TOUR DU VALAT

Strategic Plan for 2016-2020

Research Institute
for theconservation
of Mediterranean Wetlands

TOUR DU VALAT

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2016-2020 Strategic Plan

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Mediterranean wetlands: a key ecosystem under pressure

Economic, political, social, religious, and environmental pressures continue to mount in the Mediterranean Basin. The human “ecological footprint” there is nearly twice as large as the world average, with particularly high pressure on water resources. Wetlands are particularly severely affected by these pressures, which result in the degradation of biodiversity and ecosystem services, and a concomitant negative impact on Mediterranean communities, especially those on the coast.
While the destruction and alteration of wetland functions have been identified (but poorly measured), our lack of knowledge on the key functional role played by wetlands and the services they provide often lead to an underestimation of the consequences of their degradation for the local community.

Our answer

In response to this societal issue, which has become increasingly clear in recent decades, the Tour du Valat, a wetlands conservation research institute, has defined its actions in terms of a medium- and long-term vision, so that it can be more pertinent, effective, and efficient in carrying out its mission:

Ensure the conservation and wise use of Mediterranean wetlands by improving the understanding of their functioning and fostering a community of actors.

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To accomplish this mission, we have set the following objectives:

Undersand

- Improve and share knowledge on the functions, services, and values of Mediterranean wetlands, as well as their dynamics in response to global changes.

Manage

- Test and capitalise on the management practices enabling the sustainable management, conservation, and use of the biodiversity, functions, and services provided by Mediterranean wetlands.

Convey

- Strengthen the synergies between Mediterranean wetland stakeholders, in particular through capacity building for scientists, wetlands managers and users, and civil society to ensure that behaviour really changes.

Convince

- Unite key stakeholders to convince decision-makers of the importance of Mediterranean wetlands by providing them with reliable arguments and governance tools.

Our strengths and future challenges

The Tour du Valat's historical development gives it major advantages for addressing issues in the future, in terms of:

- its multidisciplinary and operational expertise, which has been tested in the field and received international recognition;
- its ability to transform its actions into long-term projects, which greatly increases its capacity to analyse environmental changes, and then to imagine the appropriate response;
- its capacity to convey its ideas, catalyse action, and create synergies between stakeholders and organisations around a common cause.

Given the increasing complexity of issues, it is vital for the Tour du Valat to remain focused on the key areas in which it can make a difference today, while maintaining its capacity to get involved in the new fields that will be decisive tomorrow.

The main challenges for the next five years (2016-2020) are:

- **Develop advocacy for the conservation and sustainable use of Mediterranean wetlands with Tour du Valat acting as a key leader;**

- **Develop new modalities to reinvest in the southern and eastern Mediterranean following a period focusing on the Camargue due to the institutional and political instability in the Mediterranean basin;**

- **Strengthen synergies with the major players involved in wetland conservation in the Mediterranean basin;**

- **Extend our support to developing and strengthening NGOs engaged in wetlands in the Mediterranean countries.**

A programme built around three research themes

Based on the above, the 2016-2020 program was organized in three complementary departments coordinated by the Directors :

Species : Help with the conservation of species and the management of conflicts between these species and human activities,

Ecosystems: To analyze the consequences of global change on biodiversity, wetland functioning and socio-economic uses, and to propose methods for adaptive management and restoration.

Observatory of Mediterranean wetlands: Change the behavior of decision makers through awareness raising and the provision of information on the status and trends of wetlands.

To implement this programme as effectively as possible, we have devised it based on:

- a limited number of projects, focusing on major issues and carried out in collaboration with organisations that are recognised for their expertise;
- an explicit strategy for action, specifying the target groups, impacts, and anticipated outcomes, as well as the causal chain that should lead to these results, which will enable the adaptive management of projects;
- improving our transfer and communication strategy, targeting first of all decision-makers and wetlands managers and users
- being sure our organisation corresponds to the programme objectives, and optimising our resources.

General Introduction

Jean Jalbert et Patrick Grillas

TOUR DU VALAT

Introduction

The decline in biodiversity due to pressure from global changes is now a generally accepted fact. In spite of the growing mobilisation to save biodiversity, the various pressures on ecosystems are continuing to increase. These pressures include the destruction and fragmentation of habitats, toxic and trophic pollution, exotic invasive species, climate changes, the overexploitation of natural resources, and the emergence of infectious diseases. They are the consequences of a set of political, legal, and governance-related factors, which still largely underestimate the quantities of natural resources consumed due to choices made in terms of development models. Today, these consequences are becoming increasingly clear: the sixth mass extinction of biodiversity[1] and the negative consequences for human societies, such as the exhaustion of natural resources and climate changes, and the multiple repercussions of both.

Proof continues to accumulate in favour of the hypothesis that the dominant model of development is extremely vulnerable, because it is based on the unworkable premise of perpetual growth in an environment with limited resources. We need to create new models based on the sustainable management of natural resources, so that ecosystems and their biodiversity can be preserved. Such action would require research and nature protection organisations to develop in collaboration with all stakeholders involved the capacity to provide effective solutions to the challenges of sustainable development, which can help to maintain ecosystems and their functions, and the goods and services they provide. Research organisations like the Tour du Valat must provide the new knowledge required when it is needed, while taking effective action in the complex network of relations linking institutions, decision-makers, and demands from society.

In this context of continuously increasing pressure on biodiversity, the Tour du Valat's strategic plan is based on two main objectives:

- optimising its contribution to the conservation of biodiversity and the sustainable use of wetlands;
- sharing within the Tour du Valat and with its outside partners a common vision of the issues and the sense of its actions

The Tour du Valat's ambition for its 2016-2020 programme is to propose pertinent responses to the principal conservation issues facing Mediterranean wetlands and to work actively with other stakeholders to implement these solutions effectively.
Its strategic plan is based on a study of the current situation and expected changes in Mediterranean wetlands to define new options for proposing a sustainable response to biodiversity issues and societal needs.

The effectiveness of this programme assumes that those who degrade biodiversity will modify their behaviour or projects (Mermet 1991). The identification of the ways in which the Tour du Valat can take action is based on the analysis of its strengths and weaknesses and its complementarity with respect to other organisations in the fields of research and conservation. It is also based on the analysis of the effectiveness of the approaches implemented in its previous programmes.

Finally, strategic planning implies the critical analysis of in-house operations and how they can be improved to create the best environment in which successful Mediterranean wetlands projects can be developed. It also requires additional reflections on the most effective results, their valuation, and how they can be transferred to the stakeholders from which a change in behaviour is expected.

[1] The current rates of extinction of species on Earth is more than 1,000 time greater than the rates recorded in the past (Pimm, S.L., Jenkins, C.N., Abell, R., Brooks, T.M., Gittleman, J.L., Joppa, L.N., Raven, P.H., Roberts, C.M., Sexton, J.O., 2014. The biodiversity of species and their rates of extinction, distribution, and protection. Science 344, 1246752. doi:10.1126/science.1246752).

Context, issues and prospects for Mediterranean wetlands

The Mediterranean Basin: powerful links but profound divisions

At the crossroads of three continents with contrasting bioclimates, featuring a high degree of inter- and intra-annual variability and spatial heterogeneity, the Mediterranean Basin is a unique area that supports exceptional biodiversity. Various civilisations have prospered there for millennia, exploiting and shaping this biodiversity. In terms of the percentage of endemic species and the pressures to which these areas must respond, the Mediterranean region has been recognised as one of the 34 world biodiversity hotspots[2] [3].

Today, the Mediterranean Basin is one of the regions in the world with the greatest economic, social, political, religious, and environmental tensions. There are many dividing lines; however, the most striking ones, which generate other divisions, are[4] :

- The availability of water: 86% of the water resources are located on its northern shore. 60% of the world population lacking water (less than 1000 m^3/hab./year) lives in one of the countries around the Mediterranean Sea. Of these 180 million inhabitants, 60 million are living with extremely limited water resources (less than 500 m^3/hab./year), and 20 million do not have access to drinking water.
- The economic situation: the countries to the north contribute 83% of the regional gross domestic product (GDP) compared to only 17% for those to the south.. This is the largest gap between two contiguous zones on the earth. The economic crisis in European countries and the development of countries in the South have only closed it slightly. Fuelled by the frustrations of local populations stemming from the economic, social, and political situation in many northern African countries, the Arab Spring that erupted in 2011 and its consequences in various countries in the Maghreb and the Middle East have deeply distressed and undermined these societies.

There have been drastic upheavals in the relationships between Society and Nature in the last 150 years due to strong demographic growth and constantly increasing anthropogenic pressure, which have been worsened by the often ineffective and poorly shared management of resources. The constant increase in environmental disturbance by human activities has resulted in both biodiversity and an epidemiological crisis marked by the emergence of new infectious diseases from wild and domestic animals.

The intensity of the exploitation of natural resources can be measured in terms of the ecological footprint. In the Mediterranean region[5] (Figure 1), the ecological footprint for 2008 was 3.1 hectares per person (gha/person), or nearly twice the world average (1.8 gha/person). What is even more preoccupying is that the average ecological footprint in the Mediterranean region is 1.8 gha/person more than the biocapacity there, which has been evaluated at 1.3 gha/person, thus demonstrating a significant and growing overexploitation of natural resources (Figure 2).

[2] A biodiversity hostpot must meet two strict criteria: it must contain at least 1500 species of endemic vascular plants (>0.5 percent of th world's total) and have at leas 70 percent of its origina plant cover (Myers et al. 2000).

3 Doğa Derneği, 2010. Profil d'écosystème: HOTSPOT DE LA BIODIVERSITÉ DU BASSIN MÉDITERRANÉEN. Critical Ecosystem Partnership Fund.

[4] www.planbleu.org

[5] MEDITERRANEAN ECOLOGICAL FOOTPRINT TRENDS, Année: 2012 http://www.footprintnetwork.org/images/article_uploads/Mediterranean_report_FINAL.pdf.

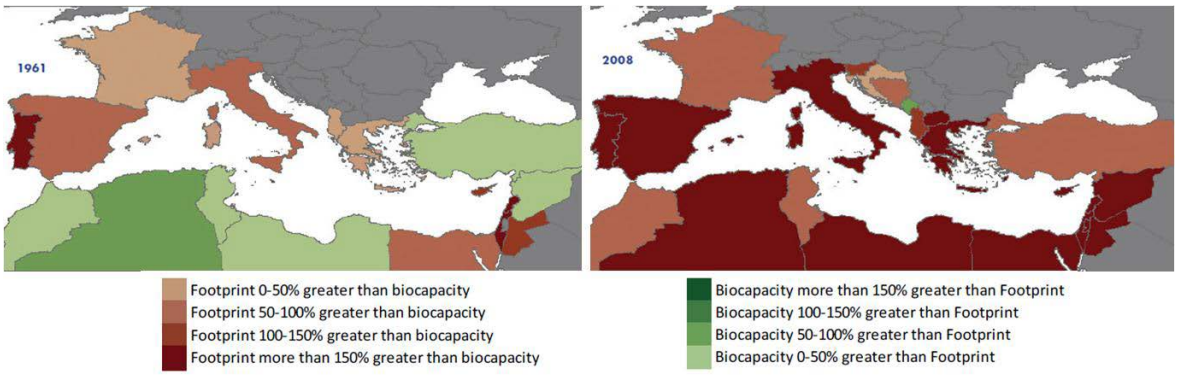

Figure 1 : Negative (red) and positive (green) ecological balances of Mediterranean countries 1961 (left) and 2008 (right) (Galli & Halle 2014).

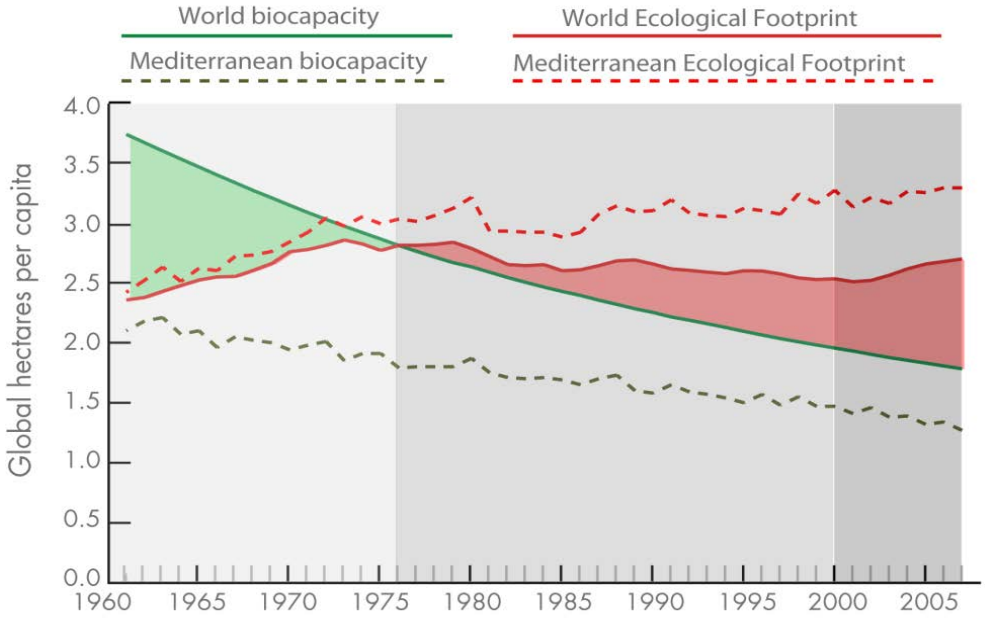

Figure 2 : Trends in the ecological deficit in the Mediterranean Basin compared to the global average.[6]

In spite of these pressures, Mediterranean biodiversity remains exceptional, and its ecosystem services are of major importance for the populations and national economies.

Forecasts by the Blue Plan[7] for 2025 predict increasing anthropogenic pressures on ecosystems, particularly in the southern part of the Basin:

- The current population of 430 million inhabitants will increase by 95 million (+22%) (90 million in the south and more than 30 million on the coast).
- 140 million additional international tourists per year (+56%), so the Mediterranean region will remain the premiere destination in the world.
- 50 km^3 of additional water used each year (+17%).

The increasing population, intensification of human activities and climate changes all threaten the functioning of ecosystems and the vital resources upon which many local communities depend (freshwater, food, and other ecosystem services).

[6] Galli A. & Halle , 2014. Mounting Debt in a World in Overshoot: An Analysis of the Link between the Mediterranean Region's Economic and Ecological Crises. *Resources* 2014, *3*, 383-394; doi:10.3390/resources3020383.

[7] www.planbleu.org.

There must be multiple responses that are as significant as the issues themselves. A Mediterranean Strategy for Sustainable Development was developed within the framework of the Mediterranean Action Plan (MAP/UNEP)[8], a programme for implementing the Barcelona Convention. This strategy, which was adopted by all of the Mediterranean countries, aims to change the modes of production and consumption that are not sustainable, and to provide sustainable management of natural resources, particularly, the integrated management of resources and the demand in terms of water. The economic crisis that erupted in 2008 has demonstrated the fragility of our current modes of development, yet it has also contributed to making decision-makers pay less attention to environmental issues, because they have been more focused on seeking immediate solutions to its socio-economic consequences of this crisis.

The Mediterranean, a climate change hotspot

The Mediterranean region is considered to be one of the most vulnerable regions in the world in terms of climate changes that will affect the capacity of its ecosystems to provide services to human societies (Bangash et al. 2013)[9]. A temperature increase of more than 2°C would have catastrophic consequences on biodiversity, with heavy impacts on the economy, development, and the socio-cultural context[10]. The sea level has been rising increasingly fast[11] moving from 1.5mm/year from 1901 to 1970 to 2.0mm/year from 1971 to 1990, and 3.2mm/year from 1990 to 2010, and is influenced by more than 70% by the thermal expansion of oceans due to global warming.

The Fifth Assessment Report of the IPCC[12] shows that for most parameters, field data corresponds to worst trend scenarios and are sometimes even worse. The increase in temperatures since the early 20th century may exceed 2°C before 2050 (RCP 8.5). Likewise, the models used predict that during the 21st century the sea level will continue to rise with an increase of 0.52 to 0.98 m from now to 2100 according to RCP 8.5. These changes will be accompanied by an increase in the frequency and intensity of extreme climate events.

The impacts of climate change should be particularly important in the Mediterranean region due to their combined effects with many other factors of anthropogenic pressure, which will decrease ecosystem resilience capacity there. All kinds of wetlands are going to be affected; however, **coastal wetlands** will be the most severely affected. In other respects, the **beds of major streams and rivers, as well as the alluvial system,** must play a key role in response to extreme climatic events, in any case, more than they do today.

Mediterranean wetlands: a key ecosystem

Wetlands are the category of ecosystem that contributes the most to human subsistence and development,[13] yet paradoxically, wetland ecosystems are also the ones most highly threatened by human activities.[14] Wetlands represent approximately 15% of the carbon pool of the terrestrial biosphere,[15] play a major role in climate changes, and can contribute to our adaptation to these changes (Australian Government 2012[16]).

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[8] See www.unepmap.org.
[9] Bangash et al; 2013. Ecosystem services in Mediterranean river basin: Climate change impact on water provisioning and erosion control. Science of the Total Environment, 458-460: 246-255.
[10] Synthesis of National Overviews on Vulnerability and Impacts of Climate Change on Marine and Coastal Biological Diversity in the Mediterranean Region, UNEP-MAP RAC SPA info doc, 2009.
[11] http://www.climatechange2013.org/images/report/WG1AR5_Chapter13_FINAL.pdf
[12] http://www.climatechange2013.org/images/report/WG1AR5_Chapter12_FINAL.pdf
[13] The services provided to humanity by wetlands are evaluated to be 15 trillion dollars per year. This represents 45% of all services provided today for a land cover of only 6% (source CBD).
[14] Millennium Ecosystem Assessment (www.greenfacts.org/ecosystems/#99 and www.milleniumassessment.org).
[15] Bolin & Sukumar 2000 ; Patterson 1999.
[16] Issues Paper: The Role of Wetlands in the Carbon Cycle. July 2012. http://www.environment.gov.au/resource/issues-paper-role-wetlands-carbon-cycle.

Mediterranean wetlands play a key functional role for many resident and migrating species.At the dawn of the sixth mass extinction of biodiversity, our perception of biodiversity is still too often limited to a few flagship species, whereas it is crucial to consider it as the foundation of life itself and the numerous interactions between nature and human societies, because of the countless goods and services it provides. These species are exploited for fishing, hunting and grazing, are harvested for food or medicine, and contribute to the Mediterranean economy and the well-being of Mediterraneans.

The key role played by wetlands is even more crucial because of their scarcity in this region where severe droughts are common. They are also indispensable for the sustainable management of water resources in terms of both quality and quantity.

An alarming observation

In spite of the commitments made by countries, in particular within the framework of the Convention on Wetlands of International Importance (Ramsar 1971), and actions by NGOs, these areas have continued to disappear at a rapid rate (Prigent *et al.* 2012[17], Davidson 2014[18]). Freshwater species are highly threatened, probably more than those in marine and terrestrial ecosystems.[19]

The area of wetlands in the Mediterranean Basin[20] is estimated to be between 15 and 22 million hectares (one fourth artificial). The Mediterranean region has lost more than 50% of its wetlands since 1900.[20] These losses are continuing today with a 10% loss of natural wetlands from 1975 to 2005.[21] Meanwhile, the creation of artificial wetlands, which are of much lower quality, corresponds to only half of the area of the natural wetlands lost (Figure 3).

[17] Prigent C., Papa F., Aires F., Jimenez C., Rossow W.B. & Matthews E., 2012. Changes in land surface water dynamics since the 1990's and relation to population pressure. Geophysical Research Letters, 2012, 39, L08403.
Finlayson C.M. & Davidson N.C. 1999 (2nd Edition). Global review of wetland resources and priorities for wetland inventory. Summary Report. Darwin, Australia, Environmental Research Institute of the Supervising Scientist/Wetlands International. http://www.wetlands.org/Portals/0/publications/Report/WI_GRoWI-Report_1999.pdf

[18] Davidson N.C., 2014. How much wetlands has the world lost? Long-term and recent trends in global wetland area. Marine and Freshwater Research 65: 934-941.

[19] http://intranet.iucn.org/webfiles/doc/SpeciesProg/FBU/IUCN_WCC_Freshwater_Factsheet.pdf).

[20] OZHM 2012. Mediterranean wetlands outlook. First Mediterranean Wetlands Observatory report. Tour du Valat Ed., 128p.

[21] Mediterranean Wetlands Observatory, 2014. Land Cover: Spatial dynamics in Mediterranean coastal wetlands from 1975 to 2005. Thematic Collection Special Issue N°2. Tour du Valat, France. 48 pages. ISBN: 2-910368-59-9.

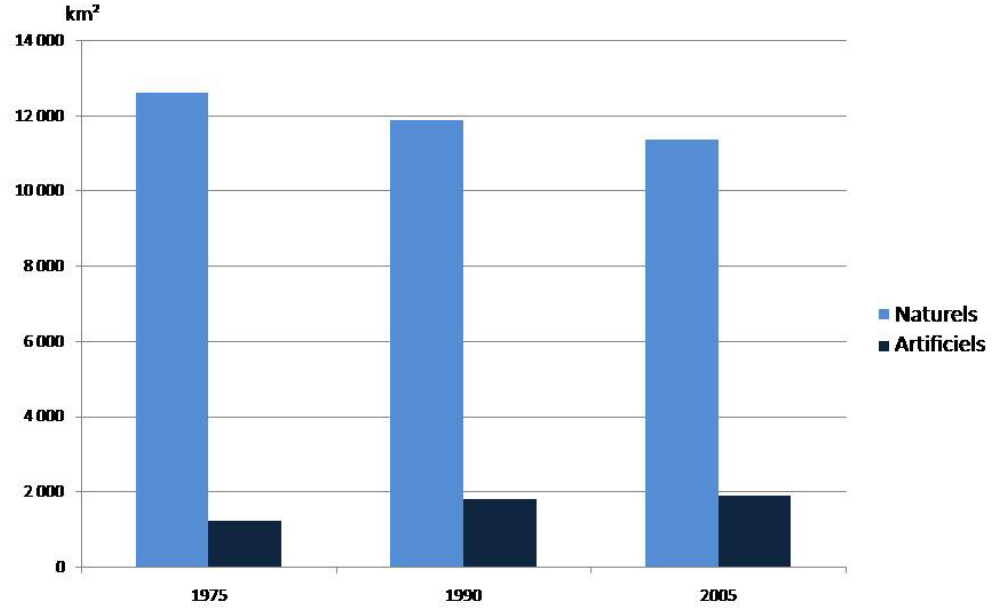

Figure 3. Area of natural and artificial wetland habitats in 214 coastal wetlands in the Mediterranean Basin from 1975 to 2005 (km²).

