crops adapted to the effects of climate change;
- Our canteen prioritises organic, locally produced, seasonal ingredients, using short supply chains and solidarity-based economic principles; it regularly provides vegetarian meals, proscribes species whose stocks are threatened, and limits and repurposes waste.

The main developments in 2015 were as follows:

Energy-performance and architectural renovation of our buildings

The main building, inaugurated in 1954, is now getting old, with poor energy performances and a degraded appearance. We therefore initiated a study aimed at requalifying it architecturally, insulating it better, and making it more practical for users. The project will involve insulating it from the outside with rice straw covered by a cladding of wood produced by thinning the spinney on the Petit Saint Jean Estate. Part of the southern façade will be fitted with Trombe walls, in order to absorb the warmth of the sun in wintertime. Finally, the internal spaces will be redesigned to ensure better air flow and optimal thermal comfort, and the shared areas re-planned to make them more practical and convivial.

Canteen women
in the new electric vehicule

© Tour du Valat

Establishment of a sustainable transport policy

Our geographical isolation, broad range of field activities and international involvement generate a large amount of travelling. In order to reduce our ecological footprint linked to these journeys, and to reduce costs, we have devised a sustainable transport policy based on four angles of attack

1. Rationalising the management of our car fleet by reducing the number of vehicles and acquiring a single model, with low fuel consumption and maintenance costs;
2. Prioritising non-polluting means of transport on the Estate by acquiring electric service vehicles, e-bicycles and mountain bikes;
3. Optimising home-to-work commuting by organising car-sharing arrangements and financially assisting the use of public transport by purchasing a vehicle for journeys between the Tour du Valat and the nearest bus stop;
4. Reducing national and international trips by prioritising the use of tele- or video-conferencing, and the use of less expensive, low-ecological-footprint means of transport.

Development of an agro-ecological project on the Petit Saint-Jean Estate

After two years of consideration carried out with expert support, thanks to the involvement of the *Fondation de France,* we were able to finalise the experimental agro-ecological project on the Petit Saint-Jean Estate, a 101-hectare property in the Western Camargue. The aim is to set up a range of organic agricultural production systems, in accordance with the principles of agroforestry and permaculture, and prioritising short-supply-chain commercialisation.

The objectives of the project are as follows:

- Set up environmentally friendly agricultural production systems that favour biodiversity, whose management will be planned by applying and/or adapting the methods used for natural areas (site management plan, integrated and adaptive management, and environmental monitoring;
- Assess the agronomic and ecological benefits, together with the feasibility and viability (financial costs and human resources) of the various experiments implemented, within an overall perspective for the management of the site;
- Mutualise activities and transfer the results of the project in order to encourage local and regional uptake of the lessons learned, particularly by agriculture professionals.

Petit Saint-Jean Estate

Library

The Library was established in 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.

Collections

Comprising:

- 11,500 publications and thesis
- 1,200 different periodicals
  of which 350 are running
- 24,000 offprints, booklets and reports

The reference section specializes 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, Entomology
- Botany

Access

The Library is open to anyone who wishes to consult publications on site; they may not be removed from the Library. A copying machine (chargeable) and a scanner are available.

Opening hours
Monday to Friday from 9am till noon and from 1 till 5pm (*please inform us of your coming in advance*).

Address

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 : biblio@tourduvalat.org

In Camargue, they call me
Missouninque"

Laura Dami,

Head of Project

"Surrounded by dynamic researchers and collaborating with a wide range of partners in the Mediterranean Basin, I work on waterbirds to create links between the census of bird populations and the functioning of wetlands. Who could ask for more?"

The teams

our life force

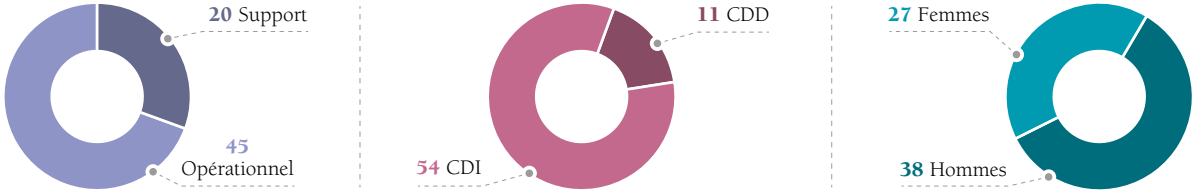
In 2015, work continued on structuring the Tour du Valat's social and salary policy through the setting up of an agreement concerning gender equality in the organisation.