Protected areas cover a very small percentage of the territories concerned (e.g., 1.37% of metropolitan France[22]). The terrestrial part of protected areas with either contractual protection (Regional Natural Parks) or covered by international conventions (Ramsar, Natura 2000) represents approximately 20% of the total area of EU countries.[23] Comprehensive data on protected areas in countries outside the EU only exist for the Ramsar Convention. The total area of Ramsar sites in the Mediterranean region has increased significantly and now represents 6 million ha.[24] However, these sites include a large proportion of non-wetland habitats (about 50%[20]). Only part of these sites are effectively protected,[20] and their conservation status varies considerably.[25]

The amount of water available for the environment, and for wetlands in particular, is decreasing throughout the Mediterranean region. Except for the Rhone and the Po, river flows are decreasing everywhere, because they have been profoundly affected by water withdrawal, dams, and climate changes. The situation is particularly critical in the southern and eastern parts of the region. The IPCC predicts increased aridity in the Mediterranean region, which will result in decreased flows and more and more intermittent rivers (Schneider *et al*. 2013[26]). The situation will be worsened by the withdrawal of water[27].

Our knowledge of water quality is still inadequate at the scale of the Mediterranean Basin, due to a lack of data especially for the eastern and southern zones. Water quality has been stable or has improved in Europe since the 1980s in terms of nutrients and heavy metals (locally). The situation for Mediterranean countries appears to be more complex with a significant increase in phosphate concentrations in the rivers flowing into the Mediterranean Sea, as well as an increase in nitrate concentrations. In addition to nitrogen and phosphorous, other chemical pollutants such as PCBs,

[22] http://www.statistiques.developpement-durable.gouv.fr/indicateurs-indices/f/1966/1115/evolution-surfaces-despaces-naturels-proteges.html
[23] http://ahpne.fr/spip.php?article199
[24] http://www.tourduvalat.org/sites/default/files/note_thematique_1_ozhm_biodiversite_0.pdf
[25] Anonymous, 2015. Regional overview of the implementation of the Convention and its Strategic Plan in Europe. http://www.ramsar.org/sites/default/files/documents/library/cop12_doc11_summary_europe_e.docx
[26] Schneider et al. 2013. How will climate change modify river flow regimes in Europe? Hydrol. Earth Syst. Sci., 17, 325–339, 2013
[27] Schaldach, R., Koch, J., Aus der Beek, T., Kynast, E., and Fl¨orke, M.: Current and future irrigation water requirements in pan-Europe: An integrated analysis of socio-economic and climate scenarios, Global Planet. Change, 94–95, 33–45, 2012.

pesticides, and endocrine disruptors are abundant and very inadequately monitored. For most of them, their impacts on the environment and health are poorly understood. In the context of global changes, decreasing river flows will lead to increased concentrations of pollutants[26].

The destruction of wetlands, their conversion into urban areas and farmland, and the increasingly artificial management of water and growing eutrophication have had a major impact on their biodiversity. While some waterbird species have experienced a spectacular increase in numbers (e.g., herons, pelicans, and cormorants), many waterbird species specific to temporary Mediterranean wetlands have greatly decreased. More generally speaking, most groups of non-bird vertebrates have experienced significant declines in their populations, and of the species evaluated by the IUCN (www.iucnredlist.org) that are dependent on Mediterranean wetlands, nearly one third are in danger of extinction (Figure 4).

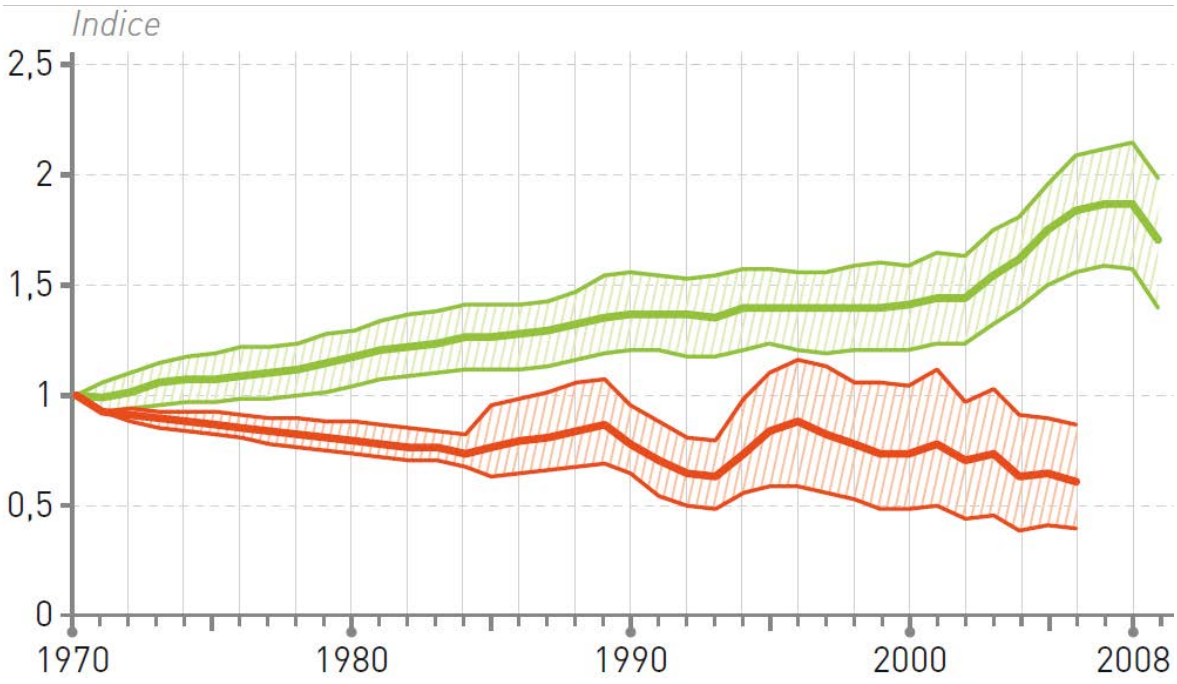

Figure 4. Living Planet Indexes of Mediterranean wetlands for birds (green) and other vertebrates (orange)--fish, amphibians, reptiles, and mammals.[28]

Beyond the impact of the rising level of the Mediterranean Sea on their habitats, rising temperatures also affect species distribution and the specific composition of communities. Species are 'sliding' to the north at varying speeds.[29] The least mobile species are particularly threatened by the impact of climate changes and the degradation of ecosystems. For example, floods and increasing temperatures are having a negative impact on endemic trout populations in Slovenia.[30]

The current global change contributes notably in wetlands in the emergence and spread of diseases, whether directly through epizootics and epidemics or through the development of resistance to treatments. The resulting epidemiologic crisis is affecting domestic livestock, wildlife and human health. They consequently contribute to a negative image of wetlands and are used to justify types of management that are unfavourable to wetlands and their biodiversity (in particular drainage and destruction of wetlands).

[28] Biodiversity: status and trends of species in Mediterranean wetlands. Thematic Collection Special Issue N°1. 2012. Tour du Valat, France. 52 pages. ISBN : 2-910368-57-2

[29] Devictor, V. Julliard, R. Jiguet, F. Couvet, D. (2008) Birds are tracking climate warming, but not fast enough. *Proceedings of the Royal Society of London B* 275, 2743-2748.

[30] Pujolar et al 2011. The Effect of Recurrent Floods on Genetic Composition of Marble Trout Populations. 6(9): e23822 ; doi:10.1371/journal.pone.0023822

Mobilisation for the sustainable management of wetlands

Even if perceptions are changing, particularly in Europe, wetlands are still too often considered to be areas that must be 'cleaned up' and 'enhanced', based on the old but still thriving idea that they are insalubrious and worthless. The negative vision of wetlands is often linked to the health risks associated with them (e.g., a breeding place for disease vectors), which can also be extended to the species that use them (for example waterbirds because of avian flu and the West Nile virus).

In much of the Mediterranean Basin, they are first of all considered to be competitors for water, which is becoming rarer and rarer and more and more highly coveted. The increasing anthropogenic pressures have an important impact on them, in particular due to:

- loss of surface area;
- loss or degradation of functions;
- fragmentation of habitats, which isolates biodiversity in increasingly smaller zones within a network of urban infrastructure.

MedWet, the Mediterranean initiative for wetlands, was founded in 1991 with the will to reverse this trend. Today, it unites 27 Mediterranean countries, 3 international conventions, the European Union, UNDP, as well as 7 major NGOs and scientific research centres. Recognised as a model of regional cooperation within the framework of the Ramsar convention, MedWet has been copied in various regions throughout the world.
However, after a rich and productive pioneering period, MedWet has experienced considerable difficulties in recent years. Its actions and profile have declined and its very existence was jeopardised by the crises that have severely shaken Mediterranean countries. A new dynamic has been launched with the complete renewal of its team, and the relocation of the MedWet Secretariat in France (at the Tour du Valat), which will enable its synergies with the Tour du Valat to be optimised and funding to be obtained so it can engage in concrete, targeted actions.

Due to the importance of the changes expected, and the kinetics of some of them, such as climate change, which are powerful and profound but slow acting, it is indispensable for all the stakeholders involved to approach the issues with a long-term vision.

Countering the effects of climate change ?

In response to climate change, today we must develop and implement strategies for mitigating greenhouse gases and adapting to the consequences of changes in the climate. **Adaptive strategies** must take account of new approaches for managing ecosystems (CBD Secretariat 2009[31]), and in addition, **engage in a profound review of the principles and tools used for territorial development.**

Wetlands can contribute to the fight against climate change, both in terms of mitigation and adaptation, through the services they provide: regulating the climate by storing carbon (mitigation), protecting against extreme climate events, flood control, and storing wate. In other words, wetlands can play a role as a 'climate change mitigator'[32], as long as they are in good ecological condition. . In addition, some wetlands emit methane (CH_4), particularly when they are perturbed, a gas that is twenty-three times more potent than CO_2 in terms of its greenhouse effect.
The **strategies for mitigating** greenhouse gas emissions with respect to Mediterranean wetlands must focus on the conservation of types of wetlands that can sequester carbon and especially on promoting wetland management practices that **limit the release of CO_2 and CH_4**. In the Mediterranean region, saline wetlands (estuaries, lagoons, and coastal wetlands), and wet meadows can be 'carbon sinks'.[33] The carbon storage capacity is lower in wetlands flooded for a short length of

[31] Secretariat of the Convention on Biological Diversity, 2009. *Connecting Biodiversity and Climate Change mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change.* Montreal, Technical Series n°41. 126 p.
[32] Vaschalde D., 2013. Services écologiques rendus par les zones humides en termes d'adaptation au changement climatique. Etat des lieux des connaissances et évaluation économique. Rapport Plan Bleu - Fondation Tour du Valat, 126p.
[33] Study on the role played by wetlands in the fight against climate change and the loss of biodiversity, IUCN France, 2008.

time, and temporary marshes can be net exporters of carbon[34]). By accumulating a small amount of carbon, and with flooding occurring mainly in winter and spring, temporary natural wetlands produce only small amounts of methane. Climate changes and anthropogenic withdrawals contribute to decreasing the role of wetlands in storing carbon.

Measure and evaluate wetland biodiversity and associated ecosystem services[35]

The general perception of biodiversity is still too often limited to a few flagship species, whereas it is critical to understand it as the foundation of life itself and of many of the interactions between human societies, to which it provides countless goods and services. The study of the goods and services of Mediterranean wetlands is in the study of human-nature relationships and therefore calls upon pluridisciplinary research involving the humanities as well as ecological and social sciences. The technical evaluations used may still be unreliable at times and rigor is required for the choice of methods and their implementation. The results from studies on ecosystem services, including those made on an economic basis, are not often used in the decision process[36]. Nevertheless, the identification of the services provided by wetlands can help to better understand human-nature relations and can serve as a communication tool for policy makers and the general public.

Because of the variety of services they provide, and the central role they play in the development of our societies, wetlands are an excellent subject of inquiry for this approach.

The principal issues for the upcoming years are to:

- take into account all ecosystem services, particularly those linked to non-monetary functions and services that have ethical, cultural, and aesthetic values (notably landscape values);
- conduct a biophysical evaluation of ecosystems and ecological functions;
- develop an economic evaluation system for ecosystem services when that proves to be relevant;
- if possible, combine cartographic approaches and predictive models, which would enable alternative management scenarios to be evaluated.

Ensure resilience and connectivity in ecosystems

The overall ecological coherence needs to be improved through global measures for the conservation of 'ordinary' nature. This would enable the coherence and resilience of protected areas to be improved through the effective implementation of measures for the protection of particular areas and species.
Due to their small size and scattered distribution, protected areas may not have enough resilience capacity to be able to support the species emblematic of their biodiversity.

Consequently, in the context of global changes, the major challenge for tomorrow will be to conserve the **potential for change and adaptation** of the habitats and communities they support. This will require us to:

- not limit our actions to the management of protected areas, but also take account of all biodiversity (i.e., 'ordinary nature') and aim to conserve functional ecosystems;
- re-establish **functional connections** between protected areas to ensure biological flows ("Green and Blue Networks");

[34] Morris EP, Flecha S, Figuerola J, Costas E, Navarro G, et al. (2013) Contribution of Donana Wetlands to Carbon Sequestration. PLoS ONE 8(8): e71456. doi:10.1371/journal.pone.0071456

[35] On qualifie de biens et services écosystémiques, l'ensemble des bénéfices retirés par les sociétés humaines des écosystèmes. Les biens extraits des écosystèmes ont un caractère tangible avéré (e.g : eau, aliments, matériaux) et leur valeur de marché traduit bien un degré de dépendance de l'économie vis à-vis des écosystèmes considérés. Les services retirés des écosystèmes ont un caractère plus intangible (e.g. : purification de l'eau, séquestration du carbone atmosphérique) et lorsque leur valeur monétaire peut être mesurée, elle traduit également un degré de dépendance de l'économie vis-à-vis des écosystèmes étudiés.) (EFESE)

[36] Use of ecosystem services economic valuation for decision making: Questioning a literature blindspot. Laurans et al 2013.

- implement an **adaptive ecosystem management system**[37] that optimises the potential for change and the resilience capacity of ecosystems by adapting to the context and making use of the results of past management experiences and modelling to create an 'evaluation-adjustment loop' in the management system.

Promoting environmental governance[38] and policy

Important progress has been made in the last thirty years through the creation of environmental protection policies (legislation, technical and specialised agencies) in most Mediterranean countries, as well as the strengthening of Mediterranean environmental cooperation. Governing bodies for biodiversity and wetlands have been established at different scales and international and regional agreements have been adopted (the Barcelona Convention, MedWet, and IPBES, as well as the Sustainable Development Goals (SDGs) that will come into effect, creating a solid framework for the implementation of Mediterranean wetland programmes. The objectives of these agreements are defined within country-specific programmes. They can become legally binding within the framework of the European Union, through control mechanisms and implementation of Birds, Habitats, and Water directives. In most countries, a trend toward decentralisation is developing with the explicit desire to use participative approaches in the management of territories and natural resources. Inter-sectoral committees for wetlands and strategies or action plans for these habitats have also been put into place in some countries.

Nonetheless, it must be said that we are still far from attaining our goals: there are failings in the implementation of legislation, environmental policies are poorly integrated into sectoral policies for areas such as tourism, agriculture, transportation, manufacturing industry, and energy; only modest advances have been made by nations in the fight against climate change; environmental questions are not placed very high on the political agenda in most Mediterranean countries, and there is a very weak participation by the local populations. In addition, in recent years, environmental issues have received less attention in political agendas. This drop can be partly explained by the economic crisis affecting European countries, and the social, institutional, and political crises facing several countries in North Africa and the Middle East. Consequently, the different objectives to halt (EU) or slow down (CBD) the loss of biodiversity, or to reverse the current trend toward dwindling environmental resources (Millennium Development Goals) will not be achieved.[39]
Today, biodiversity is not a priority in terms of political action in Mediterranean countries, especially in this time of social and economic crisis. Therefore, the inactivity is not only due to a lack of knowledge, evaluations undertaken too late, poorly articulated policies, or a lack of dialogue with stakeholders. The priorities on the political agenda are barely affected by these arguments. In many cases, knowledge does exist on the decline of biodiversity, the evaluations conducted are sometimes used to justify the decisions already made, the perfect integration of policy themes and scales seems to be an unattainable myth, and, finally, accommodating the participation of all the parties concerned in multi-

[37] **Adaptive management:** term invented in 1978 by C.S. Holling
"Adaptive management is an approach to managing natural systems that is rooted in learning—from common sense, experience, experimentation, and monitoring—adapting our practices in function of what we have learned" Cordonnier & Gosselin (2009).
"Its most effective form […] employs management programs that are designed to experimentally compare selected policies or practices, by evaluating alternative hypotheses about the system being managed" BC Ministry of Forests and Range.
http://www.for.gov.bc.ca/hfp/amhome/Admin/index.htm

[38] Governance: method of regulation and decision making involving various places and/or stakeholders and based on a partnership between stakeholders.

[39] Tittensor, D.P., Walpole, M., Hill, S.L.L., Boyce, D.G., Britten, G.L., Burgess, N.D., Butchart, S.H.M., Leadley, P.W., Regan, E.C., Alkemade, R., Baumung, R., Bellard, C., Bouwman, L., Bowles-Newark, N.J., Chenery, A.M., Cheung, W.W.L., Christensen, V., Cooper, H.D., Crowther, A.R., Dixon, M.J.R., Galli, A., Gaveau, V., Gregory, R.D., Gutierrez, N.L., Hirsch, T.L., Höft, R., Januchowski-Hartley, S.R., Karmann, M., Krug, C.B., Leverington, F.J., Loh, J., Lojenga, R.K., Malsch, K., Marques, A., Morgan, D.H.W., Mumby, P.J., Newbold, T., Noonan-Mooney, K., Pagad, S.N., Parks, B.C., Pereira, H.M., Robertson, T., Rondinini, C., Santini, L., Scharlemann, J.P.W., Schindler, S., Sumaila, U.R., Teh, L.S.L., Kolck, J. van, Visconti, P., Ye, Y., 2014. A mid-term analysis of progress toward international biodiversity targets. Science 346, 241–244. doi:10.1126/science.1257484.

stakeholder committees often tends to marginalise the very stakeholders who are trying to defend biodiversity (BIOPIQUE).

The principal issue for the future is to take better account of wetlands and their biodiversity in governance processes and policies involving and having an effect on the environment. To meet this objective, we must attempt to:

- revitalise MedWet, in particular its inter-institutional dimension, which should enable us to more effectively raise the awareness of decision-makers in the Mediterranean region in different sectors, such as water, land-use planning, and agriculture, on the issues relating to biodiversity and the sustainable management of water resources and the local territory;
- better identify and place a value on the goods and services provided by wetland ecosystems to help to raise the awareness of decision-makers;
- engage in capacity building for the civil society and in particular for the groups that support conservation actions and put pressure on politicians and government employees involved in the conservation of the goods and services provided by Mediterranean wetlands;
- disseminate more convincing and targeted information about the relationships between wetlands and the areas that have an influence on the principal sectoral policies, notably water and agriculture, but also infrastructure development;
- better articulate the relationship between science and politics in the analyses of our results so they are easier to appropriate by institutions in Mediterranean countries, and this information can be more easily transposed to public policies.

The Tour du Valat: an organisation committed to wetlands and humankind

The history of the Tour du Valat is first and foremost a history of passionate commitment. The commitment of one man, Luc Hoffmann: a naturalist, scientist, patron, and above all visionary, who has understood how to unite energy and skills around a single powerful idea: **better understanding for improved management**.

Under his guidance and vision, the Tour du Valat has always been ready to enter new fields, anticipating forthcoming changes and breaking new ground at the interfaces between disciplines.

Today, this founding passion is shared by a wide community.

The Tour du Valat in a few dates

1947 Purchase of the Tour du Valat estate, in the Camargue, by Dr. Luc Hoffmann.

1950s Study of waterbird migration and populations, and ringing.
1954 Establishment of the Station biologique de la Tour du Valat – a private research institute.

1960s Hosting of the headquarters of the International Waterfowl Research Bureau - IWRB (now Wetlands International).
Development of conservation activities in the Mediterranean.
Active support for project MAR, which laid the foundations for the Ramsar Convention.

1970s Diversification of wetlands research into fields other than ornithology (management of wetlands by grazing and ecological requirements of colonial waterbirds).
1971 Signing of the International Ramsar Convention on wetlands, following the programme MAR carried by the Tour du Valat.
1974 Establishment of the present legal structure: a private scientific foundation officially recognised as being of public utility.

1980s The knowledge acquired by the different research programmes, in various disciplines, contributes to the design of multidisciplinary tools for wetlands conservation.
1984 Part of the estate (1071 ha) was designated as a Voluntary Nature Reserve.
1986 Production of the first Nature Reserve Management Plan in France, by the Tour du Valat.

1990s Development of integrated research programmes on vulnerable species and habitats.
Integration of new disciplines: hydrology, geomatics.
1991 Launching of the MedWet Initiative..
Tour du Valat exports its expertise on wetlands management throughout the Mediterranean.
Acquisition of additional skills in transfer / training.

2000s Increasing integration of research and conservation, notably via European projects and the contribution of human sciences.
Health Ecology projects
Contribution to the development of public policy.
2007 Launching of the Mediterranean Wetlands Observatory
2008 Classification of 1884 ha of the Tour du Valat estate as a Regional Nature Reserve.

Années 2010 Reinforcement of multi-disciplinary intergration.
Develops population and ecosystem modeling projects.
Undertakes restoration ecology projects.
Starts hosting the MedWet Secretariat.

Our vision, our mission

Active for more than half a century, the Tour du Valat is an independent, non-profit organisation, managed by a state-approved Public Utility Foundation.

Mediterranean wetlands are a socio-ecosystem in which humans and nature maintain a highly interdependent relationship. On the one hand, the structure and functioning of wetlands often result from the interactions between human activities and natural processes; on the other, wetlands provide a wide range of goods and services to human societies. Concerted action by all sectors of society is required, from international to local level, to conserve these habitats, both for their intrinsic value and for the services they provide now and to future generations.

Accordingly, our long-term **vision** is as follows:

Mediterranean wetlands are preserved, restored and valued by a community of actors mobilized for the sake of biodiversity and human societies.

In order to give substance to this vision, we have set ourselves the following **mission**:

Ensure the conservation and wide use of Mediterranean wetlands by improving the understanding of their functioning and fostering a community of actors.

Boasting some sixty employees and very many partners, we are a scientific organisation that generates knowledge and produces tools and information to assist wetland managers and decision makers in taking the most appropriate measures for the sustainable development and wise use of these threatened habitats.

Our Values

Seven values guide the action of the Tour du Valat and the team:

- ***Commitment*** - A recognized scientific expertise with applied research implemented by a mobilized team.
- ***Humanism*** - A resolutely oriented approach connecting human societies to nature.
- ***Independence*** - A scientific rigor supported with decision-making autonomy.
- ***Perseverance*** - A unique capacity for analysis and proposals based on a historical action inscribed over the long term.
- ***Solidarity*** - Support for actors on the Northern and Southern shores of the Mediterranean led by shared expertise.
- ***Dialogue*** - Attentive listening inspired by the desire to exchange experiences, to catalyze initiatives, and build together.
- ***Audacity*** - An ability to think outside the box, to explore new methods and to be independent of prevailing trends.

Our modes of actions

The Tour du Valat, scientific organisation…

La Tour du Valat is a research institution whose mission is to understand and manage Mediterranean wetlands, transmit knowledge and to convince society to conserve and use these areas for the benefit of both biodiversity and human well-being.

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The Tour du Valat is a research institute dedicated to the sustainable conservation of biodiversity in Mediterranean wetlands. Our research is conducted within the theoretical framework of conservation sciences, and includes the study of plant and animal ecology, hydrology, geography, and sociology to foster the wise use of wetland socio-ecosystems.

Both self- and externally funded, the Tour du Valat conducts interdisciplinary research on the Estate and at various pilot sites in the following fields:

- comprehensive reports on the status of Mediterranean wetlands, their biodiversity, and the causes behind the trends observed;
- the analysis of the processes and mechanisms (including human activities in the broad sense of the term and the effects of pathogenic agents) involved in population dynamics and the structuring of communities;
- the acquisition of medium- and long-term data accounting for stochastic fluctuations and the medium- and long-term trends of populations and ecosystems;
- field observations combined with experimentation at different scales (from laboratory experiments to ecosystem restoration).

The theoretical framework at the Tdv is based on conservation science, including plant and animal ecology, hydrology, geography and sociology; incorporating a perspective of rational use of the socio-ecosystem associated with wetlands.

… involved

The Tour du Valat develops its scientific research based on its practices and the knowledge of users and managers (professionals and non-professionals) of wetlands, taking account of development systems to try to influence them. It implements and promotes research that is 'committed,' striving to develop and maintain a dialogue between professional researchers, wetland users, and decision-makers. To ensure that our research is as objective as possible, we submit our findings to external evaluators, notably through publications in peer-reviewed scientific journals, and engage in a plural and transparent approach.

The research issues we explore are first shaped by current conservation issues on the basis of fundamental research.[40] The research questions we address fall within a large range of complementary approaches that include fundamental and applied research.

… looking for solutions to problems

The Tour du Valat's research aims to identify and propose solutions to problems linked to the conservation and wise use of wetlands.

Considering that changes are inevitable in the current context of global changes, to conduct its mission successfully the Tour du Valat:

- seeks to better identify and promote the benefits ecosystems provide society;
- considers that the entire range of sectoral interests must be taken into account, based on an integrated approach, to identify the positive and negative consequences of the interactions between sector-specific interests and activities;
- tests and proposes solutions for the wise use of wetlands and the conservation of their biodiversity;
- encourages the participation of local communities in environmental management.

[40] Franck Courchamp , Jennifer A. Dunne Yvon Le Maho, Robert M. May, Christophe Thebaud, and Michael E. Hochberg. Fundamental ecology is fundamental TREE in press

Our strengths and future challenges

The Tour du Valat's historical development gives it major **advantages** for addressing issues in the future, in terms of:

- its multidisciplinary and operational expertise, which has been tested in the field and received international recognition;
- its ability to transform its actions into long-term projects, which greatly increases its capacity to analyse environmental changes, and then to imagine the appropriate response;
- its capacity to convey its ideas, catalyse action, and create synergies between stakeholders and organisations around a common cause.

Given the increasing complexity of issues, it is vital for the Tour du Valat to remain focused on the key areas in which it can make a difference today, while maintaining its capacity to get involved in the new fields that will be decisive tomorrow. The constantly changing situation provides various opportunities for our development for the 2016-2020 period including the following:

- **Develop advocacy** for the conservation and sustainable use of Mediterranean wetlands with Tour du Valat acting as a key leader;

- **Develop new modalities to reinvest in the southern and eastern Mediterranean** following a period focusing on the Camargue due to the institutional and political instability in the Mediterranean basin;

- **Strengthen synergies with the major players** involved in wetland conservation in the Mediterranean basin;

- **Extend our support to developing and strengthening NGOs** engaged in wetlands in the Mediterranean countries.

Strategic priorities of the 2016-2020 programme

The programme objectives

The programme's strategic priorities have been defined on the basis of an analysis of Mediterranean wetlands issues (cf. part one of this document), which were closely examined in terms of our mission, our strengths and weaknesses, and possible partnerships.

On the basis of this analysis, the Tour du Valat has set the following four objectives, which will be pursued in our projects over the next five years:

Understand

Improve and share knowledge on the functions, services, and values of Mediterranean wetlands, as well as their dynamics in response to global changes.

Manage

Test and capitalise on the management practices enabling the sustainable management, conservation, and use of the biodiversity, functions, and services provided by Mediterranean wetlands.

Convey

Develop the synergies between stakeholders, in particular through capacity building for scientists, wetlands managers and users, and civil society to ensure that behaviour really changes.

Convince

Unite key stakeholders to convince decision-makers of the importance of Mediterranean wetlands by providing them with reliable arguments and governance tools.

Our priorities for action

The strategic objectives delimit the framework within which current projects must be implemented. Projects, sites, and species will be chosen on the basis of current conservation issues and the demonstrative value of the expected results.

Conservation priorities

Our action must first provide responses to issues/sites that are important for the conservation and management of species and habitats, responding to emergencies (risk of extinction), and seeking solutions at the appropriate scale (functioning, connectivity, etc.).

Our efforts will first focus on ***coastal wetlands and their catchment areas***. This choice is justified by the size and importance of these wetlands for biodiversity and human societies, as well as by the intensity of the pressures affecting them (coastalisation, major infrastructure, *cf.* Blue Plan, and the Millennium Ecosystem Assessment). They are also more exposed to the rising sea level than other wetlands. Finally, from a practical point of view, the Tour du Valat's current expertise justifies this priority.

Meanwhile, for the target species in our projects, we will focus **on species with an unfavourable conservation status and ones that are essential** for wetlands conservation. In terms of ecosystems, priority will be given to those that support populations of species with an unfavourable conservation status as well as the projects showcasing the services provided by ecosystems or showing the possibilities of sustainable management, which are favourable for both biodiversity and economic development.

Overlappoing geographical scales

To meet the objective of the Tour du Valat and to address the issues it has decided to confront, our activities must take place at three distinct and complementary geographical scales: (1) the Mediterranean Basin, (2) the Camargue and (3) the Tour du Valat estate.

The Mediterranean basin
Our sphere of activity is limited to the Mediterranean Basin (countries bordering the Mediterranean sea, + non-Mediterranean countries that are members of MedWet/Com: Portugal, Macedonia, Bulgaria, Jordan).
Actions beyond this area will be avoided as much as possible, limited in scope, and undertaken only if they are compatible with our priority actions.
Two priority intervention zones have been identified: the Maghreb and the Balkans/Turkey, because they are currently experiencing very significant pressure on their wetlands and water resources, and also for historical and cultural reasons (a long-standing relationship with the Tour du Valat, which facilitates communication).
Projects must be developed in the Mediterranean Basin on the basis of strong partnerships with local stakeholders, for logistical reasons and in the aim of capacity building operations.

Pilot sites
The concept of 'pilot sites' was developed to encourage a concrete approach at the local level and to closely link research activities with conservation issues. A pilot site is defined as a geographic area in which Tour du Valat teams, in close concertation with local management stakeholders, can develop activities and partnerships to provide concrete responses to conservation issues at a scale that is at least microregional, and which have a demonstrative value and can be replicated. These sites are also intended to be used for real-life testing of integrated management processes for Mediterranean wetlands. They must be used for a long length of time (at least 5 years and probably much longer) to establish an operational relationship between research and conservation and to create a relationship based on trust within the network of partners.
The principal criteria for choosing the pilot sites are the conservation issues, how representative they are in terms of management and conservation issues, a favourable socio-economic and political context, and finally the existence of a local partnership. In 2014**,** there are **three pilot sites in the northern Mediterranean region**, in the Camargue, the Prespa National Park, and the Gediz delta. We are also looking for a pilot site in North Africa, but our efforts been hampered until now by the socio-political situation (the Arab Spring) and lack of availability of our team.

In the Camargue, where we are a historical stakeholder, fully involved in the scientific and also institutional and political dimensions of the sustainable management of the territory, in partnership with others, we must be developing and mobilising our knowledge to create prospective scenarios on changes in this territory and its natural heritage in response to global changes. We will also advocate for them via the appropriate bodies and processes (PNRC, MAB Reserve, Regional Scheme for Ecological Coherence…).

The Tour du Valat estate (Tour du Valat and Petit St-Jean)
Conserving the biodiversity of the estate is a priority. In addition to this issue, the estate is an ideal site for demonstrating the activities of the Tour du Valat and as a back-up for the research, which in return has to be used in the process of making management decisions.

The farming on the estate, including the Petit Saint Jean estate, should enable a model for sustainable agricultural management to be developed, allowing biodiversity to be maintained or even increased. This model should become a showcase for raising the level of awareness in the agricultural world.

Plans to develop agricultural activities on the Tour du Valat estates are based on product diversification in a system essentially oriented toward raising livestock and the agroecology and agroforestry activities at the Petit St Jean Estate, with the development of innovative and experimental approaches at both sites.

The Estate provides an exceptional but under-exploited opportunity for setting up experimental management activities and experiments in management and restoration, with excellent possibilities for monitoring and measurement. Inversely, the Estate should benefit from the research activities to test and evaluate the management results. The estate also has the potential for hosting partners' projects, especially protocols for long-term monitoring in fields that complement ours. The 2016-2020 management plan takes into account these opportunities and has identified research perspectives that could improve the management of the Estate. (*cf Tour du Valat Management plan,* 2015).

Research priorities

Vertebrate population biology, particularly of birds, has played a decisive role in the history of the Tour du Valat and its international visibility. It remains an important area of research in our current scientific activities as much in terms of our long-term databases as in the number of researchers on our teams. Over time and with the need for interdisciplinary research, our areas of research opened up to the study of the interactions between different trophic levels, and then ecosystem ecology. More recently, Humankind has become an explicit target of our research, not only as a factor of pressure, but also and especially as a beneficiary of our action. Using the same approach, our research now takes account of how pathogenic agents play a key role in the interactions between Humankind and biodiversity in relation to public health and veterinary issues. This research aims to understand the functions and dynamics of Mediterranean wetland socio-ecosystems.

Our research priorities are as follows:

- analyse the consequences (and mechanisms involved) of global changes on the conservation of Mediterranean wetlands, their biodiversity, and the functions and services they provide;
- model the dynamics of populations, communities, and ecosystems in function of environmental fluctuations, global changes, and direct management;
- restoration ecology.

Results transferred to key stakeholders

For each project, it is vital that the targets of our work be identified and prioritised and, more generally, that we determine how they will be able to achieve the expected result in terms of conservation. The most appropriate end-users (targets) for our results, of which there will sometimes be several or many, therefore need to be identified in accordance with the objectives of the project and with the strategic levers that we wish to use to allow the envisaged changes in management to take place. It is therefore necessary to consider not only the immediate users of our results, but to view them as being part of a logical sequence:

What aspect(s) of management must change?
➔ Strategic levers to enable the change to take place
➔ Practical objectives
➔ **Pertinent targets**
➔ Anticipated results (changes in management, better conservation).

A mode of action directed towards the appropriate targets

Advocacy for wetlands

Beyond the goal of transfer, which is central to the impact logic of each project, the key targets of our programme are (1) decision-makers at various levels (ultimate target), and (2) the community of institutions and individuals working on biodiversity issues in Mediterranean wetlands.

1. **Decision-makers** are targeted directly, principally through the MedWet initiative and more generally through international commitments made by States (Ramsar convention, AEWA, Barcelona Convention, Convention on Biological Diversity, etc.) and their regional equivalents (MedWet).

2. **All the stakeholders** involved in Mediterranean wetland conservation activities (NGOs, site managers, scientists…) represent an informal and widespread community, which often has limited resources but is highly motivated. The recent action by the MAVA Foundation has enabled this community to be better connected, at least partially. The Tour du Valat's programme must inform this community with the results of its research, which can be useful for it in terms of lobbying and management, and the community can relay messages from the Tour du Valat to local politicians.

3. **The media, the civil society and the general public** are intermediary targets that should create a request or even a demand on the priority targets.

4. **The scientific community and the financial donors** are targets that increase the capacity of the Tour du Valat to produce results.

Methods of transfer to reach these targets

The appropriate methods of transfer must also be adapted to the targets and to the nature of what is to be transferred.

Our results have to influence the attitudes and practices of the identified targets by providing new information, and by the rapid dissemination of the results of research and studies. To this end, it is desirable that the anticipated targeted users be involved from the start of the project, to ensure that it meets their requirements and that the transfer methods are the most satisfactory.

The modes of activity used to reach them may also be extremely variable within projects depending on whether they are focussing on the initial stages of tackling a problem (development of knowledge), or the more practical stage (improving the capacities of stakeholders in order to achieve better management), or both at the same time. Lastly, transfer methods must be specific to the target audiences, and the practical details must correspond to their day-to-day activities.

Programme monitoring and assessment

Assessment cycle

The Tour du Valat carries out two external assessments within the framework of each of its five-year plans: one at midterm and the other at the end of the programme. The goal of the final assessment is to report on results from the entire programme. Meanwhile, the midterm assessment is more strategic and prospective. It must enable the programme to be re-oriented, if necessary, and help prepare the next five-year programme.

Assessment criteria

In an effort to assess the impact of our work and the different stages of knowledge production and transfer, our impact will be assessed on the basis of five main criteria, listed below in decreasing order of importance:

1. Status of the populations/communities/ecosystems targeted in our programme
2. Changes in attitudes and practices observed (subsequent to direct Tour du Valat action or by target groups/partners)
3. Amount of interest aroused: how are our results taken into account by our targets (for example, policies that are favourable to wetlands are adopted with a contribution by the Tour du Valat, the Tour du Valat receives requests for expertise)
4. Transfer of the results obtained (training, popularisation, dissemination)
    - Scientific documents adapted for the public at large
    - Capacity building and results activities (training - assistance in decision-making processes) at different scales, particularly the Camargue and the Mediterranean region
    - The innovative, experimental, completely modern nature of the approaches implemented
    - Training young researchers (Masters, PhD, and post-doc students)
5. Scientific and technical production
    - Number and quality of publications (impact factor)

Efforts will be assessed on the basis of the following criteria:

1. Partnerships and networks: Assessment of the relationships established by the project/programme with individuals, institutions, and/or networks working on similar topics in the Mediterranean region or elsewhere, as well as the added value of these collaborations
2. Participation in national and international projects
3. Resources in terms of staff and financial means: was the initial budget (staff, investments) respected, in particular in terms of expenditures and external funds obtained?

Impact assessment must be carried out in the first place at the level of the projects (axes). It implies that the causes of degradation, the current processes, the blocking factors, and the key stakeholders have all been clearly identified for each of the projects, as well as the means to influence these factors and make people change their practices as needed. More precisely, the general objectives will be evaluated as defined in the strategic plan as well as their translation into more detailed objectives in the departments and Axes (Tableau 1).

Table 1: Objectives of the programme

a. Objective 1

	Department Objectives	Research Area objectives
4. Unite key stakeholders who will defend the cause of Mediterranean wetlands vis-à-vis decision-makers by giving them convincing arguments and governance tools	Understand Mediterranean wetland species dynamics in response to global changes (SP 1)	Make management recommendations that enable target species to remain in a good conservation status (SP 1.1)
		Evaluate species conservation problems, by detecting the unfavourable trends and identifying their causes (SP 1.3)
	Understand the interactions between biodiversity and public health and veterinarian issues (SP - SP 2)	**Reconcile the conservation of Mediterranean wetlands and the impact pathogenic agents in them have on the health of humans and animals (SP 2.1)**
		Reconcile the conservation of Mediterranean wetlands and the impact pathogenic agents in them have on the health of humans and animals (SP 2.1)
		Contribute to the conservation of the species with an unfavourable status during epizootic events (SP 2.3)
		Understand the effects of global changes on the interactions between wildlife species, their health and the health of humans and domestic animals (SP 2.4)
	Predict the distribution of species and pathogenic agents in function of landscape dynamics (SP3)	**Improve our understanding of the functioning of vertebrate and pathogen populations and their response to the combined effects of climate and anthropogenic changes. (SP 3.1)**
	Develop efficient infrastructure for gathering, managing, and consulting naturalist data (SP-SP 4)	**Better manage and share naturalist data so that it will contribute more effectively to action that favours Mediterranean wetlands (SP 4.1)**
		Optimise our efforts in fieldwork by making use of protocols discussed in advance so we can obtain high-quality scientific data (SP 4.1)
		Develop a metadata system so that all of the data on the Tour du Valat's server can be referenced effectively (SP 4.1)
		Develop tools for gathering field data (SP 4.1)
		Develop tools that facilitate database interoperability (SP 4.1)
		Consolidate and develop Internet tools for gathering bird census and ring re-sighting data at the Mediterranean scale (SP 4.1)

	Department Objectives	Research Area objectives
1. Improve and share knowledge concerning the functions, services provided by, and values of Mediterranean wetlands as well as the dynamics of their responses to global changes.	E.1 Produce knowledge on the dynamics and resilience of ecosystems when facing identified stressors (EcoS 3)	Improve our understanding of the functioning of Mediterranean wetland ecosystems and their responses to the combined effects of climate and anthropogenic changes (EcoS 1.2 - SP1.1)
		Provide ecosystem modelling tools that can be used as the foundation for the spatial and temporal modelling of vertebrate and pathogen populations (EcoS 1.4.3)
		Measure the importance (1) of stochasticity in mechanisms of dispersal (abiotic filter), (2) of the priority effects in mechanisms of competition (abiotic filter), and the consequences for the structure of communities. (EcoS 2.1)
	Analyse the status and trends of Mediterranean wetlands and their biodiversity, and the goods and services they provide, as well as the environmental and anthropogenic factors responsible for these trends (Obs 1)	**Produce accurate scientific knowledge on the status and trends of ecological services in Mediterranean wetlands that is appealing to social groups other than scientists (Obs 1.1)**
		Produce knowledge on the status of biodiversity in wetlands (Obs 2.1)
		Prioritise the stressors that are having an impact on biodiversity and evaluate the effectiveness of the conservation actions being undertaken at the pan-Mediterranean scale (Obs 2.2)
		Set up monitoring operations for a few key water components, which are compatible with international systems (e.g., UN Water, World Water Council, Ramsar, CBD) and would enable comparative analyses to be made with MWO data on biodiversity and ecosystem services (Obs 3.1 - 3.3)
		Set up monitoring with remote sensing to measure the area flooded in the Mediterranean Basin (Obs 3.1)
		Compile the existing monitoring and evaluation data on the most probable underlying causes that explain the status and trends of Mediterranean wetlands, as well as the responses provided, and regularly update this database (Obs 5.2)

b. Objective 2

2. Test and capitalise on the management practices that enable better conservation, utilisation, and sustainable management of the biodiversity, functions and services provided by Mediterranean wetlands		Test out more favourable management practices (habitats, available stocks, level of exploitation tolerable...) and ones for controlling species or that respond to demands from society (threatened species, generating nuisance...) (SP 1.3)
	Make use of case studies in the Camargue that highlight urgent conservation issues or high potential to be transferred and generalised to the Mediterranean Basin (EcoS 3)	Provide assistance for species and ecosystem management and restoration actions using an adaptive approach based on predictive scenarios and experimentations (SP3.2 - EcoS 1.2)
		Implement the management plan for the Tour du Valat estate, Petit St. Jean, Verdier marsh, and former Camargue salt works site (EcoS 3.2)
	Apply current knowledge on ecosystem dynamics and resilience to pilot projects focusing on ecological restoration and the sustainable management of land while givin preference to a pilot site approach (EcoS 3	Evaluate how community structuring mechanisms can be influenced so that plant dynamics will be on the desired ecological trajectories in restoration ecology projects (EcoS 2.1)
		Restore the biodiversity and functions of ecosystems, parts of ecosystems, and degraded communities (EcoS 2.2)
		Inform and influence site managers in terms of sustainable management approaches (priority subjects may include integrated management, hunitng, and crop and livestock production) (EcoS 3.2)
		Evaluate and promote restoration methods for ecosystems and/or communities (EcoS. 2.2)
		Produce accurate scientific knowledge on the status and trends of ecological services in Mediterranean wetlands that is appealing to social groups other than scientists (Obs 1.1)
		Evaluate the effectiveness of the conservation actions undertaken at the pan-Mediterranean scale (Obs 2.2)