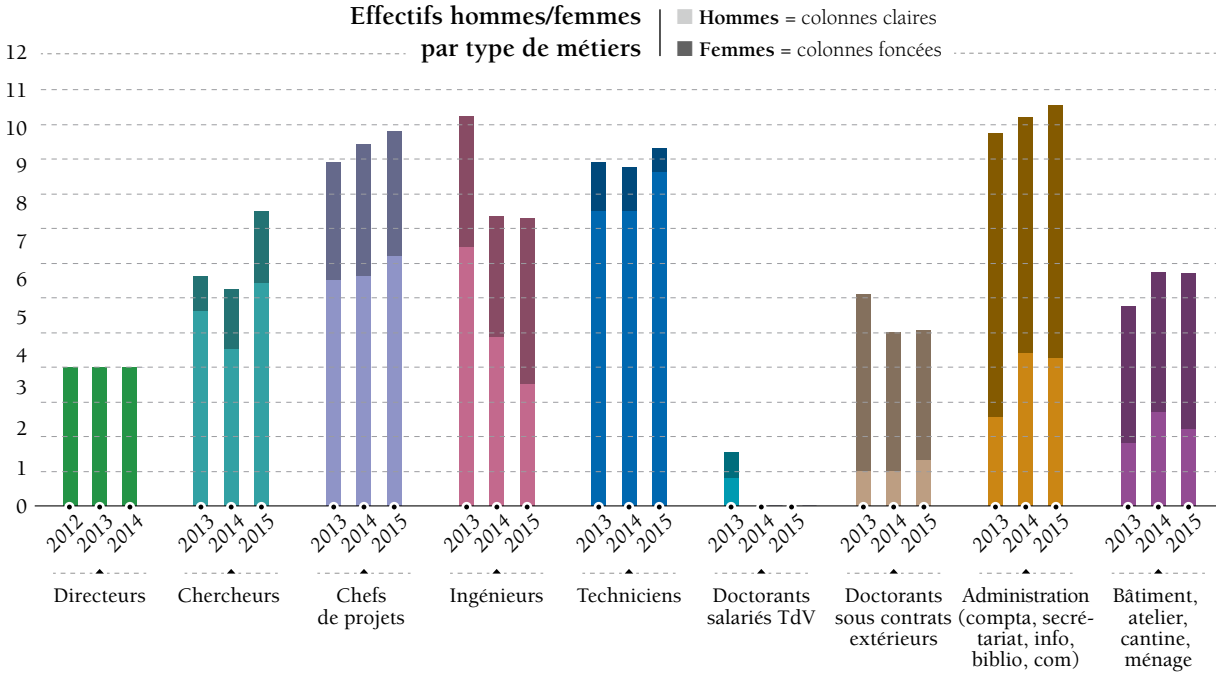
With regard to the teams, we were delighted to be able to recruit new PhD students this year, in partnership with the Universities of Montpellier, Aix–Marseille and Toulouse. These doctoral students work within the established teams to ensure high-quality scientific production, in accordance with the recommendations of our Scientific Council. We also continued to receive and co-direct students from Universities around the Mediterranean Basin (Sfax (Tunisia), Guelma and Batna (Algeria), Mohammed VI (Morocco), Ege (Turkey) …

In 2015, the whole Tour du Valat team was thus made up of 71 staff plus four Doctoral students carrying out their thesis and five new Doctoral students on external contract since the start of the academic year, all of which represent a total equivalent of 65.3 full-time employees.

The team was also reinforced by 27 trainees and three European volunteers who came to contribute their enthusiasm and invaluable collaboration to the Tour du Valat's scientific activities.

Total Équivalent Temps Plein (ETP) = 65





Us

DIRECTION

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

DEPARTMENT "CONSERVATION OF SPECIES AND THEIR POPULATIONS IN THE CONTEXT OF GLOBAL CHANGES"

- **Dr Arnaud Béchet** — *Head of Department, Research Scientist*
- **Antoine Arnaud** — *PhD, University of Toulouse*
- **Thomas Blanchon** — *Research Technician*
- **Clarisse Boulenger** — *PhD, Muséum National d'Histoire Naturelle (co-funding Brittany Region)*
- **Dr Jocelyn Champagnon** — *Research Scientist*
- **Pascal Contournet** — *Research Technician*
- **Dr Alain Crivelli** — *Research Director*
- **Laura Dami** — *Project Leader*
- **Clémence Deschamps** — *Project Officer*
- **Charlotte Francesiaz** — *PhD, University of Montpellier II (co-funding SIBAGHE)*
- **Christophe Germain** — *Research Assistant*
- **Yves Kayser** — *Research Assistant*
- **Dr Delphine Nicolas** — *Research Scientist*
- **Claire Pernollet** — *PhD, University of Montpellier (co-funding Montpellier Supagro)*
- **Charlotte Perrot** — *PhD, University of Montpellier (co-funding Montpellier Supagro)*
- **Dr Alain Sandoz** — *Research Scientist*
- **Dr Sophie Véran** — *Project Leader*
- **Dr Marion Vittecoq** — *Research Scientist*

DEPARTMENT "ECOSYSTEM MODELLING, RESTORATION AND MANAGEMENT"

- **Dr Brigitte Poulin** — *Head of Department, Research Scientist*
- **Nathalie Barré** — *Research Technician*
- **Nicolas Beck** — *Project Leader*
- **Dr Olivier Boutron** — *Research Assistant*
- **Dr Philippe Chauvelon** — *Research Scientist*
- **Nathalie Chokier** — *Research Assistant*
- **Dr Lisa Ernoul** — *Project Leader*
- **Samuel Hilaire** — *Research Technician*
- **Philippe Lambret** — *Project Leader*
- **Dr Gaëtan Lefebvre** — *Research Assistant*
- **Virginie Mauclert** — *Project Leader*
- **Dr François Mesléard** — *Research Director*
- **Marc Thibault** — *Project Leader*
- **Loïc Willm** — *Research Assistant*
- **Nicole Yavercovski** — *Research Assistant*