c. Objective 3

	Department Objectives	Research Area objectives
3. Improve synergies between Mediterranean wetland stakeholders, particularly by strengthening the capacities of scientists, site managers and wetland users as well as the civil society to ensure a long-term change of behaviour.	Support, assist, and guide the scientific and management teams in their responses to conservation issues and the management of species in Mediterranean wetlands, by developing scientific partnerships, training research professors and site managers, and supervising the research conducted by students in universities in France and other Mediterranean countries (SP 5)	Contribute to teaching in universities, particularly in the major engineering schools (in France) to raise the awareness of top engineers about environmental issues (Com 1.2 - all projects)
		Organise TdV actions around strong Mediterranean alliances that reach beyond the Camargue
		Assist in the setting up of wetlands observatories (or ones with a "wetlands" component), which are as compatible / convergent as possible with the MWO (Obs 3.1)
	Capitalise on knowledge about EcoSsystems and transfer it to decision-makers and site managers in a form they can easily use (EcoS 3)	Local stakeholders make use of scientific results (in particular modelling results), and the "biodiversity" component is taken into account in the management choices made at the different sites studied (EcoS 1.4)
		Set up and promote adaptive and integrated management for the restored ecosystems (EcoS 2.2) (Ecos.2.2)
		Produce accurate scientific knowledge on the status and trends of ecological services in Mediterranean wetlands that is appealing to social groups other than scientists (Obs 1.1)
	Promote the importance of the functions, values, and services provided by wetlands to encourage decisions that favour their sustainable management and effective restoration (Com 3).	Inform decision-makers about the value of Mediterranean wetlands, advise them, and provide them with tools that encourage and facilitate their work (Obs)
		Develop a network of well-disposed stakeholders that will encourage decision-makers to make choices that are favourable to Mediterranean wetlands (i.e., European directives, national strategies) (Com)
	Reinforce and develop the Tour du Valat's credibility by promoting its scientific results, and tranferring the results of it projects to others (Com 1)	Provide assistance to scientific teams and promote their research and scientific expertise (Com)

d. Objective 4

	Department Objectives	Research Area objectives
4. Unite key stakeholders who will defend the cause of Mediterranean wetlands vis-à-vis decision-makers by giving them convincing arguments and governance tools	Encourage leaders to take account of biodiversity issues in the management o their local territories (EcoS 5)	Test and validate methodologies (including management plan methodologies such as Open Standards) and management approaches (e.g., integrated and adaptive management) on pilot sites in the Camargue and in the Mediterranean Basin (EcoS 3.2)
		Improve our knowledge of the variables that influence decision-makers (EcoS 3.2)
		Create tools for transfering the management methodologies developed and tested (EcoS 3.2)
	Encourage leaders to make decisions that are effective in terms of the protection, restoration, and sustainab use of Mediterranean wetlands (Obs 2	**Encourage leaders to make decisions that are effective in terms of the protection, restoration, and sustainable use of Mediterranean wetlands (Obs 2)**
		Create Wikipedia pages to disseminate information about Mediterranean wetlands and to attract readers to the TdV website (Obs)
		Provide technical assistance to develop national wetland strategies/policies (Obs)
		Produce synthetic documents for various target groups, which may include the production of new indicators, the better utilisation of already existing indicators, and the synthesis of information that already exists about certains topics (Obs 3)
	Build partnerships with the convention and organisations involved in international agreements to ensure th information will be adequately and effectively conveyed to political decision making bodies such as MedWet, and Ramsar (Obs 1-5)	**Use the knowledge on the role played by wetlands in preserving terrestrial freshwater resources to advocate for the sustainable management of wetlands, in synergy with the new orientation adopted by Ramsar and MedWet (Obs 1.1)**
		In conjunction with MedWet, ensure that MWO results are conveyed to, understood by, and taken account of by decision-makers (Obs 2.2)
		Make MWO indicators converge with those developed by the Ramsar Convention, the Convention on Biological Diversity, and Sustainable Development Goals (SDGs) (Obs 3)
		Contribute to the inclusion of the Observatory's monitoring analyses in national policy agendas and supranational commitments (Obs 5.2)
		Promote a network of allies so as to identify "ambassadors and friends" ready to transmit TdV messages (Obs, Com 3)
	Firmy establish the TDV's leadership by improving its reputation and bringing together a community of stakeholders fro throughout the Mediterranean region (Co 2)	Organise TdV actions around strong Mediterranean alliances that reach beyond the Camargue ("Mediterranean wetlands platform") (Com 2)
		Establish constructive dialogue among stakeholders to ensure the transfer of research results from the TdV and other stakeholders, as well as a good understanding of the issues (Com 3)
	Attract new financial partners and reinfor our current partnerships (Com 4)	Establish relationships with our financial partners based on trust, which will enable medium- and long-term collaboration with them, to offer them visibility in the framework of TdV communication activities, and for them in exchange to promote the TdV in their own communication documents and other media (Com)

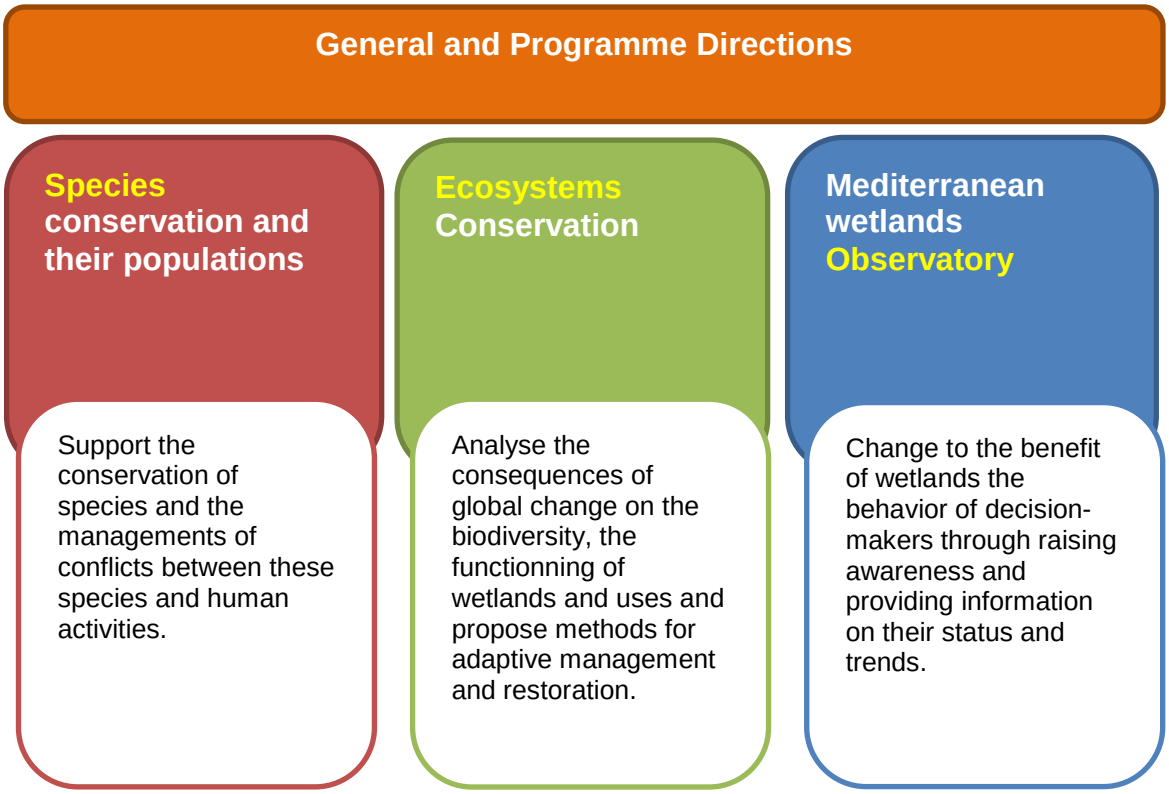
2016-2020

programme

TOUR DU VALAT

Structure of the programme

Based on the text above, the 2016-2020 programme was organized in three complementary departments coordinated by the Directors:



The Direction

The activities linked to the program are based on three main levels:

1- Develop an institutional, technical and financial framework favorable for the implementation of the Tour du Valat program

Identify and develop collaboration with key partners including institutional, technical, scientific and financial institutions. Reinforce the image and the reputation of the Tour du Valat in general and more specifically for key partners. This role is primarily the responsibility of the General Director in collaboration with the President and with the support of the Program Director and the Financial and Administrative Director.

2- Pilot the development, the implementation and the adjustments necessary for the program

Stimulate the operational team, especially the Heads of Department, to ensure that the program responds to the identified stakes and that the implementation corresponds to the planned provisions. If needed, the director will pilot the reorientation of activities and/or projects. This role is the primary responsibility of the Program Director.

3- Contribute to the implementation of the program, with an emphasis on advocacy, bringing together key actors and reinforcing the synergy between actors (Objectives 3 and 4)

Be the spokesperson for the Tour du Valat in different political, technical or scientific organizations by promoting the results and the value of these results for the society. Identify key technical and scientific actors and civil society organizations that could federate the actions and build the necessary synergies. This role is the responsibility of the General Director and the Program Director, depending on the identified actors.

The departments

Each department is divided into Axes including one or more projects:

Species Conservation

Arnaud Béchet

General objectives of the department

The objective of this Department is to find solutions to conservation problems affecting Mediterranean wetland species, both those that are under threat and those that are the sources of economic or health problems.
The main research objectives are (i) to understand the dynamics of Mediterranean wetland species, (ii) to understand the interactions between biodiversity and human and veterinary health, and (iii) to predict the distribution of species and pathogenic agents in relation to landscape-scale processes. To achieve these objectives, the department will seek (iv) to develop an efficient infrastructure for collecting, managing and displaying natural history data. It is expected that as a result it will be possible to identify the key factors in the problems relating to the conservation of Mediterranean wetland biodiversity and to identify the changes in practice required to remedy them.
The overall approach of this department rests on the generation of scientific knowledge, whether by directly carrying through complete research projects or by transferring and applying the results acquired through the work of the scientific world in general. The scientific output will depend in particular on the development and management of databases derived from the long-term monitoring of (i) marked individuals, (ii) populations and (iii) landscapes.
Particular attention will be paid to supporting, helping and guiding scientific teams and managers in their approaches to the issues of management and conservation of Mediterranean wetland species, through the development of scientific partnerships, the training of teacher-researchers and managers, and the supervision of students on university courses, both in France and in the Mediterranean countries.

Conservation issues

Some authors consider that we have entered into a new geophysical epoch, the Anthropocene. In addition to the fact that the planet is being subjected to unprecedented anthropogenic changes, this concept raises the question of a new form of biodiversity stewardship. While the loss and degradation of habitats constitute direct, irreversible impacts on species dynamics, some aspects of the management of territories (for health, hunting, fish-farming, agriculture and even conservation) can have major indirect negative effects on the dynamics of species, particularly as regards their specifically Mediterranean character.
The main environmental issue is therefore to light the way for this new biodiversity stewardship through the generation of scientific knowledge about the life history traits of the species in question, in order to make recommendations that are appropriate for the specifically Mediterranean character of these species. It is anticipated that the result will be an improvement in the resilience of Mediterranean species confronting global changes.

As a priority we will be focusing on:

1. Species that are endemic to Mediterranean wetlands (e.g. Marble Trout) whose conservation status is unfavourable in the Mediterranean or which have a specifically Mediterranean character (e.g., Slender-billed Gull, Glossy Ibis).

2. Species with unfavourable conservation status which are found in Mediterranean wetlands (e.g. Amphibians, Terrapins, Spotted Eagle).

3. Iconic Mediterranean wetland species (e.g. Greater Flamingo).

4. Species that are exploited in Mediterranean wetlands (e.g. Ducks, Eel).

5. Species covered by the Ramsar and Bonn Conventions (e.g. waterbirds).

The amount of effort allocated will however continue to depend on (i) the level of funding for research projects and (ii) the data already available (priority given to species for which a long-term data set already exists). Lastly, studies under the Health Ecology theme may rely on some more common

species (e.g. Yellow-legged Gulls, rodents) because they can act as a reservoir for pathogens that could have an impact on species with unfavourable conservation status.

Strategy

The Department's strategy is to provide and transfer sound scientific knowledge relating to population dynamics, interactions between pathogens and biodiversity, and the distribution of species. The Department accordingly bases itself in primarily on scientific output (publication in international scientific journals being the basic product) and the development of new tools (infrastructure for collecting, managing and presenting data), in order to gain legitimacy, credibility and international visibility.

The scientific output will be based in particular on long-term monitoring studies which will need to be developed and continued. In particular it will be necessary to anticipate future technical innovations and the requirements of other research centres that no longer have access to the field or to long-term data (feather banks, serum banks etc.).

The transfer of the knowledge that is acquired will be carried out by (i) attending scientific meetings, participating in expert groups and contributing to joint research programmes involving users, managers, decision-makers and the general public, and (ii) the production of popularised material (leaflets, internet site) for the benefit of users, managers, decision-makers and the general public, with the support of the Communications team.

Expected results

Expected results in environmental terms, in terms of changes of practices and management

Status of target populations

- Populations in a good state of conservation in an ecosystem that has regained its Mediterranean character
- An increase in numbers for target populations
- A decreased risk of extinction for target populations
- A decrease in the conflicts between target populations and nature users
- An increased sensitization of users to improve cohabitation with target populations

Changes of practices and management

- Conservation policies better take into account the life history traits of species and scenarios of the spatio-temporal dynamics of species at the scale of the Mediterranean basin
- Site managers better take into account species life history traits and implement conservation actions in an adaptive management framework (better integration of management and monitoring)
- Public and Veterinary health policies better take into account biodiversity conservation.
- Site managers better take into account the dynamics of pathogens when implementing conservation actions
- The general public and the community of naturalists is better involved in producing and sharing data aimed at understanding the dynamics of Mediterranean wetlands biodiversity (networks, tools for data collection, etc.);
- Mediterranean wetland biodiversity data are produced and shared by several networks (Flamingos /Pelicans / International Waterbird Counts) and are geolocalised, standardised, secured and easily accessible through a common and collaborative web portal.

Expected results in terms of research

- An increase in knowledge of species dynamics in front of global change
- An increase of knowledge regarding the interactions between biodiversity and health
- An increase of knowledge of the distribution of species as a function of landscape dynamics
- A strengthened capacity for research teams in the Mediterranean basin.

Results indicators

Geographic distribution of species considered (budget analysis)

- Conservation status of species considered (budget analysis)
- Conservation status of habitats used by species considered (budget analysis)
- Functioning of the department (budget analysis)
- Protection status of sites (budget analysis)
- Associated partners (semi-quantitative scale from 0 to 5)
- Contribution of projects and department to program objectives (semi-quantitative scale from 0 to 5)

Conservation indicators

- Biodiversity conservation
- Changes of attitudes
- Interest shown by target groups

Production

- Transfer : Quantitative analysis of transfert products
- Scientific : quantitative analysis of scientific production (e.g. IF / download, citations etc…)
- Consolidated list of scientific publications and main products

Budget: quantitative evaluation

- Use of own funds
- Success in collecting external funding
- Quantitative analysis of external funding

Structure of the Department

Axe 1: Dynamics of animal populations in response to global changes

- This research theme addresses the identification of the mechanisms that affect the dynamics of the populations being studied by combining demographic, genetic, parasitological and ecotoxicological approaches with the identification of local and global factors.

Axe 2: Ecology of health and conservation

- This research theme seeks to understand the interactions between biodiversity and problems of public and veterinary health in the context of global changes.

Axe 3: Temporal and spatial modelling of f vertebrates and pathogens

- This research theme aims to predict the spatial and temporal distribution of species and of pathogenic agents in relation to landscape-scale processes. It complements the Ecosystems Department's "Modelling" theme.

Axe 4: Management system for large databases for conservation

- This research theme seeks to identify and develop methods for collecting, managing and displaying natural history data in order to optimise their acquisition over the long term and at lower cost.

Axe 1

Dynamics of animal populations in response to global changes

Arnaud Béchet *& Jocelyn Champagnon*

Environmental issues

The animal species of Mediterranean wetlands react to global changes in a variety of ways. Those species that are gaining (e.g. flamingos, spoonbills, ibises) have benefited from interventionist local management that has a high cost in water and energy. This management can facilitate the establishment of alien species, and can be in conflict with more general objectives such as the conservation of the specifically Mediterranean character of these habitats and the need to save water in countries where it is a limited resource. In time, this management may also be viewed unfavourably from the social point of view (e.g. incursions of flamingos into rice fields). For the species that are losing, the demographic parameters underlying the deterioration in their status have not yet been completely identified (e.g. Eels, Slender-billed Gull, Pochard) making it impossible to act effectively to arrest their decline.

The main indirect factors affecting (positively or negatively) the demography of these species are the deterioration in the quality of their habitats (pollution, stabilisation), changes in land use, climatic changes and the presence of alien species. The main factors that may directly affect their demography are management practices (e.g. agriculture, salt extraction), conflicts between usages and management recommendations for the species in question, and to a lesser extent a kind of "conservation chauvinism", which may affect a geographical area (local views of conservation issues) or a species (priority given to a species rather than to a habitat or to landscape-scale processes), as in the case of the flamingos in the salinas.

While a number of species have been well-studied locally through the long-term monitoring of marked individuals, there is at present a lack of understanding of the way in which their populations are reacting to global changes on a broader scale, in particular taking into account the interchanges between populations (dispersal) or between sites (migration) that are affected by different pressures. An integrated approach, combining the monitoring of marked individuals, censuses, individual genotypes, and the diversity of individual strategies, will allow a better understanding of the way in which some species are able to respond to global changes. It will then be possible to model the demography of these populations in response to various scenarios of change, including those that are caused by management actions.

The potential for wider application is very high because our investigations are linked with those carried out by many practitioners of conservation science. Far from limiting ourselves to recommendations specific to the biological models under consideration, we use these case studies to draw general conclusions about the practice of animal species conservation.

Objectives (conservation)

The ultimate conservation objective is to provide management recommendations that will ensure a good state of conservation of the target species, with a commitment to respecting the specifically Mediterranean character of the life history strategies of these populations. The result should be to improve the resilience of the species that are confronted with global changes while at the same time conserving their adaptation to the unpredictable hydrological/climatic conditions that are characteristic of this region (and liable to become more unpredictable with climate change).

The practical objectives of the project are to diagnose the problems of conservation of species, detecting unfavourable trends and identifying their causes; to test out more favourable modes of managing (habitats, available stocks, acceptable levels of exploitation, etc.) or of controlling species; to respond to social demands (high-risk species, those which cause problems, etc.).

To achieve these objectives, it will be necessary to transfer the results to site managers and to share a vision of conservation based on:

- thorough knowledge of population dynamics;
- an adaptive approach (based on monitoring and on experimentation through management);
- an evolutionary approach (the conservation of biodiversity as evolutionary potential rather than as a collection of species).

Strategy and targets

The levers and intended targets for transfer, allowing the changes in management to take place that are necessary for achieving the conservation objectives, are the raising of awareness of managers, the general public and decision-makers across emerging issues and an exemplar suite of species.

The project has high potential for transfer for site users (hunters, fishers), wetland managers, international conservation organisations (Wetlands International, IUCN, etc.), and also a wider audience which would get the general public involved in wetland conservation.

The principal scientific problem posed is to identify the mechanisms which affect the dynamics of the study populations using a combination of demography (Capture-Mark-Recapture, censuses, breeding success), genetics (mtDNA, microsatellites, SNPs, MHC), parasitology and ecotoxicology, plus the identification of local factors (conservation management) and global factors (climate, changes of use/habitat associated with large-scale public policies). We intend to carry out this work with a varied range of species by making use of the existing long-term demographic databases at the Tour du Valat, by setting up new ones, and by combining demographic analyses with genetic, parasitological and ecotoxological analyses.

Several populations of the species being considered (e.g. greater flamingos, slender-billed gulls, European pond terrapins) are fragmented, whether at the scale of the Camargue or over the whole of the Mediterranean basin. We will seek to quantify the flows among populations (genetic demographic studies), to evaluate/identify the presence of source and sink populations, and to identify possible problems of connectivity.

We will evaluate the effect of certain individual parameters such as genetic diversity (heterozygosity), the diversity of MHC markers (immunity), and the level of parasitism or pollutant levels (organic pollutants or heavy metals) (see also Theme 2) on various demographic parameters (survival, recruitment, dispersal) in the presence of anthropogenic pressures.

Expected results

Expected results in environmental terms, in terms of changes of practices and management

Status of target populations

- Populations targeted in a good state of conservation in an ecosystem that has regained its Mediterranean character;
- An increase in numbers for targeted populations : Eel / Pond terrapin / Pelican / Eurasian Spoonbill / Ibis / all monitored charadriiforms species / Pochard ;
- A decrease in the conflicts between Flamingos and agriculture

Changes of practices and management

- A better appraisal of species life history traits in policy design and management measures
- Policies or management measures aimed at improving the status of focus species are taken in an adaptive management framework
- Recommendations for managing species or their habitats, whether to preserve populations that have conservation issues or to control problem populations (e.g. exotic invasive species)
- The capacity of managers of protected areas to conserve the biodiversity of Mediterranean wetlands is strengthened

Expected results in terms of research

- An increase in knowledge of species dynamics in front of global change.
- A strengthened capacity for research teams in the Mediterranean basin;

Results indicators

The same as for the department.

- Numbers and trends in populations of various study species;
- A better perception and a change in attitude regarding Mediterranean wetland species;
- Number of recommendations from the Tour du Valat, deriving from research, that are included in management plans;
- Number of participations in steering committees for the management of species;
- Number of publications for transfer (leaflets, internet pages etc.);
- Number of publications and IF;
- Number of projects, publication with Mediterranean collaborators ;
- Number of teams, scientists supported

Projects and stydy site(s)

There is only one project in this theme.

Project 1A: Long term individual monitoring

Individual monitoring data enable populations and metapopulations to be analysed demographically using Capture-Mark-Recapture studies, and also, via sampling during catching sessions, enable population genetics, ecotoxicology and parasitology studies to be undertaken. Research topics will include (i) the study of the causes of individual variations in dispersal and migratory strategy and (ii) the effects of global changes on species differing by their life history traits. A multicriteria analysis performed among the ornithological staff identified 5 species as priority in terms of developing a research program relying on marked individuals. The 5 species are the Slender-billed Gull, the

Pochard, the Spectacled warbler, the Yellow-legged gulls and the Great Bittern. The Slender-billed Gull, is already the focus of a mark-recapture program together with Flamignos, Spoonbills and Ibis. These long-term studies should be carried on based on a thorough appraisal of scientific priorities. A thesis should be launched on the Pochard with ONCFS. Funding opportunities to launch studies on the Spectacle warbler, the Yellow-legged gulls and the Great Bittern will be explored. The brainstorming has also identified a priority to attempt to develop research on Mediterranean herbivorous ducks, especially as a way to increase collaboration with North African countries. Besides waterbirds, we plan to carry on long term individual monitoring on European pond terrapin and Marble trout.