DEPARTMENT "MONITORING AND EVALUATION & WETLANDS POLICIES"

- **Dr Laurent Chazee** — *Head of Department*
- **Dr Coralie Beltrame** — *Project Leader*
- **Dr Elie Gaget,** — *PhD (Tour du Valat/ Museum National d'Histoire Naturelle)*
- **Dr Thomas Galewski** — *Project Leader*
- **Anis Guelmami** — *Research Assistant*
- **Dr Christian Perennou** — *Project Leader*

ESTATE MANAGEMENT

- **Cyril Caillat** ..... *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*
- **Morad Martoune** ..... *Estate Technician*
- **Ludovic Michel** ..... *Estate Technician*
- **Elvin Miller** ..... *Technician - Guard*
- **Anthony Olivier** ..... *Technician - Guard*

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SUPPORT SERVICES

- **Anne Ackermann** ..... *Executive Secretary*
- **Muriel Arcaute-Gevrey** ..... *Association Friends of Tour du Valat*
- **Nicole Bonfils** ..... *Accountant*
- **Vincent Boy** ..... *Computer Specialist*
- **Corinne Cuallado** ..... *Cook*
- **Florence Daubigney** ..... *Executive Secretary*
- **Marie-Antoinette Diaz** ..... *Secretary*
- **Kamal El Bachir** ..... *Accountant*
- **Rosalie Florens** ..... *Executive Secretary*
- **Cécile Girard** ..... *Cleaning Officer*
- **Stéphanie Gouvernet** ..... *Cleaning Officer*
- **Coralie Hermeloup** ..... *Communication Manager*
- **Jean-Claude Pic** ..... *Chief Accountant*
- **Catherine Picard** ..... *Accountant*
- **Justine Sanchez** ..... *Cleaning Officer*
- **Josiane Trujas** ..... *Canteen Assistant*
- **Josiane Xuereb** ..... *Accountant*
- **Gwenael Wasse** ..... *Librarian/ Communication officer*
- **Emmanuel Thévenin / Evanne Lefur** ... *Project Leader seconded to GIP ATEN*

STUDENTS

Camille Aneris, Rodrigue Archambeau, Tiphaine Arnoult, Marianne Bernard, Livia Bieder, Julie Campagna, Coline Canonne, Louise Briaut, Hugo Carre, Audrey Delannoy, Laetitia Driss, Julien Formento, Thibaud Gravez, Hermann Gauduin, Anne-Sophie Hervy, Wided Khechimi, Charlotte Lemoine, Maréva Merabet, Camille Moriconi, Lisa Paix, Valentine Plessis, Florent Sabatier, Emeline Sabourin, Fanny Santucci, WilliamSkinner, Hoang HaTran, Axelle Valero, Annabelle Vidal.

EUROPEAN VOLONTARY SERVICE | Erasmus+

Imogen Rutter, Céline Hanzen, Eva Gumzej, Tatiana Fuentes

FIXED-TERM CONTRACTS (SHORT PERIOD)

François Cavallo, Lisa Paix, Géraldine Simon, Marie Suet.

Our partners

A
- ACCOR Group - FR
- AEWA
- AFAC Agroforesterie
- Agro-Paris-Tech (Paris Institute of Technology of Life, Food and Environmental Science)
- Agroof - FR
- Agropolis Foundation - FR
- Alpilles Regional Natural Park - FR
- Arles Chamber of Commerce and Industry - FR
- Arles Hunting Group (GCA) - FR
- Arles Town Council - FR
- Artelia Water & Environment - FR
- Asphodèle Association - FR
- Atlantic Marshes, Channel and North Sea Transfer Unit - FR
- Authorized Coalition of the Fumemorte (ASA Fumemorte) - FR

B
- Bagnas National Nature Reserve - FR
- Banc d'Arguin National Park - Mauritania
- Barcelona Convention
- Berre Pond Joint Association (GIPREB) - FR
- Biotope - FR
- Bird Paradise Union of Izmir (Izkus) - Turkey
- Birdlife International
- Bolmon and Jaï Intercomunal Coalition - FR
- Bouches-du-Rhône Chamber of Agriculture - FR
- Bouches-du-Rhône Departmental Territories and Sea Authority (DDTM BDR) - FR
- Bouches-du-Rhône General Council - FR
- BPI France - FR
- British Trust for Ornithology - UK
- BRL Ingénierie - FR
- Burgundy Region - FR

C
- Camargue Horse Center - FR
- Camargue National Reserve / SNPN - FR
- Camargue Regional Natural Park (PNRC) - FR
- Catalan Technical Centre for Forestry - Spain
- Center for Evolutive and Functional Ecology (CNRS-CEFE) - FR
- CEPF (Critical Ecosystem Partnership Fund)
- Cepralmar - FR
- Chérine National Reserve - FR
- Chiroptera Group of Provence - FR
- Chréa National Park - Algeria
- CIHEAM/IAMM/Montpellier (Mediterranean Agronomic Institute of Montpellier) - FR
- CNRS-MIVEGEC (Infectious Diseases and Vectors: Ecology, Genetics, Evolution and Control) Montpellier - FR
- Coastal Mediterranean mosquito control coalition (EID Méditerranée) - Fr
- Coastal Protection Agency - FR
- Coastal Protection and Planning Agency -Tunisia
- Convention on Biological Biodiversity
- Corsica Regional Direction for Environment, Planning and Housing (DREAL Corse) - FR
- Corsican Environment Office (OEC) - FR
- Coussouls de Crau National Reserve - FR
- Cultural and Natural Heritage Industries Unit - FR
- Curtin University - Australia

D
- Departmental Hunting Federation of then Gard (FDC 30) - FR
- Direction of National Parks - Senegal
- Doga Dernegi - BirdLife - Turkey
- Doñana Biological Station - Spain

E
- Ebro Delta Natural Park - Spain
- EcoLab: Environment and Functional Ecology Laboratory / Toulouse - FR
- Egyptian Agency for Environmental Affairs - Egypt
- El Kala National Park - Algeria
- ENEDIS
- ENGREF Internal School of the Paris Institute of Technology for Life, Food and Environmental Science - FR
- Environment Quality Authority - Palestinian Authority
- Estagnol National Nature Reserve - FR
- Euro-Mediterranean System for Information and Water Datas (SEMIDE) - FR
- European Commission
- European Environment Agency
- European Research and Teaching Centre for Geoscience and Environment (CEREGE) - FR
- European Space Agency (ESA)
- European Topic Center on Land Use and Spatial Information - Spain
- Eurosite

F
- Federation for the Protection and Management of the Camargue in the Gard (SMGC) - FR
- Federation of Conservatories for Natural Areas
- Foundation for Biodiversity Research - FR
- Foundation of France - FR
- Foundations of Success
- France-Quebec Office for Youth - Canada
- François Sommer Foundation for Hunting and Nature - FR
- French Development Agency (AFD)
- French Ecological Society - FR
- French Environment and Energy Management Agency (ADEME) - FR
- French Foundations Centre (CFF) - FR
- French National Nature Reserves - FR
- French Peatland Resource Centre - FR
- French Research Institute for Exploitation of the Sea (IFREMER) - FR
- French Rice Centre (CFR) - FR
- French Society for Herpethology - FR
- French Society of the Study of Odonates - FR
- French Space Agency (CNES) - FR
- Friends of Pont de Gau Ornithological Park Association - FR
- Friends of the Birds Association (AAO) - Tunisia
- Friends of the Vigueirat Marshes Association - FR
- Friends of Tour du Valat Association - FR
- Fuente de Piedra Natural Reserve - Spain

G
- Gard Chamber of Agriculture
- Gard Departmental Territories and Sea Authority (DDTM Gard) - FR
- Gard General Council - FR
- GECINA Foundation - FR
- Géco Ingénierie - FR
- Global Footprint Network
- Gouraya National Park - Algeria
- Grand Lemps National Reserve - FR
- Greek Biotope/Wetland Centre - Greece
- Green Balkans NGO - Bulgaria

H
- Hebraic University of Jerusalem - Israel
- Hedmark University College - Norway
- Heritage Foundation (Fondation du Patrimoine) - FR
- High Commission for Waters and Forests and the Fight against Desertification - Morocco
- HydroSciences Laboratory Montpellier - FR

I
- Ichkeul National Park - Tunisia
- IMBE (Mediterranean Institute for Biodiversity, Marine and Continental Biology) - FR
- Initiative Centre for the Promotion of Agriculture and Rural Environment in the Gard Region (CIVAM Bio) - FR
- INRA-ENSAM (National Institute for Agronomy) - FR
- INRA - INNOVATION - FR
- INRA-UAPV - University of Avignon - FR
- INRIA - LEMON (National Research Institute in Computing and Automation) - FR
- Institute for Ecology and Environment (CNRS-INEE) - FR
- Institute for Environmentak Protection and Research (ISPRA) - Italy
- Institute of Geosciences and Earth Resources - National Centre for Research - Italy
- International Union for the Conservation of Nature (IUCN)
- IRD-CNRS Evolution and Symbiotic Systems Team - FR
- IRSTEA (National Research Institute of Science and Technology for the Environment and Agriculture) - FR
- ISIS-SPOT Images programme - FR
- IUCN International
- IUCN (International Union for the Conservation of Nature) French Committee
- IUCN (International Union for the Conservation of Nature) Mediterranean Cooperation Centre - Spain
- Izkus, Conservation Union Izmir - Turkey
- Izmir Provincial Department for Forestry and the Environment (National Parks) - Turkey

L
- Laboratory of Geophysical and Industrial Flows - FR
- LAMETA INRA-SupAgro - FR
- Languedoc-Roussillon Conservatory for natural areas (CEN LR) - FR
- Languedoc-Roussillon Region - FR
- Languedoc-Roussillon Regional Centre for Forestrian Property - FR