Possible funding

- ANR / DFG / Marie-Curie post-doc grants
- Fondation Total
- Agence de l'eau
- Life+ (ENVOLL / MC-SALT)
- PACA Region

Axe 2.

Ecology and health and conservation

Marion Vittecoq *& Jocelyn Champagnon*

Environmental issues

The two current crises - loss of biodiversity and emergence of pathogens - are linked by their partly common origins: increased perturbations of the environment due to human activities. Faced with the challenges presented by these two crises, the ecology of health and conservation seeks to understand the interactions between human, animal and plant health, the health of ecosystems, and environmental perturbation. Certain parasites or the use of certain chemicals (antibiotics, antiparasitics, industrial pollutants, etc.) can have a strong influence on the dynamics of host or target populations, the potential economic uses of wetlands (riding, agriculture, tourism, etc.) and human health. They consequently contribute to a negative image of wetlands and are used to justify types of management that are unfavourable to biodiversity (in particular drainage and destruction of wetlands). However they are rarely the subject of investigations into conservation biology. The current global changes will undoubtedly play a part in the emergence and spread of diseases, whether directly through epizootics and epidemics or through the development of resistance to treatments. It therefore appears essential that adequate knowledge of the dynamics of infectious diseases within ecosystems be acquired, in order to: i) prevent measures being put in place during health crises that are ineffective and harmful to vulnerable wild populations (mass slaughter, poisoning, etc.); ii) be in a position to devise conservation measures that can benefit the health both of wildlife and of humans.

The factors currently having an impact on the dynamics of these infective agents are numerous and mainly anthropogenic in origin. Particularly notable are:

- The globalisation of transport, which facilitates the interchange of pathogens and vectors.
- The use of medicinal treatments and the global rise in pollution, which favour the development and spread of resistance.
- The introduction of alien species, which modify the host and vector communities.
- Climatic changes, which alter the ranges of the hosts and vectors and thus of the pathogens themselves.

There is a high level of potential for wider application. Health ecology is a booming discipline and it is becoming clear that on one hand the problems of human health cannot be sustainably solved without recourse to these environmental approaches to the dynamics of the infectious agents, and on the other that such approaches are necessary to avoid conflicts between conservation and health. In addition, the models that we are using for study are pathogens that are associated with important health and economic issues on the international scale (e.g. influenza virus, antibiotic-resistant bacteria, liver fluke, etc.). The mechanisms which we are bringing to light in the special study region that is the Camargue will provide the information to enable a better global understanding of the dynamics of these infectious agents to be obtained.

Objectives (conservation)

The ultimate objective of the project is to enable the conservation of wetlands to be carried out while minimising the impact on human and animal health of the pathogens that are present in these ecosystems. To this end, our project will be seeking to understand which practices, modes of management and contextual factors affect the dynamics of the infectious diseases being studied and what changes are to be proposed to limit the associated health risks.

The practical objectives of the project are to contribute to the conservation of species with unfavourable status during epizootics and to understand the effect of global changes on interactions between wild species, their health, and public and veterinary health. These objectives will be achieved through the acquisition and transfer of knowledge which will:

- Identify which measures could be the most effective during health crises to limit the impact of the disease in question on vulnerable wild populations that could potentially be affected, on human populations, and on populations of domestic animals.
- Predict health crises by characterising the mechanisms of interchange of pathogens between these three epidemiological divisions (for example by determining where the points of direct or indirect contact are by analysing gene flows).
- Help to understand what changes in practice (e.g. antiparasitic treatments, management and treatment of water, management of invasive species) will be needed to minimise the long-term probability of health crises occurring.
- Help to understand the effects of unavoidable changes (e.g. climate change) in order to identify the preventive measures (e.g. intensified health monitoring, raising doctors' awareness of the presence of a new disease, etc.) which could reduce their future impact.

Strategy and targets

The strategy consists in establishing a bridge between the farming world, in particular livestock farmers, the conservation world and the health world, while gaining scientific credibility in the management of health problems in the environment. In particular this involves changing the negative views or perceptions about species or about Mediterranean wetlands in general that are often expressed by the health world, and to ensure that conservation strategies take potential consequences for health into account. The principal targets are health organisations, the mangers of natural areas, the general public (public health) and those involved locally (farmers, vets, hunters etc.).

The overall scientific issue addressed by the project is to understand the interactions between biodiversity and public and veterinary health problems in the context of global changes.

Expected results

Expected results in environmental terms, in terms of changes of practices and management

Status of target populations:

- Maintaining target populations (e.g. Slender-billed gulls) which could be affected by the pathogens themselves or by the inappropriate measures that are taken during health scares.
- A decrease in the conflicts between some species (e.g. Anatidae, Yellow-legged gulls) and nature users

Changes of practices and management:

- Recommendations for managing species or their habitats to control populations of hosts or vectors so as to minimise the impact of an infectious disease on human and/or veterinary health;
- Strengthening of the capability of managers of protected areas to conserve the biodiversity of Mediterranean wetlands while taking into account the effect of management and conservation measures on the dynamics of pathogens.
- Taking biodiversity conservation into account in public and veterinary health policies;
- A rational use of the chemicals used in campaigns against pathogens and their vectors (antibiotics, antiparasitics etc.);
- An improvement in the treatment of water and waste.

Indicators results

The same as for the department, and more specifically for this axe :

- A decrease in conflicts between the users of Nature and wild species;
- A better perception and a change in attitude regarding Mediterranean wetland species;
- A rational use of chemicals used in campaigns against pathogens and their vectors (antibiotics, antiparasitics etc.);
- Involvement in research networks and university networks associated with health problems;
- The number of publications for transfer (leaflets, internet pages etc.);
- The number of IF publications.

Projects and Study site(s)

The research aiming to improve our knowledge of the dynamics of pathogens will be based mainly on the work carried out in the Camargue. The results will help in obtaining a better understanding of these dynamics over the Mediterranean basin as a whole. The modelling approaches, based especially on the data of the Mediterranean Wetlands Observatory (MWO), will be able to cover all Mediterranean wetlands.

Projet 2A : Antimicrobial resistant bacteria in wildlife

The aim of this project will be to gain insight into the role played by wildlife in the dynamics of antimicrobial resistant bacteria. We will address three main questions: i) Which resistant bacteria are currently circulating in wildlife within the Camargue ii) Are these bacteria related to those recovered from humans in the region? iii) Are their some ecological traits that influence the risk of carrying such bacteria among wild species? Our results will help to understand how antimicrobial resistant bacteria enter wild populations and to suggest control strategy that may limit the contamination of natural ecosystems. We will also identify species that could be a reservoir, disperser or a victim of antimicrobial bacteria, which could be crucial to design surveillance and control strategies.

Projet 2B: Dynamics of the liver fluke in the Camargue

This project aims at understanding the dynamics and the risk of emergence of fasciolosis in a context of strong human impacts. This work will be divided in two parts i) study the diversity of the parasite (liver fluke, Fasciola hepatica) between and within its different host compartments: intermediate hosts (freshwater molluscs) versus final hosts (mammals), wild versus domestic, with large and small dispersion abilities; ii) understand how this diversity and its dynamics are affected by human impact factors: water management, contacts between wildlife and domestic animals, pesticide and anti-parasitic treatment use. The work will be conducted in the Camargue and will lead to practical management recommendations.

Projet 2C: Evolution of wetlands and waterbirds communities in the presence of emerging pathogens.

Collaboration with the Mediterreanean Wetland Observatory. Integrate a health component in the study of the evolution of Mediterranean wetlands led by the OZHM. As a first step towards this goal emergence events and prevalence of different pathogens associated with wetlands will be studied from 1970 to present in parallel with available data concerning wetland degradation and land use change in the Mediterranean basin. This collaboration will allow to improve our knowledge of the links between wetland ecological state and associated health benefice / risks, which is a major current challenge as stated in the recent Ramsar report entitled “Healthy wetlands, healthy people” (2012).

Projet 2D: MHC and flamingos

Our overall aim is to provide the first empirical study on the interactions of host MHC genotype, pathogen prevalence, gut bacterial community, host fitness traits, and host long-distance dispersal using a very large dataset of greater flamingos. We believe that this will have important implications for our understanding of the role of long-distance dispersing/migrating avian species in the spread of pathogens. Specifically the project has the following four objectives:(i) To test the effect of the local environment and long-distance dispersal on the gastrointestinal bacterial community and MHC class II diversity of breeding populations across the Mediterranean basin and west Africa, (ii) To Identify MHC-fitness traits correlations in the large panmictic population of greater flamingos, (iii) To test for variation in MHC allele frequencies and MHC selection across time and (iv) to investigate the combined effects of MHC variation and pathogen loads on long-distance post-fledging and breeding dispersal for greater flamingos born in the Camargue, southern France.

Table 2. Characterization of the four projects by the aimed pathogenic agents, the studied host species, the nature of the works and the study sites.

Pathogen	Host species	Type of study	Site d’étude
***Escherichia coli* Antibiodic-resistant**	Gulls and rodents	Microbiological sampling, phylogeny	Camargue
Liver fluke (*Fasciola hepatic*	Cattle, snails, coypus rats	Parasite sampling an phylogeny	Camargue
Pathogens causing epidemics around Mediterranean wetlands sin 1980	Humans and bird communities	Modelling	Mediterranean basin
Gut bacterial community	Greater flamingos	Microbiological sampling, genetic analyzes	Mediterranean basin and West Africa

Possible funding

- INEE CNRS (particularly via the Camargue global ecology study site (SEEG))
- French Agency for Food, Environmental and Occupational Health & Safety (ANSES)
- French National Research Agency (ANR) young researcher programmes
- European Union

Axe 3.

Spatio-temporal distribution of vertebrates and pathogens

Jocelyn Champagnon, *Alain Sandoz, Marion Vittecoq, Clémence Deschamps, Laura Dami, Olivier Boutron and Arnaud Béchet*

Environmental issues

The last few decades have been marked by the increasing significance of climate change and of major changes in land use, and changing practices in agriculture, fish-farming and hunting. These changes have been accompanied by several health crises with which it has been possible to associate the biodiversity of Mediterranean wetlands (e.g. avian influenza). The next few decades will see the same changes generated by human societies, no doubt with the addition of more. All these changes will be sure to continue to bring about profound modifications in the spatio-temporal distribution of Mediterranean wetland species and are liable to contribute to the emergence of new pathogens.

To anticipate and predict the future changes on the basis of quantitative observations of past and present phenomena is a fundamental environmental imperative. The development of tools for the synoptic monitoring of biodiversity and the simulation of crises (for example of an epidemiological nature) is a need that has been very inadequately met, if at all. To remedy this, this area of research will seek to (i) model the effect of different management strategies on the persistence of populations among species that are exploited (e.g. ducks / eels) and/or subject to profound habitat changes in years to come (e.g. flamingos), and (ii) in synergy with the Conservation of Ecosystem Department's Modelling theme, to develop models which will include geographic and landscape aspects of the distribution of animals and pathogens.

Besides their heuristic aspect, it will be possible to use these models to provide assistance to decision-makers in taking appropriate management measures by evaluating various different scenarios in order to guard against irreversible impacts on the environment, and also to alert the public to practices that are harmful to biodiversity. It will be possible to apply the predictive scenarios and models being developed to the whole of the Mediterranean basin.

These models will be based on data collected within Themes 1 and 2, combined with data on the processes taking place in habitats, landscapes and climate. Efforts will be made to the parameters structuring the landscape (e.g. landscape indicators, area and depth of water) that affect the distribution and trends of the populations involved. In particular, landscape will be considered in its geographical dimension (fragmentation, configuration and land cover) as well as in its vertical dimension taking into account the presence, or absence, of hedges and woods as well as the effects of micro-relief. It will then be possible to apply scenarios simulating various pressures to predict the changes in spatial and temporal distribution of species and pathogens.
This axe is the Modelling section covered by the Conservation of Species Department. It complements the Modelling theme covered by the Conservation of Ecosystems Department.

Objectives (conservation)

This axe has two objectives, the second being shared with that of the Ecosystem Department's Modelling theme. They comprise:

- To improve our understanding of the functioning of populations of vertebrates and pathogens and their response to the combined effects of climate change and anthropogenic changes.
- To support actions taken to manage and restore species and ecosystems, following an adaptive process on the basis of predictive scenarios and experiments. For example, hazard maps for practices which could in time create conservation problems could be presented to managers of natural areas and decision-makers to improve the governance of Mediterranean wetlands.

In association with Theme 1, the main species concerned will be those whose numbers and distribution are subject to long-term monitoring: ducks, gulls, flamingos, waders, etc.

In association with Theme 2, the models that are developed will be concerned with viruses, multicellular parasites and their vectors that have already been studied in the Camargue, such as the Influenza A virus and liver flukes, in relation to environmental variables (habitats, fragmentation, salinity etc.) and the dynamics of the hosts. The aim is to predict or to shed light on factors concerning the presence of various pathogens (antibiotic-resistant bacteria, influenza virus, etc.) in relation to scenarios for the management of water, wetlands and host populations. Hazard maps showing the predicted probability of the presence of pathogens will be produced.

The models used will be derived from matrix population models, distribution models as well as niche models (e.g. Species distribution modelling), thermodynamic models (e.g. NicheMapper) or individual-based mechanistic models (e.g. MORPH).

Strategy and targets

The strategy for this area of research is to predict changes in the spatio-temporal distribution of biodiversity in relation to global changes.

The targets are the scientific community and decision-makers who will be alerted to the future consequences of present activities, wetland users (hunters, farmers etc.), local communities, the health services, the environmental surveillance services and the managers of natural areas. The establishment of participative GIS will facilitate dialogue with and transfer to the intended targets.

The scientific question posed is how to predict the distribution of species and pathogens in relation to landscape dynamics. In particular this will mean obtaining an understanding of the processes which are behind the spatial distribution of species. Some of the answers will come from Themes 1 and 2, but on a broader spatial and temporal scale, it is of course the link between the presence of species and the data on habitats/presence of hosts, combined with models of transmission/spread, that will provide the rest of the answers.

In addition, in association with the Ecosystem Department's Modelling theme, the management responses drawn up for the conservation of biodiversity will be based on the knowledge acquired on different scales, from pathogen to ecosystem, taking into account the host, the individual, the population, the habitat and abiotic factors.

Expected results

This axe will enable new data to be produced relating to landscapes, their dynamics and their relation to species, and will allow a range of bio-indicators to be drawn up. The models developed will allow the changes in distribution of species or the spread of a disease in changing habitats to be spatially visualised, and the consequences in conservation terms to be predicted.

Expected results in environmental terms, in terms of changes of practices and management

Status of target populations

- Populations in a good state of conservation in an ecosystem that has regained its Mediterranean character
- An understanding of nature users on the role of the target populations and their dynamics

Changes of practices and management

- Recommendations for managing species or their habitats, whether to preserve populations that have conservation issues or to control problem populations
- Policies or management measures aimed at improving the status of species are taken in an adaptive management framework
- Recommendations for managing species or their habitats to control populations of hosts or vectors so as to minimise the impact of an infectious disease on human and/or veterinary health
- Taking biodiversity conservation into account in public and veterinary health policies
- Taking account of future scenarios in present management decisions by local authorities, private landowners, managers of protected areas, etc.
- An understanding of managers on the role of each target population, how it is affected by the practice, (for instance: the necessity of rules or threshold in the exploitation)

Expected results in terms of research

- An increase of knowledge regarding the interactions between biodiversity and health
- An increase of knowledge of the distribution of species as a function of landscape dynamics
- A strengthened capacity for research teams in the Mediterranean basin.

Results indicators

The same as for the department, and more specifically for this axe :

- Number of models of relationships between landscapes and species.
- A better perception and a change in attitude regarding Mediterranean wetland species;
- Dispensing of advice about the risks associated with pathogens.
- Number of publications for transfer (leaflets, internet pages, etc).
- Number of IF publications.
- Number of projects and publicatios with Mediterranean collaborators.

Projects and Study sites

Projet 3A: Modelling spatio-termporal distribution of Greater flamingos

A first mechanistic model and individual-based spatially explicit (MORPH software) has been developed to predict the distribution of breeding flamingos in the Camargue. This model, which gives fairly good predictions, however, must be refined by incorporating more realistic behavioral

components of flamingos and invertebrates distribution. In parallel, a first multi-matrix model colonies population based on Leslie matrix was developed. The goal is to combine these two modeling approaches to assess how environmental changes associated with the restoration of ponds and marshes of the Camargue salt will affect the local dynamics of the flamingo population (MORPH) and more broadly the persistence of the flamingo population roses across the Mediterranean (Matrix Model multi-colonies population). The models developed by the hydrology team on the hydrological functioning of the system will generate different water development scenarios and salinity for ponds. The distribution of flamingos and the expected reproductive success will be an additional layer modeling and integrative environmental forcing these scenarios.

Projet 3B: Modelling spatio-temporal distribution of vertebrates

Efforts for monitoring wetland biodiversity will focus first at the Camargue level (standardised protocols for protected areas, monitoring of wintering and breeding waterbirds, biodiversity logs). The step beyond will be to assess trends at the Mediterranean scale by fuelling and animating strong networks of partners (e.g. IWC of Wetlands International...). These networks will contribute to the assessment of the status of the biodiversity in the Mediterranean basin in collaboration with the Mediterranean Wetland Observatory.

Projet 3C: Modelling pathogens (virus) dynamics

Model the spatial dynamics of avian influenza virus persistence in the Vaccares hydrosystem throughout the wintering period using available data on wintering duck abundance in the different pounds, infection rates in these ducks other time and persistence of influenza viruses in water according to environmental conditions to feed existing hydrological models. This collaboration with the ecosystem department will allow mapping the risk of avian influenza virus presence in the Vaccares hydrosystem other time. The development of this innovative approach will in a second step be applied to other pathogens such as antimicrobial resistant bacteria.

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Axe 4.

Management system for large databases for conservation

Christophe Germain, *Alain Sandoz, Clémence Deschamps, Jocelyn Champagnon, Arnaud Béchet*

Environmental issues

The monitoring of trends in the biodiversity of Mediterranean wetlands has always relied not only on managers and scientists but also on the contributions of amateur naturalists, whether in assisting with censuses or in resighting marked individuals. The Tour du Valat has accumulated composite long-term databases bringing together the data provided by hundreds of observers affiliated to a wide variety of organisations.

These days the good old field notebook can in some cases be complemented by mobile electronic tools for collecting data (tablets, smartphones) which enable data to be loaded directly and enable better standardisation of large-scale protocols that depend on many observers. Further developments, such as the ability to enter data on an Internet site, are revolutionising the way in which natural history data are collected and can generate vast quantities of data very quickly. Whether they are on mobile devices or on the Internet, these data are these days almost always automatically spatialised. These new modes of gathering and capturing data in the field can be redesigned to improve the quality of the data and reduce the time required for capture as well as the associated errors.

Explaining and predicting population trends requires integrated approaches that allow the relative parts played by various potential impact factors to be distinguished and estimated. This integration requires a good level of standardisation of collected data and the implementation of tools to make databases mutually compatible.

These days naturalists' data are more and more in demand, especially by the DREAL (Regional Directorates for Environment, Planning and Housing), Nature and Landscape Information System (SINP), but also by research consultancies, and it is essential to be able to manage them and to share them while at the same time protecting the originators' copyright.

The issues for this theme are accordingly:

- To optimise the collection of data in the field, their archiving and conservation for the staff of the Tour du Valat.
- To optimise the collection of data relating to natural history, counts or ring-reading by amateur naturalists.
- To combine several heterogeneous databases rapidly in order to carry out any pertinent statistical analyses.
- To manage and share the data of volunteer contributors in a transparent manner.

- To display the data, particularly georeferenced data, for the purposes of communication and sharing (participative GIS, see Theme 3).
- To firm up a system for archiving and securing data.

The potential for wider application is very high as our work ties in with that of a number of nature protection organisations who are faced with these large databases.

Objectives (conservation)

The ultimate conservation objective of the project is to improve the management and sharing of natural history data so that they contribute more effectively to actions in support of Mediterranean wetlands.
The practical objectives of the project are:

- To optimise field work through the implementation of protocols that are decided in advance so as to obtain data of high scientific quality.
- To develop a metadata system enabling all of the data stored at the Tour du Valat to be referenced.
- To develop tools for collecting data in the field.
- To develop tools to facilitate the mutual compatibility of the databases.
- To strengthen and develop Internet tools for the collection of count data and ring resighting data throughout the Mediterranean.

Strategy and targets

The levers consist in the deployment of the existing tools (e.g. cybertracker) or in developing others (preferably open source).
The targets are the people involved in collecting data (managers, technical staff and rangers at the Tour du Valat and amateur naturalists) and, possibly, the general public and decision-makers for the tools for displaying data (graphics and mapping).
The overall scientific topic being addressed is to identify methods for collecting, managing and displaying natural history data in order to optimise their acquisition in the long term and at low cost. The kind of data obtained could be very variable in quality but with the efficient management of databases, the information available (for example georeferences, level of expertise of the volunteer, cross-checking of information via various sources, etc) enables the quality of the data to be evaluated. The distribution and trends in numbers of the local wildlife may then be estimated in a robust way and can contribute to a better understanding of the local biodiversity.

Obstacles

- Users' time (for development, the people in the field must be included at the discussion stage).
- Developers' time.
- Motivation of users.
- Cost of equipment.
- Limited internet connection (on-line mapping, etc.)..

Expected results

Expected results in environmental terms, in terms of changes of practices and management

Changes of practices and management

- An integrated database infrastructure with easy access to any data of the department
- Medwaterbirds fully developed and extensively used by Tour du Valat team and our partners in the Mediterranean
- ObsNature Crau-Camargue-Alpilles with a high rate of use by the community of naturalists.
- Applications developed for recording data with mobile devices.

Expected results in terms of research

- A strengthened capacity for research teams in the Mediterranean basin.