Funding | Technical | Institutional | Scientific

FR = France

- Languedoc-Roussillon Regional Direction for Environment, Planning and Housing (DREAL LR) - FR
- Languedoc-Roussillon Regional Network for Environmental Education (GRAINE LR) - FR
- Le Citron jaune / Ilotopie, National Centre for Street Arts - FR
- League for the Protection of Birds (LPO) - FR
- Libelo - FR
- Listel
- Local nature guides office - FR

M

- Marseille Fos Port Authority (GPMM) - FR
- MAVA Foundation - Switzerland
- MedINA - Greece
- Mediterranean Botanical Conservatory of Porquerolles - FR
- MedPan Association
- MedWet
- Meridionalis
- Ministry for Agriculture and Hydraulic Resources - Directorate General of Forests - Tunisia
- Ministry for Agriculture and Rural Development Directorate general of Forests (DGF) - Algeria
- Ministry for Ecology, Sustainable Development and Energy (MEDDE) - FR
- Ministry for Environment - Libya
- Ministry for Environment and Forests - Turkey
- Ministry for Foreign Affairs - Turkey
- Ministry for Higher Education and Research - FR
- Mohamed V University of Rabat - Morocco
- Molentargius Saline Regional Natural Park - Italy

N

- Narbonnaise Regional Natural Park - FR
- National Agency for Health Security - Animal Health Laboratory - FR
- National Centre for Scientific Research - Chizé Centre for Biological Studies (CNRS-CEBC) - FR
- National Environment Protection Agency (ANPE) - Tunisia
- National Institute for Agronmy Tunis - Tunisia
- National Institute for Youth and Community Education - Canada
- National Museum for Natural History - FR
- National Office for Hunting and Wildlife (ONCFS) - FR
- National Office for Water and Aquatic Environments (ONEMA) - FR
- National Research Agency (ANR) - FR
- National School for Agronomy of Toulouse (ENSAT) - FR
- National School of Architecture Montpellier - FR
- National Veterinary School / Lyon, FR
- Natural Areas Documentation and Training Centre (ATEN) - FR
- Nature Conservation - Egypt
- Noé Conservation

O

- OPTRONIK - Germany
- Ostraka workshop - FR
- Overseas Transfer Unit - FR

P

- Pasteur Institute - Molecular Genetics of RNA Viruses - FR
- Paul Sabatier University, Toulouse - FR
- Permanent Centre for Environmental Initiatives / Arles (CPIE) - FR
- Plaine des Maures National Nature Reserve - FR
- Po Delta Emilia-Romagna Regional Park - Italy
- Polytechnic Institute of Milan - Italy
- Ponds, Inland wetlands, and Flood plains Transfer Unit - FR
- Pont de Gau Ornithological Park - FR
- Practical School for Higher Education (EPHE) / Montpellier - FR
- Prince Albert II of Monaco Foundation - Monaco
- ProValat Foundation - Switzerland
- Provence-Alpes-Corsica Savings Bank (CEPAC) - FR
- Provence-Alpes-Côte d'Azur Conservatory for Natural Areas (CEN PACA) - FR
- Provence-Alpes-Côte d'Azur Region - FR
- Provence-Alpes-Côte d'Azur Regional Environment Protection Agency (ARPE) - FR
- Provence-Alpes-Côte d'Azur Regional Network for Environmental Education (GRAINE PACA) - FR
- Provence-Alpes-Côte d'Azur Regional Network of Natural Area Managers (RREN) - FR
- Provence-Alpes-Côte d'Azur Regional Direction for Environment, Planning and Housing (DREAL PACA) - FR

R

- Ramsar Convention
- Ramsar France Association - FR
- Regional Council for the Environment of Andalucia - Spain
- Regional Network of Aquatic Ecosystem Managers - FR
- Remote Sensing Centre Montpellier - FR
- Research Group for Organic Agriculture - FR
- Research Group for Bird Protection in Morocco - Morocco
- Rhône-Alpes Conservatory for Natural Areas (CEN RA) - FR
- Rhône-Mediterranean Migratory Fish Association - FR
- Rhône-Mediterranean - Corsica Water Agency - FR
- Royal Society for Nature Conservation - Jordan

S

- Saint-Laurent-d'Aigouze Town Council - FR
- Saintes-Maries-de-la-Mer Town Council - FR
- Salins Group - FR
- Savoy Natural Heritage Conservatory - FR
- Scientific Institute of Rabat - Morocco
- Society for the Protection of Prespa - Greece
- Spanish Centre for Wetlands (CEHUM) - Spain
- SPEA - BirdLife Portugal (Portuguese Society for the Protection of Birds) - Portugal
- SPYGEN
- Sustainable Research Centre - Australia
- Synthesis and Analysis Centre for Biodiversity (CESAB) - FR

T

- Tlemcen National Park - Algeria
- Tolmin Angling Association - Slovenia
- Total Foundation - FR
- Tunisian Observatory for Environment and Sustainable Development - Tunisia

U

- UFR PhITEM
- UNEP Mediteranean Action Plan
- UNEP-RAC/Blue Plan (United Nations Programme for Environment / Regional Acivity Centre)
- UNEP-RAC/SPA - Tunisia
- University Hassan II of Casablanca - Morocco
- University of Aix-Marseille - UFR Sciences - FR
- University of Aix-Marseille -UMR ESPACE - FR
- University of Aix-Marseille CEJU - FR
- University of Aix-Marseille IMBE (Mediterranean Institute for Biodiversity, Marine and Continental Biology) - FR
- University of Angers - UMR LETC LEESA - FR
- University of Annaba - Wetlands Research Team - Algeria
- University of Avignon - IUT / Hydrogeology Team - FR
- University of Biskra - Algeria
- University of Burgundy - UMR BioGéoSciences - FR
- University of Cambridge - UK
- University of Chott Meriem - Tunisia
- University of Ege - Turkey
- University of El Tarf - Algeria
- University of Gabès - Science Department - Tunisia
- University of Göttingen - Germany
- 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 - FR
- University of Malta - Malta
- University of Montpellier II - Institute for Evolutionary Sciences - FR
- University of Montpellier II -Ecosym Team - FR
- University of Moulay Ismaïl - Morocco
- University of Oxford - Edward Grey Institute - UK
- University of Parma - Italy
- University of Provence - Chemistry and Environment Team - FR
- University of Rennes - UMR ECOBIO - FR
- University of Rennes 1 - OSUR - FR
- University of Sassari - Italy
- University of Sfax - Tunisia
- University of Skikda - Algeria
- University of Tel-Aviv - Israel
- University of the Sunshine Coast - Sustainable Research Centre - Australia
- University of Tizi-Ouzou - Algeria
- University of Toulouse - Ecolab - FR
- University of Tripoli - Libya
- University of Uppsala - Sweden

V

- Verdier Marshes Association - FR
- Verots Foundation - FR
- Vigueirat Marshes National Nature Reserve - FR

W

- Water Competitive Cluster - FR
- Water Footprint Network
- Wetlands International
- Wetlands International European Association
- World Conservation Monitoring Centre
- WWF France - FR
- WWF international - Switzerland
- WWF Mediterranean Programme Office

Z

- Zoological Institute - UK
- Zoological Society of London - UK

FR = France

€ Funding | Technical | Institutional | Scientific

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Support

the activities of the Tour du Valat

In order to help the Tour du Valat to continue its actions for the common good, we need your support. There are several ways to provide it.

Join the association "Friends of Tour du Valat"

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The association was founded in 2014, on the occasion of the 60th anniversary of the Tour du Valat, in order to bring together the fabulous human capital built up over the years by all those who have made the Tour du Valat what it is, and more broadly all those who share our values and the sense of our actions. Its aim is to provide exchange and knowledge-sharing, and to promote the work of the Tour du Valat.

All you have to do to join is download the membership coupon from our website:

www.tourduvalat.org/soutenir

or contact us for further information at:

amis@tourduvalat.org

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Make a gift

Gifts enable us to continue and intensify our research work to conserve the biodiversity of Mediterranean wetlands and encourage the wise use of their natural resources.

To make a gift just download the gift form (.pdf) available on our website:

www.tourduvalat.org/support

and send it to us together with your payment.

© Tour du Valat

TAX-DEDUCTIBLE SUPPORT

The Tour du Valat Foundation is recognised as being of public interest and therefore authorised to receive gifts of money. 66% of your gift is tax-deductible up to the limit of 20% of your taxable income. A gift of 100 € will thus only really cost you 34 € after tax deduction.

Sponsor a Greater Flamingo

© Jean E. Roché

On becoming a sponsor you will be informed of the movements of "your" flamingo all through the year, and whether it bred successfully.

Each time an observation of your flamingo is communicated to us, you will be informed by email and will be able to consult the records of its movements on an interactive dynamic map and in the form of a table.

By sponsoring one or more banded flamingos, you will support the "Greater Flamingo Network" and be involved in protecting the species at pan-Mediterranean scale. Sponsoring costs 25 € per flamingo per year. This sum is entirely dedicated to buying optical equipment such as binoculars and telescopes to be given to our partners in the south and east of the Mediterranean Basin so that they can contribute to monitoring flamingos throughout their range.

If you sponsor two flamingos (2 X 25 €) it will only really cost you 17 € after tax deduction.

You can subscribe via the website:
www.tourduvalat.org/support
under "adopt a flamingo"

or contact us for more information:
parrainageflamants@tourduvalat.org

Make a donation or bequest

Because the Tour du Valat's values are dear to you, and you appreciate the quality and independence of its work, you can act on a long-term basis and help us to shape its future by making a donation or bequest to the Tour du Valat Foundation. Again, you will benefit from tax rebates. Don't hesitate to contact us for further information.

partenariat@tourduvalat.org

THE PETIT SAINT-JEAN ESTATE

Thanks to the generosity of Mr Bernard, the Tour du Valat has become the owner of an estate in the Gard whose total area of 101 hectares includes a remarkable pine wood (50 ha), marshes (24 ha), and agricultural land (26 ha). In keeping with the spirit of its donor, the Tour du Valat is using the site for an agro-ecological partnership project aimed at developing a productive, sustainable, resilient and autonomous agricultural system based on synergies with natural habitats.