Results indicators

The same as for the department, and more specifically for this axe :

- Number of users/data of a standardised system for collecting and managing natural history data as extended to all of the data collected.
- Number of request /export
- Number of people adopting a system of data collection using mobile devices.
- Number of tools transmitted to Mediterranean teams.

Projects and Study site(s)

Projet 4A: Medwaterbirds. A web server for geolocalised counts, breeding surveys, ringing and ring-resightings of waterbirds at the scale of the Mediterranean basin.

The Medwaterbird web portal has been developed under the impulse of the IWC initiative. It has been chosen by Tunisia, Algeria, Libya and Egypt as the online tool for managing counts of mid-winter waterbirds. It is fully compatible with the Wetlands International data format, being able to exchange data with the IWC database. Medwaterbirds includes a module to manage breeding surveys. This module, first developed for Dalmatian Pelicans, should allow centralising the breeding surveys of all species monitored by Tour du Valat and its partners. Future developments include allowing to import large datasets of breeding data surveys, to manage ringing and resighting data including import facilities. The tool will be improved by offering facilities to explore (maps, graphs, tables), query and export raw and/or aggregated data. Additionnaly, specific part will be grafted to manage the flamingo supporting scheme (online registration and payment fees, visualization of the movements of flamingos on an interactive map ...).

Project 4B: ObsNature Camargue-Crau- Alpilles. A web server for geolocalised observation of animal and plant species in the region

The ObsNature Crau-Camargue-Alpilles web portal has been developed to standardise and optimise the management of opportunistic or observations collected in research project frameworks, of animal and plant species in the Camargue, Crau and Alpilles region. Based on the MNHN taxonomic referential system, it is ready to accommodate data from about 74 000 taxa. Several modules for sharing data with partners and to query and export data have been developed. A module allowing to import the historical Tour du Valat's "Log" data will be implemented.

Project 4C: Development of tools to record data on mobile devices

Long-term ecological monitoring data are still suffering of a lack of harmonization and standardisation. Data acquisition is still a time consuming step and finally big data sets are not interoperable, shareable and comparable between projects or organizations. The general aim of this project is to provide all-in-one solution to geolocalised data acquisition through mobile device. This will in turn reduce the time required by managers and researchers to collect monitoring data and improve data quantity and quality. The project will seek to rely on flexible and opensource tools such as cybertracker which are already available for PDA or Android devices (tablets or smartphones).

Possible funding

- DREAL (Regional Directorates for Environment, Planning and Housing) / Ministry of the environment
- AEWA

Ecosystems conservation

Brigitte Poulin

General objectives of the Department

To preserve biodiversity and ecosystem functions and services in a context of global changes, on the basis of three complementary themes: (1) modelling, to support management and restoration actions based on a better understanding of the functioning of ecosystems and their probable development; (2) restoring the biodiversity and functionality of degraded ecosystems, and (3) implementing and promoting adaptive, trans-sectoral and sustainable management that integrated into territorial development and favouring a site-based approach.

The overall approach of the Department is based on three principles: (1) the studies are multidisciplinary, address clearly-defined conservation issues, and are based on sound protocols that are suitable for the scales at which the work takes place; (2) the resulting management recommendations are efficiently transferred to managers, or developed within an integrated, participative framework in situations where there is the potential for conflict; and (3) their implementation is monitored and measured in terms of impact (indicators), enabling adjustments to be made if necessary (adaptive management), and the factors responsible for the non-implementation of a management recommendation are identified and analysed.

Environmental issues

Mediterranean wetland ecosystems face many pressures resulting from the combined effects of climatic and anthropogenic changes. The migration of people to coastal zones, land-use changes, and intensified land use, including agriculture and future changes in environmental conditions, call into question the ability of wetlands to maintain their condition and biodiversity and to continue to function and provide their services. The socio-economic and political context tends to generate short-term responses that do not adequately address the long-term environmental issues. The main conservation issues relate to changes in land use, climatic variability, pollution, the overexploitation of resources, intensification of practices, and the spread of alien species. In Mediterranean wetland ecosystems, these threats are most often associated (as causes or consequences) with the changes in hydroperiod and salinity, which act as principal driving forces. The Camargue in particular is at present facing major changes in land use, notably with the renewal of the Common Agricultural Policy, which brings with it the potential for a reduction in the area under rice cultivation and changes in the hydrological management of the delta, as well as the partial winding down of the salt extraction industry, to which may be added changes in the coastline and the erosion of the infrastructure that restricts interchanges between lagoons and the sea. The scientific approach of choice is the development of tools to interpret the processes taking place and to predict how they will develop, and what their impacts will be, in order to promote an adaptive form of management or to undertake practical rehabilitation activities.

Strategy

- To generate knowledge about the dynamics and resilience of ecosystems in relation to the different identified pressures,
- To apply this knowledge via pilot studies of the ecological restoration and sustainable management of land, favouring a pilot site approach,
- To make use of case studies in the Camargue that involve urgent issues or that have a high potential for transfer and wider application in the Mediterranean Basin,
- To develop and transfer this knowledge in forms that enable it to be used by decision makers and managers,
- To encourage the taking into account of biodiversity issues in land-use management.

The managers and decision-makers who are the principal targets for our results will ideally be involved at an early stage, in line with a participative, co-constructional approach that brings together scientists,

managers and users. The collective capacity for adaptation and the perspectives of the stakeholders will also be taken into account, as will the general public, which can have a significant influence on political decisions, especially as regards certain topics.

Expected results

Expected results in environmental terms, in terms of changes of practices and management

- better management of Camargue ecosystems, based on understanding their functions and spatiotemporal dynamics, particularly with regard to the evolution of the stressors concerned;
- conservation status, functions, services, and biodiversity at the restored sites;
- improved knowledge and understanding of the mechanisms (succession process and effects due to priorities) involved in the restoration of sites;
- increased knowledge about the impacts of management on the evolution of ecosystems;
- the inclusion of climate changes as constraints likely to influence ecosystem management options;
- a greater capacity to predict the developmental paths of communities and ecosystems (trial restoration sites used as acid-tests);
- the implementation of integrated, adaptive management of sites reconciling the conservation of natural heritage with socio-economic activities;
- raised awareness among local people and politicians concerning the advantages of preserving natural heritage and better dialogue between stakeholders;
- the drawing up of realistic and operational management plans for pilot sites;
- dissemination of the results and their importance among the scientific community and among site managers, so that the methods tested can be applied to future restoration projects;
- the organisation of events and the creation of awareness-raising documents aimed at site management organisations, the local population, and decision-makers.

Expected results concerning scientific and technical production

- a structured data bank for long-term analysis/synthesis;
- dissemination of the results and their importance among the scientific community and among site managers so that the methods tested can be applied to future modelling, management, and restoration projects;
- the organisation of events and the creation of awareness-raising documents aimed at site management organisations, the local population, and decision-makers;
- scientific papers published in high-IF journals;
- scientific communications (conferences, colloquia, and seminars);
- training courses and technical documents for site managers;
- leaflets, articles for the general public and in the mainstream press;
- the drawing up, publication, and assessment of management plans.

Results indicators

- status of the ecosystems studied, evolution of the biodiversity and ecological functions, and of their level of naturalness;
- improved status of pilot sites based on a better understanding of the functioning of socio-ecosystems, resulting in the preservation of a mosaic of fragile wetlands and sustainable uses;
- changes in attitudes and practices, assessed in function of environment/landscape monitoring, the level of application of the methods recommended, types of management options chosen, surface areas restored, and management plans applied;
- interest in the work, measured in function of media coverage, and requests for expertise and methodological support above and beyond recommendations, the participation of stakeholders

in concertation meetings, the number of invitations to seminars/conferences, the development of new partnerships, and the obtaining of funding;
- the transfer effort measured through the number of events organised, and the production of technical and tools and documents for the general public;
- publications, in function of the type of journal, its IF, the impact of the paper, and invitations to participate in scientific congresses.

Structure of the Department

Axe 1 : Ecosystems modelling

- The overall objective in this area of research is to create models that improve our understanding of how Mediterranean wetland ecosystems function, and to propose predictive scenarios that support management and restoration actions targetting species and ecosystems.

Axe 2 : Ecosystems restoration

- The overall objective in this area is to understand the underlying mechanisms structuring plant communities, and to use this knowledge to restore wetland ecosystems.

Axe 3 : Adaptative and integrative management

- The overall objective in this area is to assess and promote management plan methodologies, experiment with them at pilot sites, and promote the sustainable management of Mediterranean wetlands.

Axe 4 : Mediterranean Lagoons Transfer Unit

- The Mediterranean Lagoons Tranfer Unit's principal objective is to facilitate an exchange network for lagoons stakeholders in which knowledge and best practices can be shared.

Axe 1.

Modelling Ecosystems

Olivier Boutron

Environmental issues

Predictive studies concerning the future of biodiversity and ecosystem services in response to global changes, and climate changes in particular, constitute a field of research that has received considerable attention in recent years, both globally and continentally (e.g. Gilman et al. 2010, Montoya & Raffaelli 2010, Salamin et al. 2010, Beaumont et al. 2011, Dawson et al. 2011, McMahon et al. 2011, Bellard et al. 2012). In this framework, predictive modelling can play an important role by alerting us about potential risks and supporting proactive development strategies that can reduce the impact of global changes on biodiversity (Pereira et al. 2010). However, the development and implementation of adaptive strategies involving decision-makers at specific sites remain quite rare (Stein et al. 2013). Spatially explicit models that are realistic from a biological point of view can be used as decision-making aid tools in simulations enabling the stakeholders in a specific territory to assess the compromises linked to the different hypothetical scenarios, and to make informed decisions, which are then reassessed within an adaptive framework (Stein et al. 2013, Martinez-Harms et al. 2015).

The Mediterranean Region, and especially the Camargue, where biogeographical and social aspects are closely interrelated, lends itself particularly well to the study of the impact of global changes (changes in land use, climatic variability, pollution, over-exploitation or intensification of land use, spread of invasive species) on the spatial and temporal dynamics of ecosystem functioning, biodiversity, and services. The modelling of these processes, building on many monitoring programmes and scientific collaborations already taking place, should enable the local stakeholders to make use of the results of simulations or even modelling tools to understand the consequences of management decisions for the short-, medium-, and long-term development of ecosystems.

This theme will be developed in close collaboration with the Species Conservation Department's theme, "Modelling the prediction of numbers of vertebrates and pathogens."

Objectives (conservation)

- To improve our understanding of the functioning of Mediterranean wetland ecosystems and their responses to the combined effects of climatic and anthropogenic changes,
- To support actions for the management and restoration of species and ecosystems via an adaptive process based on predictive scenarios and experimentation.

Strategy and targets

Modelling the functioning of Mediterranean wetland ecosystems involves several disciplines including hydrology, climatology, botany, ornithology, agronomy, sociology, and economics. The difficulty faced by the modeller is in designing “coupled” models that take into account the differences in temporal and spatial scale between the various factors. The strategy adopted is to organise the work according to a number of different areas:

Area 1: understanding and conceptualisation

By analysing already existing experimental datasets (or ones yet to be acquired), we will improve our knowledge of the influence of hydro-climatic and anthropogenic stressors on ecosystem dynamics (physio-chemical characteristics, plants, fauna, and pathogens). We will also work on defining the future experiments to set up while improving the ones already in progress.

Area 2: designing models

The objective will be to integrate the results from Component 1 into models with a spatial and temporal dimension. Given the large number of phenomena to take into account, particular attention will be given to problems relating to changes in scale. Two main approaches will be used to develop these models: a deterministic approach (solving systems of ordinary differential equations (ODEs)) and solving systems of partial differential equations (PDEs) with methods based on finite differences, finite elements and volumes, and structured and unstructured grids), and a stochastic approach.

Area 3: development of prospective scenarios, prospective simulations

The various models produced will be used to carry out prospective simulations for a number of study sites. Preliminary work will be carried out with the Ecosystem Department’s projects on “Restoration” and “Adaptive and Integrated Management”, and with the “Species” and “Observatory” Departments, as well as with local stakeholders, to identify change scenarios for the various sites. These simulations will enable the influence of management or restoration activities on the future of the ecosystems under study to be assessed.

Area 4: transfer to managers, scientists, and decision makers

Special efforts will be made to disseminate the conclusions from the prospective simulations (or even to allow managers and decision makers to make use of the tools that have been developed), in particular to the members of the Executive Water Committee and to the staff of the Camargue Regional Natural Park. This action will be achieved through workshops as well as by developing graphic interfaces to facilitate the use of the models.

Expected results

Improved knowledge

The central underlying scientific question examined by this project is the influence of different stressors on the spatial and temporal dynamics of ecosystems. These stressors include

- the climate (and the consequences of climate modifications),
- the use of resources (management of water, salt, etc.), with possible land cover modifications, and risks of pollution, overexploitation, and the proliferation of invasive species,
- economic and social constraints (in particular, maintaining, decreasing, or intensifying rice growing and salt farming activities).

These dynamics will be studied while trying to include for each site/issue all the ‘compartments / variables’ pertinent to the questions examined. For example,

- water flows (volumes of water, retention time) and related ‘solutes’ (salt, temperature, nutrients, pesticides, isotopes), as well as sediment dynamics *(Ferrarin et al*. 2014a, 2014b, 2010; Höhener *et al.* 2010; Obrador *et al.* 2008; Umgiesser *et al*. 2014);

- climatology (atmospheric exchanges, climate modifications) (De Pascalis *et al*. 2012; Schoen *et al*. 2014);
- plant ecology (distribution of plant species, short-, medium-, and long-term evolutions), in collaboration with the Restoration team in the Ecosystem Department;
- socio-economic aspects (impact of management methods linked to different uses) (Ferrarin *et al*. 2013), in collaboration with the Ecosystem Department's Adaptive and Integrated Management team;
- ornithology (distribution of bird populations, short-, medium-, and long-term evolutions) (Stillman 2008), and virology (distribution of pathogens, short-, medium-, and long-term evolutions) (Vittecoq *et al.* 2011), in collaboration with the Modelling the Prediction of Vertebrate and Pathogen Populations team in the Species Conservation Department

The combined modelling of these elements, based on predictive scenarios and experiment, will enable modes of management to be devised for the short-, medium-, and long-term that are appropriate to the developments that will probably take place at the sites in question. The potential for extending the results to other coastal Mediterranean sites will then be investigated. The anticipated results are therefore:

- a better understanding of the functioning of the ecosystems,
- a better understanding of the impacts of management on the development of ecosystems and the inclusion of climatic changes as constraints that have the potential to influence management options.

Application/conservation

The results obtained in the framework of the Modelling theme must be transferred to managers and decision makers (Schmolke *et al*. 2010). The objective is that local stakeholders make use of these results, and that the "biodiversity" component is taken into account when making choices about the management of the various study sites. Support will be set up via participation in meetings, technical review committees, and management committees. When possible, the modelling tools developed will be transferred to the managers of the various sites involved.

Link with predictions of the numbers of vertebrates and pathogens

The Modelling the Prediction of Vertebrate and Pathogen Populations team in the Species Conservation Department will participate in the various model-design phases, to help to provide ecosystem modelling tools that can be used as the foundation for the spatial and temporal modelling of vertebrate and pathogen populations.

Results indicators

- Publications in scientific journals (number of papers, impact factor), talks given (participation in and invitations to conferences);
- Publications for the general public and transfer documents;
- Requests for expertise and /or interventions;
- Transfer of tools to site managers and decision-makers;
- Modelling results taken into account by site managers and politicians in the basic management of sites and in informing future management plans.

Study site(s)

Camargue Biosphere Reserve (including the former salt works site, the Vaccarès hydrosystem, the Charnier-Scamandre lagoons, the TdV Estate, Petit-Saint-Jean, the Cassaïre Estate), and other sites in the Mediterranean (including the Gediz Delta).

Possible funding

Current : Fondation Total, WWF/Coca-Cola, Fondation de France, DG-Environnement Horizon2020, collectivités (PNRC, SMCG).

Potential : Region, European Commission, ANR projects, Agence de l'eau, AXA.

References

Beaumont L.J., Pitman A., Perkins S., Zimmermann N.E., Yoccoz N.G. & Thuiller W. 2011. Impacts of climate change on the world's most exceptional ecoregions. Proc. Natl Acad. Sci. USA 108: 2306–2311.

Bellard C., Bertelsmeier C., Leadley P., Thuiller W &. Courchamp F. 2012. Impacts of climate change on the future of biodiversity. Ecol. Lett. 15: 365–377.

Dawson T.P., Jackson S.T., House J.I., Prentice I.C. & Mace G.M. 2011. Beyond predictions: biodiversity conservation in a changing climate. Science 332: 53–58.

De Pascalis F., Pérez-Ruzafa A., Gilabert J., Marcos C., Umgiesser G., 2012. Climate change response of the Mar Menor coastal lagoon (Spain) using a hydrodynamic finite element model. Estuar. Coast. Shelf Sci. 114: 118–129. doi:10.1016/j.ecss.2011.12.002.

Ferrarin C., Cucco A., Umgiesser G., Bellafiore D., Amos C.L., 2010. Modelling fluxes of water and sediment between Venice Lagoon and the sea. Cont. Shelf Res. 30: 904–914. doi:10.1016/j.csr.2009.08.014

Ferrarin C., Ghezzo M., Umgiesser G., Tagliapietra D., Camatti E., Zaggia L., Sarretta A., 2013. Assessing hydrological effects of human interventions on coastal systems: numerical applications to the Venice Lagoon. Hydrol. Earth Syst. Sci. 17: 1733–1748. doi:10.5194/hess-17-1733-2013

Ferrarin C., Bajo M., Bellafiore D., Cucco A., De Pascalis F., Ghezzo M., Umgiesser G., 2014a. Toward homogenization of Mediterranean lagoons and their loss of hydrodiversity. Geophys. Res. Lett. 41: 5935–5941. doi:10.1002/2014GL060843

Ferrarin C., Zaggia L., Paschini E., Scirocco T., Lorenzetti G., Bajo M., Penna P., Francavilla M., D'Adamo R., Guerzoni S., 2014b. Hydrological Regime and Renewal Capacity of the Micro-tidal Lesina Lagoon, Italy. Estuaries Coasts 37: 79–93. doi:10.1007/s12237-013-9660-x

Gilman S.E., Urban M.C., Tewksbury J., Gilchrist G.W. & Holt R.D. 2010. A framework for community interactions under climate change. Trends Ecol. Evol. 25: 325–331.

Höhener P., Comoretto L., al Housari F. , Chauvelon P., Pichaud M., Chérain Y., Chiron S., 2010. Modeling anthropogenic substances in coastal wetlands: Application to herbicides in the Camargue (France). Environ. Model. Softw. 25: 1837–1844. doi:10.1016/j.envsoft.2010.05.005

Martinez-Harms M.J., Bryan B.A., Balvanera P., Law E.A., Rhodes J.R., Possingham H.P., Wilson K.A. 2015. Making decisions for managing ecosystem services. Biol Conserv 184: 229–238.

McMahon S.M., Harrison S.P., Armbruster W.S., Bartlein P.J., Beale C.M., Edwards M.E. et al. 2011. Improving assessment and modelling of climate change impacts on global terrestrial biodiversity. Trends Ecol. Evol. 26: 249–259.

Montoya J.M., Raffaelli D. 2010. Climate change, biotic interactions and ecosystem services. Philos Trans. R. Soc. Lond. B. Biol. Sci. 365(1549): 2013–2018.

Obrador B., Moreno-Ostos E., Pretus J.L., 2008. A Dynamic Model to Simulate Water Level and Salinity in a Mediterranean Coastal Lagoon. Estuaries Coasts 31: 1117–1129. doi:10.1007/s12237-008-9084-1

Pereira H.M., Leadley P.W., Proenca V., Alkemade R., Scharlemann J.P.W., Fernandez-Manjarres J.F. et al. 2010. Scenarios for global biodiversity in the 21st century. Science 330: 1496–1501.

Schmolke A., P. Thorbek DeAngelis D.L. & Grimm V. 2010. Ecological models supporting environmental decision making: a strategy for the future. Trends Ecol. Evol. 25: 479-486.
Schoen J.H., Stretch D.D., Tirok K., 2014. Wind-driven circulation patterns in a shallow estuarine lake: St Lucia, South Africa. Estuar. Coast. Shelf Sci. 146: 49–59. doi:10.1016/j.ecss.2014.05.007
Stein B.A., Staudt A., Cross M.S., Dubois N.S., Enquist C., Griffis R., Hansen L.J., Hellmann J.J., Lawler J.J., Nelson E.J., Pairis A. 2013. Preparing for and managing change: climate adaptation for biodiversity and ecosystems. Front Ecol. Environ. 11: 502-510.
Stillman R.A., 2008. MORPH—An individual-based model to predict the effect of environmental change on foraging animal populations. Ecol. Model. 216: 265–276. doi:10.1016/j.ecolmodel.2008.04.014
Umgiesser G., Ferrarin C., Cucco A., De Pascalis F., Bellafiore D., Ghezzo M., Bajo M., 2014. Comparative hydrodynamics of 10 Mediterranean lagoons by means of numerical modeling. J. Geophys. Res. Oceans 119: 2212–2226. doi:10.1002/2013JC009512
Vittecoq M., Ottmann M., Renaud F., Thomas F., Gauthier-Clerc M., 2011. Persistance des virus influenza A en fonction des paramètres environnementaux. Virologie 15: 371–379.

Axe 2.

Ecosystems restoration

François Mesléard

Environmental issues

Since the mid-20th century, Mediterranean wetland ecosystems have faced significant anthropogenic pressures including destruction, overexploitation, and the introduction of species which have strongly affected their functions and biodiversity. The intensive exploitation of wetlands generally leads to major topographical modifications (ground levelling, dykes, etc.) and of the soil (quantities of nitrogen and phosphorous, compaction, salinity, etc.). The way they are managed, whether for farming or recreational uses, tends to result in high numbers of common or invasive species, which due to their competitive behaviour compromise the passive restoration of these ecosystems. Setting up protective measures, and decreasing certain pressures (limiting or modifying practices and uses) have often proven to be inadequate for restoring habitats and their functions. It subsequently becomes necessary to carry out major rehabilitation operations, and reintroduce or eliminate species.