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Sponsors

We were able to carry out our activities in 2015 thanks to our partnerships with various sponsors, in particular:

FONDATION PRINCE ALBERT II DE MONACO

Since the Mediterranean Wetlands Observatory was set up, the Prince Albert II of Monaco Foundation has helped the Tour du Valat to assess the status and trends of wetlands in the Mediterranean Basin, in particular by defining the indicators needed to analyse their water resources and biodiversity.

MAVA FONDATION POUR LA NATURE

Created by Luc Hoffmann in 1994, the mission of the MAVA Foundation is to establish solid partnerships in order to preserve biodiversity for future generations. The Tour du Valat is one of the key projects backed by the MAVA Foundation, from which it receives major support.

ProVALAT Fondation

In 1974, Luc Hoffmann created the Tour du Valat capital endowment, which is today managed by the Pro Valat Foundation. Its revenues cover 13% of the budget of the Tour du Valat Foundation.

FONDATION TOTAL

Continuing the partnership initiated nine years ago, this year the Total Foundation has contributed to our Greater Flamingo research programme, to the monitoring of Slender-billed Gull, to the creation of an interactive wetland management tool, to the biodiversity monitoring in the marshes, and to the support of the Mediterranean Wetlands Observatory.

Fondation gecina

A new partner for the Tour du Valat, the Gecina Foundation provides support for the Resifaune Health Ecology project, whose aim is to achieve a better understanding of the role played by wildlife in the circulation of antibiotic-resistant bacteria through studying the bacteria carried by rodents and gulls in various Camargue habitats.

Fondation de France

The Foundation of France supports the Tour du Valat in two multi-disciplinary research projects: one favouring a social and human approach, using the Greater Flamingo to develop a participative Geographical Information System, the other aiming at developing an agro-ecological window-site on the Petit Saint-Jean Estate, in the Camargue Gardoise, through the use of agricultural production systems.

ENEDIS
L'ELECTRICITE EN RESEAU

The Tour du Valat Regional Natural Reserve used to be crossed by three medium-voltage power lines, with negative impacts on the landscapes, and cases of bird collisions or electrocutions. In the face of this situation, a technical, financial and skills-sharing partnership was set up with ENEDIS, which manages most of the electricity network in France, and the Provence-Alpes-Côte d'Azur Region with a view to carrying out a fairly exemplary operation to dismantle and bury the power lines. An agreement was concluded aiming, in particular, to promote this type of action and train ENEDIS employees with regard to biodiversity.

WWF

In the framework of a global partnership, WWF works with Coca-Cola in its "Replenish" Programme. The aim is to give back to human communities and nature a volume of water equivalent to that used for the worldwide production of drinks. In France, this commitment has resulted in a partnership between Coca-Cola and WWF-France in a project based on improving hydraulic and biological exchanges at the Camargue Salt Works Lagoons and Marshes, which is joint-managed by the Tour du Valat, the Conservatoire du Littoral (Coastal Protection Agency), the Camargue Regional Natural Park, and the National Nature Protection Society. The Tour du Valat is responsible for coordinating the actions carried out in the framework of this project, which is based on the site management guidelines.

Institut KLORANE
protéger explorer éduquer

The Klorane Institute, a company foundation for the protection and promotion of botanical heritage, and the Tour du Valat Foundation have many points in common. They are both the work of visionary individuals committed to a harmonious relationship between Humanity and Nature: Pierre Fabre and Luc Hoffmann, who knew each other and got on well. The two foundations have the intention to collaborate on the creation of a sketchbook of the Camargue flora, and the cultivation of European searocket, Cakile maritima, within the context of the agro-ecology project on the Petit Saint-Jean Estate.

CAISSE D'EPARGNE
PROVENCE - ALPES - CORSE

The CEPAC Savings Bank, who supported last year the acquisition of a wood chipper to capitalize on some of the wood growing on the Tour du Valat Estate, continues its commitment alongside the Tour du Valat through the funding of an extraction and storage system for the rice hull ash derived from our multi-fuel biomass boiler. It also contributes to the funding of an alternative mosquito control project, which uses no insecticides.

Hosted organisations

The Tour du Valat is hosting five partner organisations in its premises:

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'Études et Recherches Appliquées (CNERA), one of which is devoted to the smaller resident plains fauna and the other to migratory birds.

Learn: www.oncfs.gouv.fr

L'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: www.takh.org

MedWet Secretariat

The MedWet initiative is composed of 26 partner countries in the Mediterranean Basin and the Palestinian Authority. Its mission is to promote the implementation of the Ramsar Convention's objectives and initiatives in the Mediterranean region. Since 1992, MedWet has been encouraging partnerships in order to ensure and support a rational use and an effective conservation of wetlands.

In 2014, at the invitation of the French Government and with the support of the Rhône Mediterranean Corsica Water agency and Fondation MAVA, the MedWet secretariat has been relocated at Tour du Valat, and works closely with the Mediterranean Wetlands Observatory.