Ecological restoration is a rapidly developing field, which offers the ideal framework for testing hypotheses on plant dynamics and mechanisms of succession (acid tests, Bradshaw 1987, 1992). The examples in wetlands (in the Mediterranean region in particular) highlight the importance of stressor variables as well as mechanisms of dispersal (e.g., Comin 2002, Didham et al. 2007, Watt et al. 2007, Moreno-Mateos et al. 2012, Muller et al. 2014).

Abiotic stressor variables are particularly selective in Mediterranean wetlands (particularly coastal ones). They play a major role in determining the structure and dynamics of communities. However, their effects depend on dispersal mechanisms (Hutching & Both 1996). In addition, due to their capacity to occupy space, some species can prevent or facilitate the arrival of other desirable or undesirable species (McDougal & Turkington 2005). This priority effect (Palmer et al. 2003), which has been studied especially in invertebrate communities, also seems to play a decisive role in the case of plant communities (Young 2001, Fukami 2005).

From a scientific point of view, the principal objectives in this research area are as follows, based on the community assembly models proposed by Lortie et al. (2004) and Beleya et al. (2004) within the framework of ecological restoration:

- measure the importance of (1) stochasticity (Chave 2004, Heil 2004, Gewin 2006) on mechanisms of dispersal (abiotic filter), and (2) priority effects in mechanisms of competition (abiotic filter), and the consequences on the structure of communities.
- assess how these mechanisms can be manipulated to reorient plant dynamics along the desired path (White & Jentsch 2004, Scheörder et al. 2005).

Active restoration requires in the first place the establishment of ad hoc abiotic conditions, and also in most cases reinforced mechanisms of dispersal (supplying propagules). Yet, the suitability of current techniques of dispersal, their potential to be generalised, and the development of techniques appropriate for changing habitats must still be assessed (Turnbull et al. 2000, Hotzel et al. 2011, Muller et al. 2014). Some research in the field of restoration ecology has shown that in selective

habitat conditions the order in which species arrive can have an influence on the future community by preemption of resources or, on the contrary, by organising it (Suding et al. 2004, Young et al. 2005). The capacity to orient plant dynamics toward the desired communities, by giving preference to the propagules of one or several species during dispersal forcing, must still be evaluated in many habitats.

Objectives (conservation)

In terms of conservation, this project aims to (1) restore (sensu lato, SER 2004) ecosystem biodiversity and functions, parts of ecosystems, and degraded communities, (2) assess and promote restoration methods for ecosystems and communities, and (3) set up and promote adaptive integrated management plans in restored ecosystems. It is based on restoration techniques that have already been developed or will be tested (transfer, control of propagules and competition) and wetland management tools for water and herbivory. As in our previous programmes, the roles played by water and domestic herbivory remain essential questions that will continue to be assessed in the framework of restoration at various scales (mesocosm, site).

Strategy and targets

This project endeavours to implement specific engineering and ecological restoration operations while establishing adaptive management practices (ones that take account of the changing context and new advances in research), which are potentially sustainable (based on practices corresponding to social and economic realities) at particular sites. These actions can be conducted directly or after mesocosm tests (Muller et al. 2013, 2014). Given the long-term nature of restoration, this project will also capitalise on the medium- and long-term modelling set up in the previous programme.

If our ecosystem restoration project can satisfy at the same time conservation criteria and societal demands at emblematic sites, it may become a model for recovering Mediterranean wetlands, which explains why the demonstrative value of restoration operations is also crucial. The targets of this project are the scientific community and the managers of Mediterranean wetlands, as well as users and decision-makers.

This project entails 4 types of activities:

1. testing restoration methods (Cassaïre, PARIS microwave project);
2. rehabilitating and creating wetlands (former salt works, SBN pond digging project);
3. monitoring and managing restored sites (Cassaïre, Donzère);
4. promoting restoration methods (Cassaïre).

Expected results

Four types of results are expected:

- improving the condition, functions, services, and biodiversity of the sites restored;
- improving our knowledge and understanding of the mechanisms at play, in particular various processes of succession and priority effects;
- a better capacity to predict the trajectories of communities and ecosystems (use of our restoration experiments as acid tests)
- disseminating our results and their interest in the scientific community as well as among site managers so that the methods tested can be applied in future restoration projects.

Results indicators

- Sites being restored (number, surface area concerned, success of restoration).
- Publications in scientific journals (number of papers, IF) and for the general public, talks given (participation in and invitations to conferences).
- Demonstrative value of the project (interest of decision-makers and politicians, organisation of visits to the sites restored).
- Requests for expertise or interventions.
- Media coverage.

Study site(s)

The project is dependent on site availability, requests from site managers or owners, and funding, in particular for the development of ecological engineering operations and for the research (to fund the tests). Sites are therefore chosen partly on a strategic basis, but also in terms of opportunities. The list of sub-projects is thus likely to be modified during the programme.

Former salt works: restoration of the lagoons, steppes, and dunes, hydrological reconnection, adaptive management in response to the rising sea level, monitoring and monitoring tests of plant dynamics and the recovery of plants in collaboration with the Department's modelling team.

Cassaïre estate: continue recreating a wetland for the purposes of conservation and hunting on former farm land (70 ha) by setting up an adaptive management system for the site (water / grazing). New tests for introducing propagules after stabilising the management system. Monitor plants in relation to the restoration actions already completed or in progress.

Camargue: create temporary ponds and continue monitoring operations (flora, odonates, and potentially other invertebrates) on various sites (Vigueirat marsh, Camargue Regional Natural Park, Greater Marseille Sea Port …) by connecting or disconnecting them from the hydrological network.

Rivers (Gardon, Durance, and other sites of the French electric company--EDF): FUI PARIS project, use of microwaves to control invasive species.

Donzère Nature Reserve: Control of colonisation by woody species, driving biodiversity, and grazing *vs.* rotary slashing (doctoral thesis funded by the *Compagnie Nationale du Rhône* (energy company) / French National Hunting and Wildlife Agency).

Possible funding

Current: Banque Publique d'Investissement (BIP France), Compagnie Nationale du Rhône, Agence de l'eau, Ministère de l'Environnement, Région Languedoc Roussillon, Région PACA, Office National de la Chasse.

Potential: Fondation Fabre, Université Avignon.

References

Belyea L.R. 2004. Beyond ecological filters; feedback networks in the assembly and restoration of community structure? In Temperton V.M. *et al*. Assembly rules and restoration ecology. Island press Washington, pp: 115-131

Bradshaw A.D. 1987. Restoration: An ecological acid test. in W.R. Jordan, M. Gilpin & Aber J.D. (eds) Restoration ecology. A synthetic approach to ecological research, Cambridge University press,pp: 53-74

Bradshaw A.D. 1992. The biology of land restoration. In Jain SK & Bosford LW (eds), Applied population biology, Luwer Academic Press, pp: 25-44

Chave J. 2004 Neutral theory and community ecology. Ecology Letters 7: 241-253

Comin F.A. 2002. Restauracion ecologica: teoria versus pratica. Ecosistemas XI(1): 1-3

Didham, R.K., Tylianakis, J.M., Gemmell, N.J., 2007. Interactive effects of habitat modification and species invasion on native species decline. TREE: 22: 489 – 496

Fukami T., Martijn Bezemer T., Mortimer, S.R., van der Putten Wim H. 2005. Species divergence and trait convergence in experimental plant community assembly. *Ecology Letters* 8 (12): 1283–1290.

Holzel N., Buisson E. & Dutoit T. 2012. Species introduction – a major topic in vegetation restoration. Applied Vegetation Science 15: 161-165.

Mac Dougal AS & Turkington R. 2005. Are invasive species the drivers or the passengers of change in degraded ecosystems? Ecology 86: 42-56.

Muller I., Buisson E., Mouronval J.B. & Mesléard F. 2013. Temporary pool restoration after rice cultivation: is soil transfer required for aquatic plant colonization? *Knowledge and Management in Aquatic ecosystems,* 411 (03), DOI: 10.1051/kmae/2013067.

Muller I., Mesléard F. & Buisson E. 2014. Effect of topsoil removal and plant material transfer on vegetation development in created Mediterranean meso-xeric grasslands. Applied Vegetation Science 17: 246-261.

Palmer, T.M., Stanton M. L., Young T.P. 2003. Competition and coexistence: exploring mechanisms that restrict and maintain diversity within mutualist guilds. *The American Naturalist* 162 (4 Suppl.): S63–79.

Suding K.N., Gross K. L., Houseman G. R. 2004. Alternative states and positive feedbacks in restoration ecology *Trends in Ecology & Evolution* 19 (1): 46–53.

Turnbull L.A., Crawley M.J. & Rees M. 2000. Are plant populations seed-limited? A review of seed sowing experiments. Oikos 88: 225–238.

Fagan W.F., Lewis M.A., Neubert M.G. & van den Driessche P. 2002. Invasion theory and biological control. Ecol. Lett. 5: 148–157.

Gewin V. 2006. Beyond neutrality – Ecology finds its niche. PloS Biology 4(8): 1306-1310.

Heil G.W. 2004 Modeling of plant community assembly in relation to deterministic and stochastic processes. In Assembly rules and restoration ecology - Bridging the gap between theory and practice. Island Press, Washington, pp: 230-245.

Lortie C.J., Brooker R.W., Cholet P., Klikvidze Z., Michaler R., Pugnaire F.I. & Callaway R.M. 2004. Rethinking plant community theory. *Oikos* 107(2): 433-438.

Moreno-Mateos D., Power M.E., Comin F.A. & Yockteng R. 2012. Structural and functional loss in restored wetland ecosystems. Plos Biology 10:1 : e1001247.

SER 2004. International primer on ecological restoration. Society for Ecological Restoration International Science & policy Working Group. www.ser.org & Tucson: Society for Ecological Restauration International.

Scheöder A., Person L. & De Roos A.M. 2005. Direct experimental evidence for alternative stable states: a review. Oikos 110: 3-19.

Young T. P., Petersen D. A., Clary J. J. 2005. The ecology of restoration: historical links, emerging issues and unexplored realms *Ecology Letters* 8 (6): 662–673.

Axe 3.

Adaptative and integrated management

Lisa Ernoul

Environmental issues

Mediterranean wetlands face a wide range of environmental changes, resulting from development, the intensification of human activities, and direct physical and biological factors (climate, erosion, distribution of species, etc.) (UNEP/MAP-Plan Bleu 2009; Mediterranean Wetland Observatory 2012). Management plans, which are the planning tools *par excellence* for site management, have to accommodate these issues, while at the same time promoting a concerted, adaptive approach.

The uses and practices that are put in place can have a significant impact on the biodiversity of a site. The maintenance of the overall functioning and biodiversity of wetlands, and their capacity to adapt to changes depends, among other things, on whether or not it is possible to regulate the exploitation of resources (primary and secondary production, use of water) and, at the same time, on realising that wetlands are useful in providing a wide range of resources and services to local communities. While conservation strategies are partly dictated by the various international agreements and legislation (Ramsar Sites, Berne Convention, GIZC (Integrated Coastal Zone Management), it is still necessary to adapt international and regional strategies to the local context. In the context of applied research into the management of wetlands, it is possible to transfer good practices and management models to unprotected sites, provided that the specific characteristics (biological, socio-cultural etc.) of the targeted sites are taken into account.

Objectives (conservation)

- ***Ultimate environmental objective*:** To preserve the biodiversity, services, and functions of Mediterranean wetlands (at protected and unprotected sites), in the Camargue and in the Mediterranean Basin, using integrated, adaptive management methods.

- ***Practical objectives:*** (1) To test and validate methodologies (including management plan methods such as Open Standards) and approaches to management (such as integrated management and adaptive management) at pilot sites in the Camargue and in the Mediterranean Basin; (2) To implement the management plans for the Tour du Valat Estate, Petit St. Jean, the Marais du Verdier, and former salt works in the Camargue; (3) To inform and influence managers about sustainable approaches to management (priority subjects possibly including integrated management, hunting, crop and livestock farming, etc.); (4) To improve our knowledge about the factors that influence decision-makers; (5) To create tools for transferring the methodologies that have been developed and tested.

Strategy and targets

The strategy for the project is to develop and test out management methods and management plans at pilot sites in the Mediterranean to obtain practical examples that can be adapted and transferred to other wetlands. These case studies will need to demonstrate the compatibility of economic activity and the conservation of natural heritage through an adaptive, integrated approach to the management/use of natural resources. The limitations of these methodologies will be assessed and possible options for extending them will be tested. We will be collaborating closely with the social sciences and the sites' management organisations in setting up co-construction processes with local stakeholders at each pilot site. The primary targets are the site managers, decision makers, and local communities. The results will be transferred, in order to promote their application outside the pilot sites, using various methods (posting management plans on line, organising meetings, publishing scientific papers and popularised articles).

Expected results

Reconciliation of human activities with natural heritage conservation by integrating three kinds of action:

- Research: capitalise on current knowledge concerning the functioning of ecosystems (in relation with the modelling and restoration projects), the mindsets of stakeholders, and social perceptions to implement integrated and adaptive management of the sites that includes socio-economic activities.
- Concertation: raise the awareness of the local population and politicians on the interest of conserving natural heritage and improve the dialogue between stakeholders.
- Transfer: draw up realistic and operational management plans for pilot sites, organise events, and create awareness-raising documents targeting site managers, local citizens, and decision-makers.

Results indicators

- Improved condition of pilot sites based on a better understanding of the functioning of socio-ecosystems, which results in the conservation of a mosaic of fragile wetlands and sustainable uses and practices.
- Adaptive implementation of the management plans developed.
- Participation of stakeholders in the interviews and meetings held for the purposes of concertation.
- Requests from the stakeholders concerned by the site management for additional expertise and methodological support beyond the initial recommendations.
- Interest aroused by the events and awareness-raising documents (rate of participation or consultation, articles in the press).
- Publications (number of papers, IF) and scientific talks (participation in and invitations to conferences).

Study site(s)

- Delta du Gediz
- Petit St-Jean
- Marais du Verdier

- Domaine Tour du Valat
- Etangs et marais des anciens salins de Camargue
- Autres sites en Camargue

Possible funding

Current: Région PACA, Fondation de France, Contrats Natura 2000, Conservatoire du Littoral, MAVA.

Potential: Projet LIFE, AFD, MedPan, Total, Région LR, Agence de l'Eau

References

Ernoul, L., Beck N., Cohez D., Perennou C., Thibault M., Willm L., and Poulin B.. 2015. Trends in Management Plans and Guides: 25 Years of Experience from Southern France. *Journal of Environmental Planning and Management 58(6):* 1096–1112. doi:10.1080/09640568.2014.914021.

Ernoul, L., and A. Wardell-Johnson. 2014. Adapting International Conservation Strategies to Local Context: Perceptions of Biodiversity Values and Management Responsibility in Two Mediterranean Deltas. *International Journal of Biodiversity Science, Ecosystem Services & Management 10(4):*, 300–312. doi:10.1080/21513732.2014.980849.

Mediterranean Wetland Observatory 2012. “Mediterranean Wetlands: Outlook. First Mediterranean Wetlands Observatory Report - Synthesis for Decision Makers. Tour du Valat, France:, 128p.

Sutherland, W., A. Pullin, P. Dolman, and T. Knight. 2004. The Need for Evidence-Based Conservation. *Trends in Ecology and Evolution* 19 (6): 305–308.

UNEP/MAP-Plan Bleu 2009. *State of the Environment and Development in the Mediterranean*. Athens: UNEP/MAP-Plan Bleu.

Axe 4.

Mediterranean Lagoons Transfer Unit

Virginie Mauclert

Environmental issues

The Lagoons Transfer Unit was created in France in 2001 in the framework of the first National Wetlands Action Plan, in order to encourage and support local initiatives for the sustainable management of wetlands. The Lagoons Unit is now part of a network of five wetlands transfer units coordinated since 2008 by the French National Office for Water and Aquatic Habitats (ONEMA). Since 2014, the Transfer Units have had a national label for their promotion of sustainable management and their knowledge dissemination and exchange actions.
An innovative initiative to support lagoon habitat stakeholders, the Lagoons Transfer Unit is coordinated by the Tour du Valat in the Provence-Alpes-Côte d'Azur (PACA) region and works with the Conservatoire d'espaces naturels of Languedoc-Roussillon (CEN L-R) and the Corsican Environmental Office (OEC).
Its aim is to gain more recognition for Mediterranean lagoon habitats and encourage their sustainable management by facilitating a network of stakeholders, sharing knowledge and good practices, and raising public awareness.
Its sphere of action are lagoons and their peripheral wetlands, the chain of ponds that stretches over 130,000 hectares along the coasts of Languedoc-Roussillon, PACA, and Corsica.

French Mediterranean lagoons continue to face heavy anthropogenic pressures linked to land-use development, and to uses and certain practices from the catchment area to the coastline that are still far from being environmentally friendly.

Objectives (conservation)

The Lagoons Transfer Unit's ultimate objective is to participate in improving the condition of Mediterranean lagoons in France. Our working hypothesis is that sharing information and best practices, and awareness-raising can enable management practices in the field to be improved effectively while gaining recognition for these areas.

Its main objectives are as follows:

1. To share knowledge and best practices with the stakeholders/sites managers, for a better conservation or restoration of these habitats.
2. To facilitate a network of exchanges between the stakeholders concerned, including managers, scientists, elected officials, local authority and State agents, socio-professional players, environmental education associations, general public - and Technical Units, in order to promote good practices in management and restoration through experience sharing.
3. Raising awareness, particularly among elected officials and the general public, to favour the sustainable management of these habitats.

Strategy and targets

The Lagoons Unit targets above all managers and users of lagoons in Languedoc-Roussillon, Provence-Alpes-Côte d'Azur, and Corsica
It also provides a link at the national level through the network of Lagoon Units, by contributing to the national Wetlands portal and the national 'Technical Documents on Water' portal, and participating in the national environmental education and awareness-raising centre (CESP), linked to the Ramsar convention.

Its strategy is developed in the framework of its Steering Committee, made up of its main financial backers. The committee validates the actions proposed by the Transfer Unit, propositions resulting from its experience in the field and the recommendations of its bi-annual Advisory Steering Committee, which brings together decision-makers, scientists, and socio-professionals working in lagoons.

At the last advisory steering committee held in late 2014, the network stakeholders recommended the following actions for the coming years:

- Raise awareness among the decision-makers and land-use planners so that they take wetlands more into consideration in their development projects. There is a shared perception that the 'naturalist' discourse needs to be adapted to the preoccupations of these target groups in order to generate greater interest among them.
- Work with existing networks of lagoon habitat managers and researchers to facilitate their working together when research can contribute to wetland management or vice-versa
- Continue communicating about lagoon habitats to target groups not particularly converted to the cause of wetlands, such as land-use planners.

Expected results

Collect and share knowledge and good practice
The Lagoons Transfer Unit makes continuous monitoring of information on lagoons. Privileged communication tools are: (1) the bibliographic database, (2) the directory of actors and skills, (3) the electronic dissemination of the "Letter of the lagoons" sent out its network of stakeholders and (4) the website www. pole.lagunes.org. The Lagoons Transfer Unit ensures its role of gathering and provision of information to all stakeholders of Mediterranean lagoons. Certain national-scale news is also relayed via the national Wetlands portal.

Contribute to efforts to monitor the lagoon
The Lagoons Transfer Unit coordinates the Interregional Forum of Mediterranean lagoons (FIL MED), which aims to support managers Languedoc-Roussillon (LR) and PACA in the definition of management measures needed to improve or maintain lagoons quality. In particular, some data from this network (salinity, temperature, oxygen saturation level) were fed from 2007 to 2014 into the lagoon monitoring network RSL set up by the Languedoc-Roussillon region, the Rhône Méditerranéen Corse water agency, the French Research Institute for the Exploitation of Marine Resources (IFREMER) and the association Cépralmar (RSL came to an end in summer 2014). In addition, a research-management platform has been developed since 2014 intended for scientists and managers so as to favour knowledge transfer and the emergence of joint projects.

To organize a network of exchanges between the actors lagoons (managers, elected officials, communities, social and professional ...)
Training, seminars, technical conferences and exchanges of experience and thematic study tours are regularly organized for stakeholders associated with lagoons managers, local and central government departments, scientists, socio-professional stakeholders (from fishing, farming tourism, ect....).

Awareness and promote sustainable management approaches
Various actions are undertaken to awarness the general public, professionals and socio-elected to the sustainable management of the lagoons: coordination of activities of the World Wetlands Day and

European Heritage Days, production of educational materials, organization of meetings, a prize "Pôle-relais" to reward an innovative action carried out in a lagoon area by a local stakeholder in order to inspire politicians and contracting authorities.

Results indicators

- Changes in practices: dissemination of good practices on a five-year timescale
  - Number of testimonies and changes in practices most probably linked to Lagoon Transfer Unit actions
- Interest in our actions among lagoon stakeholders
  - number of subscribers and readers of the newsletter, website visits
  - consultation of databanks developed by the Lagoon Transfer Unit
  - number of long-term financial backers
  - diligence with regard to the training sessions and exchange meetings organised (Interregional Forum for Mediterranean Lagoons (FIL MED), study trips, etc.), and responses to assessment questionnaires
  - number of responses by organisations to calls for projects targeting awareness raising (WWD/EHDs/Transfer Unit Prize), media coverage, number of participants
  - number of projects set up jointly with lagoon stakeholders at their request
- Transfer
  - updating of databanks
  - number of newsletters disseminated
  - number of publications and awareness-raising documents
  - number of meetings/training sessions/seminars organised

Study site(s)

The sites covered by the LTU's work include all Mediterranean lagoons and their peripheral wetlands.

Possible funding

Current: Europe, agence de l'eau RMC, ONEMA, Région PACA, DREAL PACA, Département des Bouches-du-Rhône, groupe ACCOR.