Learn: www.medwet.org

Association Friends of Tour du Valat

The association has been created for the 60th Anniversary of the Foundation and links many an employee, current or former, intern, partner be it private or public, friend, patron who share the values and the philosophy of Tour du Valat. Its goal is to unite, advance, promote and support the action of the Foundation through this vast network of people linked professionally as well as personally.

Learn: www.tourduvalat.org/soutenir

Association CARIBAEA INITIATIVE

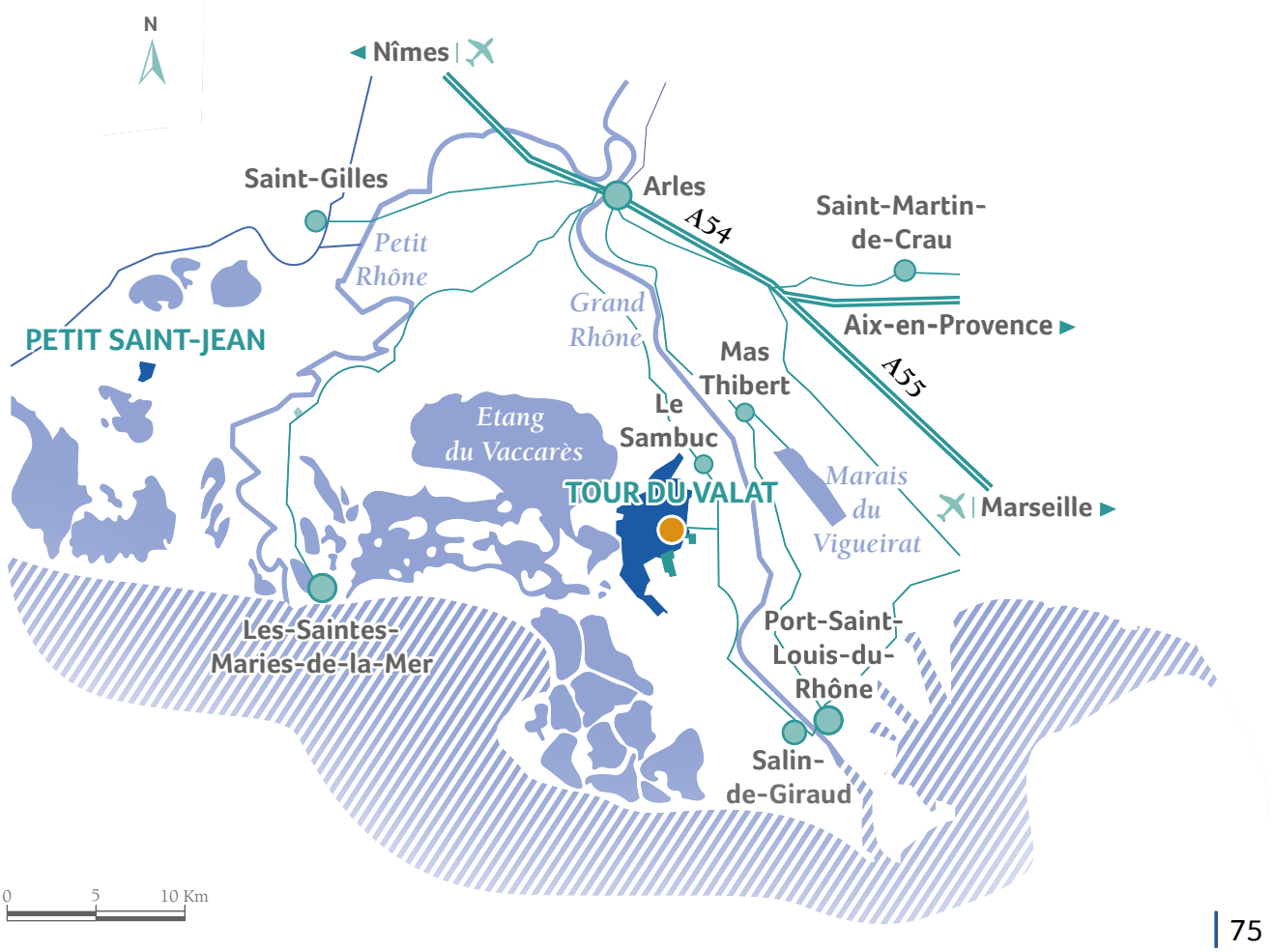
The Association « Caribaea Initiative » aims at contributing to the development of scientific research on biodiversity and wildlife management at the scale of the Antillean Arc. Created in October 2014, the Association acts to strengthen the scientific expertise capacity on animal biodiversity in the Caribbean and to support the training of future local experts, through master and PhD grants

Learn: www.caribaea.org

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.
- Together with the Bureau des Guides Naturalistes (BGN), paying guided visits are organized from November till April, every second Saturday. Registration is compulsory at BGN Bureau: +33 695 907 048
- If you wish to receive information about the programmes and other events organized at the Tour du Valat for the general public, please contact us at: secretariat@tourduvalat.org
- Follow us on:
  @TourduValat / Tour du Valat
  www.tourduvalat.org



TOUR DU VALAT

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conservation of Mediterranean wetlands

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