Potential: Département du Var, Europe (Nouveau Fonds FEDER PACA), Life ou MED

References

- Site web du projet : www.pole-lagunes.org
- Lettre des lagunes, édition Pôle-relais lagunes méditerranéennes (8 numéros/an + 1 Hors-Série annuel) : http://www.pole-lagunes.org/actualites/lettre-des-lagunes
- Base de données documentaires : http://85.31.222.100/alexandrie-7/
- Films :
    - Etang de Berre, en quête d'une lagune cachée, film documentaire, 20 minutes, réalisation Océanides, juin 2015, production Pôle-relais lagunes méditerranéennes.
    - Lag'une découverte, web-documentaire, 6 minutes, réalisation Océanides, juin 2015. Production Pôle-relais lagunes méditerranéennes.
- http://www.pole-lagunes.org/en-action/etudes-et-projets-en-cours/valorisation-paysagere-des-milieux-lagunaires-et-de-l-etang-de-
- Programmes et bilan annuel des Journées Mondiales des Zones Humides en Méditerranée depuis 2005 : http://www.pole-lagunes.org/en-action/education-lenvironnement/journees-mondiales-des-zones-humides-2012-en-preparation/bilan-de
- Programmes, affiches et bilan annuel des Journées Européennes du Patrimoine depuis 2011 : http://www.pole-lagunes.org/en-action/education-lenvironnement/journees-europeennes-du-patrimoine
- Prix Pôle-relais lagunes méditerranéennes (tous les deux ans depuis 2011) : http://www.pole-lagunes.org/en-action/rencontres-du-reseau/rencontres-decideurs
- Brochure 'Et si on partait découvrir les lagunes ?, éditée en français (2011) et en anglais (2014) : http://www.pole-lagunes.org/documentation/publications-du-pole-lagunes/brochure-et-si-partait-decouvrir-les-lagunes-pour-une-dec
- Méthodes et outils de diagnostic des roselières méditerranéennes françaises en faveur de l'avifaune paludicole, Pôle-relais lagunes méditerranéennes, 2014 : http://www.pole-lagunes.org/ftp/EC_roselieres/PRLM_Methode_outils_diagnostic_roselieres_avifaune_2014.pdf
- Synthèses thématiques documentaires : http://www.pole-lagunes.org/documentation/publications-du-pole-relais-lagunes-mediterraneennes/collection-poles-relais-syntheses

Mediterranean Wetlands Observatory

Patrick Grillas

General objective of the department

The decline and artificialisation of wetlands continues, in the north as well as the south of the Mediterranean Basin affecting the biodiversity and more generally the functions and services provided by these ecosystems. . In a power struggle in which everyone defends their own ideas about a territory and their own interests, political decisions more often than not come down in favour of the activities that create the impacts (agriculture, urbanization, and the development of infrastructure with abstraction of water and modification of hydrological cycles). As well as those who are actually responsible for implementing these kinds of activities, it is also necessary to change the priorities, or the legal framework to which they have to conform, of those responsible for land-use planning at different scales (elected representatives and civil servants).

The Mediterranean Wetland Observatory, launched in 2008 by the La Tour du Valat Wetland Research Centre (TdV), is developed within the framework of the Mediterranean Wetlands Initiative (MedWet) - the first regional initiative of the Ramsar Convention on Wetlands. It is a wetlands management tool intended to serve the MedWet initiative countries.

The ultimate objective of the Mediterranean Wetland Observatory is to contribute to better protection and management of Mediterranean wetlands. It has two operational objectives:

1. To analyse the status and trends of Mediterranean wetlands, including their biodiversity, the goods and services that they deliver and the environmental factors and anthropogenic pressures that explain their status and trends; and
2. To promote effective decision-making for the protection, restoration, wise use and sustainable management of Mediterranean wetlands.

The Observatory works firstly at Mediterranean scale, with where possible a subregional, national, or even local office.
With its partners, which include BirdLife International, Wetlands International, WWF-MedPO, MedWet, and Ramsar, the MWO has identified a series of themes and indicators for Mediterranean wetlands, based on a DPSIR model (Figure 1). During the 2011-2015 programme, indicators were developed on the biodiversity and land use (Figure 5).

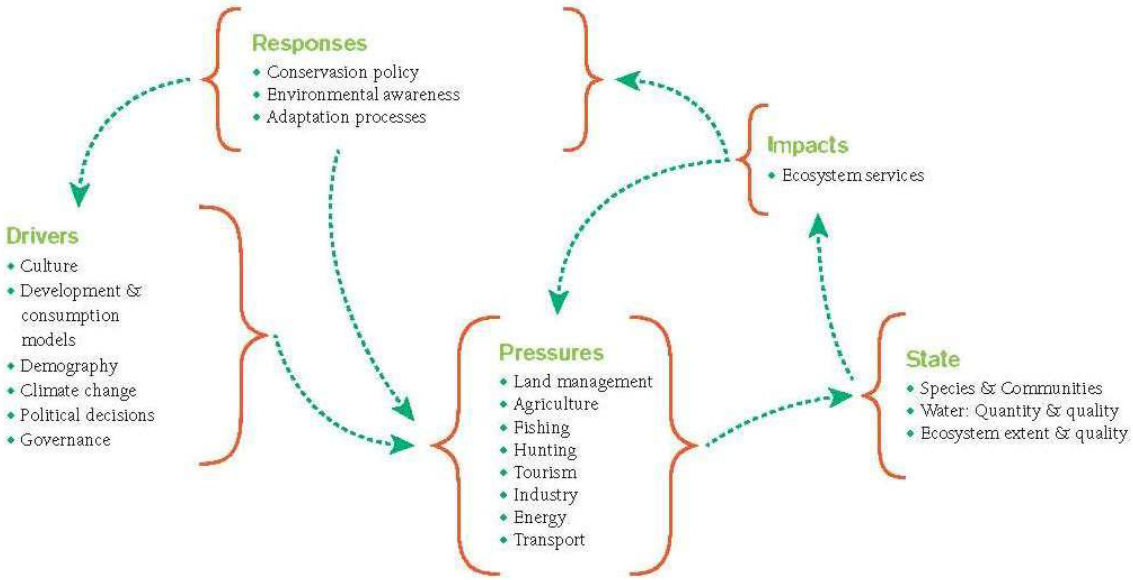


Figure 5. MWO conceptual framework (in the form of a DPSIR model: Forces, Pressures, Status, Impact, and Responses).

This work allowed a firts synthesis report publication in 2012 « Mediterranean wetlands : Outlook. First Mediterranean Wetlands Observatory report and two thematic reports on biodiversity and land use respectively.
The MWO's impact on decisions concerning wetlands remained limited despite our efforts to engage in regular discussions with our national and supranational partners. Beyond the fact that a great deal of time is needed to convince our target audience, our activity focused essentially on producing and transferring documents to decision-makers, which is probably still too limited to be effective and must be improved. In addition, wetlands remain very low on political agendas and the national-level Ramsar network has been much less visible since the launch of more global agreements.

To improve the appropriation of MWO results and messages by national stakeholders, whenever possible, the analysis of its results in a global context will be transformed into a subregional analysis, with close contact with the civil society network that are close to the decentralised bodies and thus able to influence them in the long term.
In addition to its partnership with the Ramsar Convention and Medwet, the MWO is also present at regional and national levels, working with other local observatories in the Mediterranean region that have asked for its support. Finally, whenever necessary, the MWO provides technical assistance to develop national wetland strategies/policies based on integrated management approaches for water resources, so that links between water management and wetlands conservation--including governance issues--can be better taken into account.

Environmental issues

The main conservation issue is to decrease or halt the deterioration of Mediterranean wetlands, their biodiversity, and water resources, in particular in the southern and eastern Mediterranean regions. The principal causes of the degradation of wetlands are considered to be decision-makers' lack of interest in these issues and the mode of governance.

In order to provide decision-makers with adequate information and tools to reverse this situation, three research questions are developed:

1. How the observed patterns of biodiversity distribution and richness are related to the overall development of human activities?

2. How wetland functions and other services and goods provided by wetlands (as green infrastructure) to human societies are impacted by the loss and degradation of these ecosystems?

3. What actions should be taken to maintain and/or recover wetlands' functions and services?

Developing indicators and updating their values are important results of this research, because this enables us to communicate results to our immediate target audience (the Ramsar Convention and MedWet) and to our ultimate targets (decision-makers involved in sustainable development).

Strategy

The Department's strategy is to produce comprehensive reports on the status and trends of Mediterranean wetlands, analyse the causes behind changes in them and their consequences in terms of biodiversity and more generally speaking the services they provide, so that with the help of our partners (MedWet, national NGOs, etc.) we can convince politicians that current trends are not in the long-term interests of their countries or citizens, nor in line with their international commitments. To increase the impact of our results, we make MWO indicators converge with those of the principal multilateral agreements on the environment and biodiversity. These agreements include the Ramsar Convention, the Convention on Biological Diversity (CBD), the Convention on Migratory Species and

its African-Eurasian Waterbird Agreement (AEWA), and the Barcelona Convention. In addition, the MWO will attempt to develop partnerships with NGOs in the Mediterranean region to transmit its analyses and messages locally.

Its strategy can be categorised into several activities:

Scientific and technical activities

- Ensure that MWO indicators converge with those developed by the Ramsar Convention, the Convention on Biological Diversity (CBD) and Sustainable Development Goals (SDGs).
- The priority indicators developed are for water, biodiversity, and pressure factors. In complete accordance with the Tour du Valat's mission and the validation procedures of these conventions, before they are disseminated, the indicators must be scientifically validated on the basis of studies published in science journals.
- Develop and maintain active scientific partnerships to increase our production capacity and scientific visibility.
- Draft comprehensive documents for various targets, which may include the production of new indicators, better use of already existing ones, or syntheses of the information that already exists on certain subjects.

Transfer

Political decision-makers are the principal target for transfer with a variety of means to reach them:

- Build partnerships with the conventions and organisations involved in the international agreements to ensure this information is conveyed adequately and effectively to MedWet, Ramsar, and appropriate political decision-makers. The objective is to ensure that these conventions and organisations will support and defend MWO results.
- The MWO believes these organisations can disseminate this information and influence pertinent policy and decision-making processes more effectively than the Tour du Valat alone. As a result, an effective partnership is currently being set up with the MedWet Secretariat so that it can more fully engage in the dissemination of MWO results nationally and internationally.
- Mobilise NGO networks and Mediterranean organisations, which can relay our messages and lobby their decision-makers / political leaders.
- Publish articles in the national and international press to make our results more visible. Press releases will be drafted for particular events and to announce the publication of scientific papers.
- Wikipedia: take advantage of wiki pages to publish more general information about the Tour du Valat than in the Tour du Valat website, and set up links to it.

In addition to the thematic studies and reports, more comprehensive communication documents must be produced on a regular basis so they can be distributed at key events (e.g., Ramsar COP).

Support for institutional stakeholders

- Local or national observatories will be supported when contributing to the MWO and/or when they will be likely to contribute to better decisions for wetlands and biodiversity.

- Technical assistance for developing national wetland strategies/policies in conjunction with integrated water management approaches, so that the links between water management and wetlands conservation--including governance issues--are better taken into account.

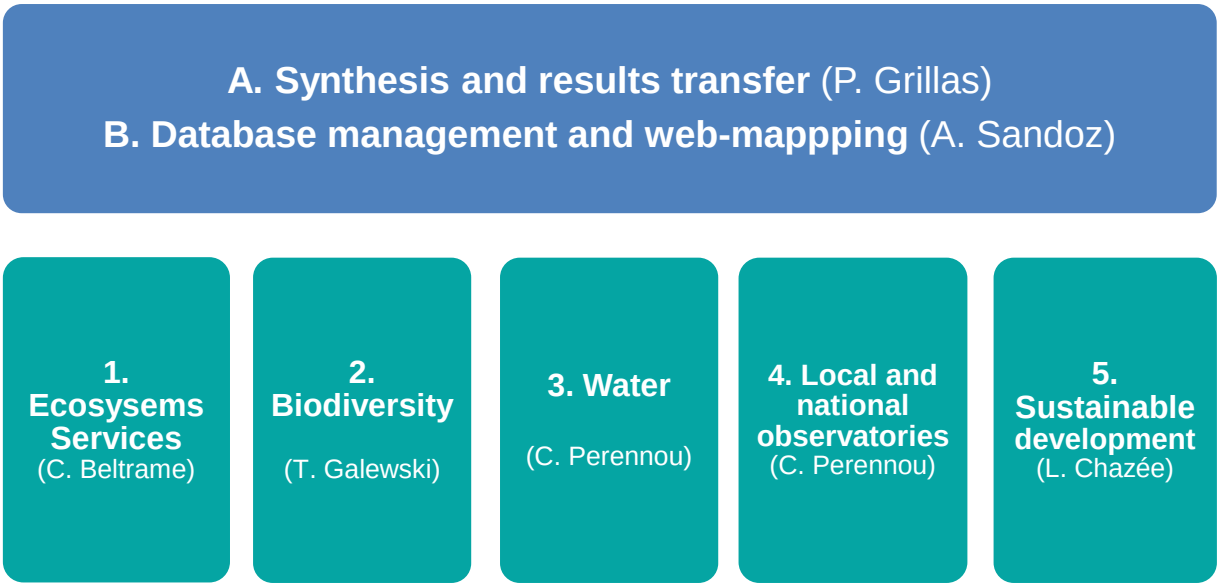
The MWO's 2016-20 strategic plan, and in particular its set of indicators, will develop in the same ways as its principal frameworks of reference: the 4th strategic plan of the Ramsar Convention; Recommendations of the Scientific and Technical Review Panel (STRP) of the Ramsar Convention; the MedWet 2016-2018 work plan; Sustainable Development Goals after 2015; updated Aichi goals, etc.

Expected results and indicators

Expected results	Indicators
Interest by target groups	
Extent to which wetlands are taken into account in country policies, strategies, governance, and planning.	a. MWO contribution to drafting strategies and to wetland committees of countries; b. MWO contribution to strategy/policy workshops organised by the countries; c. decisions more favourable to wetlands.
MedWet Secretariat and Ramsar take account of and transfer MWO results and messages to influence decision-makers.	a. Medwet and Ramsar transfer activities of MWO results: newsletter, MedWet and Ramsar websites communication tools (leaflets, brochures, posters, etc.); b. MWO contributions to the MedWet/Com and Ramsar COP.
MWO results integrated into international conventions and agreements (except Ramsar and MedWet)	Participation in work groups (number, levels), indicators integrated into CBD (number), …
Interest of partners and intermediate targets (MedWet, Ramsar, IUCN, NGOs, Observatories,...)	Participation in the MWO, projects developed with partners, requests for assistance, MedWet request MWO documents downloaded.
Transfer production	
MWO summary indicators updated for COP 2017	Documents
Thematic summary documents ("4 pages")	Regular production
Awareness raising material made available to local partners (geographical breakdown of MWO results)	Offer ready-made documents and produce or coproduce documents with local partners
Press communication on MWO activities	Local and national press articles
Dissemination of synoptic web-maps on Mediterranean wetlands	Webpages
Scientific production	
Publications in scientific journals (A) to validate indicators and integrate them with those used internationally (CBD, …); and to consolidate the MWO expertise and reputation	Publications (at least 1 per year)
Spatial databases	Connected databases and results

Structure of the Department

Among the set of indicator themes defined in the framework of the MWO, five additional areas of work have been given priority in the 2016-2020 programme. Department coordination includes two integrated projects:



A. **Synthesis of results.** In addition to what is produced in each of these areas, comprehensive reports will be drafted and the transfer strategy will be overseen at the department level. The transfer activities will be developed in close collaboration with the MedWet Secretariat, and will make an important contribution to enhancing the advocacy activities that are part of the Tour du Valat's communication strategy.
B. **Database management and web mapping.** The Department has a new activity, which is to create a bank of spatial databases and to make the links between these databases easier to use for the purposes of comparative analyses. Web mapping will be developed so that the main comprehensive data on wetlands in the Mediterranean Basin are available on the Internet.

1. **Wetland ecological services in the Mediterranean region.** In this axe will be analyzed the ecosystem services related to the production of resources and tourism attraction (in relation with the Biodiversity sub-project), to the the production of freshwater and to the regulation of the water cycle. (with the Water sub-project).
2. **Monitoring biodiversity in Mediterranean wetlands**. Biodiversity is a central issue in Mediterranean wetlands and provide important resources to human societies. The status of biodiversity results from direct and indirect effects of management notably hydrological changes, eutrophication, harvest of populations and climate change.
3. **Water**. Water is a key resource for wetlands and human societies. The information on water and wetlands will be synthesized in relation with the analysis of the analysis of the ecological services provided and biodiversity.
4. **National and local wetland observatories**. The MWO will support the development of local or national observatories when these could contribute to the conservation and wise use of Mediterranean wetlands.
5. **Wetlands and sustainable development.** Governance indicators and the socio-economic characteristics of countries will be compiled and made available to other researchers as variables that can help to explain the indicators linked to biodiversity and water. Studies will be conducted by country and subregion in the Mediterranean Basin on the causes of the pressures on wetlands to identify the means that can be used by the MedWet Secretariat and Ramsar to influence decisions.

In the first 3 axes the analyses will focus on the development or improvement of indicateurs of the status respectively of ecological services, biodiversity and water resources in Mediterranean wetlands. Within a DPSIR framework, each indicator will include an analysis of the factors and pressures that explain the status of the resources as well as ana analysis of the consequences for human societies and their responses. Syntheses of the existing information will made when the available data will not allow for the sound production of indicators.

In each axe, an effort will be made:

- to involve a sample of countries from all sub-regions in the Mediterranean, including developing and developed countries. In this sense, the project should serve also to improve synergies and cooperation among MedWet countries.
- to identify and associate at least one scientific partner, institutional or on his/her individual capacity, from other MedWet countries, especially from North Africa and/or the Middle East.

The transfer of results in each sub-project, the communication and policy questions are dealt at the Department level in close partnership with the MedWet Secretariat.

Axe 1.

Wetlands and ecosystems services in the Mediterranean region

Coralie Beltrame, *Thomas Galewski, Christian Perennou, Laurent Chazée*

Environmental issues

Ecological services constitute an important argument in favour of the conservation and wise management of Mediterranean wetlands, because they show us how useful wetlands are for human societies and how dependent they are on the proper functioning of ecosystems. Three main types of services are commonly described: provisioning, regulation, and cultural services. Our goal is to study the interactions between humans and nature, not from the point of view of the pressures exerted on nature by human activities (studied by other MWO teams in the Biodiversity and Water projects), but in terms of the benefits humans derive from nature, taking account of possible overexploitation phenomena and the threshold effect linked to the use of services.

Objectifs de conservation

The project aims to change the very widespread opinion that wetlands are of no tangible value, or in any case are of less value than a development project, whether it is for agriculture, industry, tourism, or urbanization. The underestimation of wetland assets and of their wide variety is one of the factors that result in their destruction and alteration. To better take account of them, since 2011 Ramsar has been developing a system of corresponding values between ecological services and sustainable means of subsistence (which are more comprehensible to those working in the field of socio-economic development). In general terms, nature's intrinsic, heritage and instrumental values are distinguished. In this project, we are concerned more specifically with one aspect of the instrumental value, the ecosystem services and the functions of wetlands as green infrastructures.

Drawing up and monitoring global indicators for ecosystem services is currently a key issue for the CBD, Ramsar and the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES). Implementing them at this level appears complex but not impossible. A recent study of the Ramsar STRP showed that the ecosystem services were little assessed in the Ramsar sites. In addition, Ramsar wishes to highlight the role of wetlands in the recycling and preservation of surface and underground freshwater in its 4th Strategic Plan, which will be presented at his COP12 in 2015, in order to further the conservation of these natural habitats among the signatory states and the international organisations related to water.

Our objectives are to:

- produce knowledge and reliable indicators at the Mediterranean scale on the importance of wetlands for society.
- use this knowledge and these indicators to advocate for their sustainable management.

Strategy and targets

Actions to develop

During the previous programme, the Department drafted a comprehensive report on the methods and case studies concerning the services generally associated with Mediterranean wetlands. In addition, quantitative and qualitative studies were conducted on their cultural services in a limited number of visitor centres located in wetlands to test the possibility of applying an indicator (report should be published in 2015). Lastly, ecosystem services at two sites (the Camargue and Hula (Israel)) were mapped on the basis of statements from experts.

Scientifically speaking, the strategy of this project is based on two major themes:

1. ***Production of scientifically sound results on the status and trends of various ecosystem services around the Mediterranean (supply and tourism services in particular)***

We will work on the services that produce quantifiable goods, such as:

- The production of possible indicators for services, notably hunting and tourism, in association with the indicators for "Trends in species at the core of an economic activity" developed by the CBD in line with the objective relating to the use of natural resources.
- The development of a service indicator for lagoon fishing in partnership with specialised institutes that potentially have databases while specifically exploring the question of the threshold for sustainable exploitation.

The evaluation of the impact of external factors (pressures and responses) on potential services will also be studied. They are changes in land use in wetlands (disappearance of natural wetlands and increase in artificial wetlands, farmland, and urban areas), protection measures (international or national protection mechanisms), and management implemented at the sites.

Depending on the results of the upcoming comprehensive report (2015), an indicator will be calculated for the cultural services rendered based on data gathered in the visitor centres.

For some services for which the link with wetlands and their condition is poorly known, we will seek to emphasise the link between biodiversity (wetland species, condition of wetland habitats) and the provision of services in the Mediterranean region. This exploratory work is not intented to be communicated to the decision makers by MedWet at this stage. In particular, in collaboration with the *Institut de Recherche pour le Développement* (*IRD*) and the Health ecology research team in the Species Department, a study of the link between the condition of biodiversity in wetlands and the emergence of diseases among people and livestock is being planned. This is a key topic both in terms of potential communication to decision makers (service provided by the wetlands in good ecological state by limiting outbreaks), and in scientific terms given that health ecology is a rapidly developing field.

For this part of the work, we will be using existing data at the MWO:

- the "population monitoring" database;
- the land cover figures for 284 wetlands in the Mediterranean Basin;

as well as further data that will be collected:

- data for sites, including for wetlands that are important for biodiversity, metadata of various sorts: human activities, protection status, and whether or not there is a management plan;

or databases provided by external partners:

- database on the emergence of diseases;
- the FAO database on lagoon fishing (if available) or others (to be explored).
- the comprehensive report on the possibility of calculating an indicator for cultural services in visitor centres.

2. Devising studies on the role of wetlands in ecosystem services linked with the freshwater cycle (water supplies, regulation of extreme weather events, water purification, etc.).

In many cases, wetlands play a vital role in the hydrological cycle. In a region that is lacking water, brining to light sound evidence for this role should be a strong reason for their conservation (see Water Axe) .This is the gamble being taken by, among others, Ramsar and MedWet. However, this area of ecological services, which is for both the provisioning of freshwater and regulating, is poorly known because the mechanisms are complex, inadequately studied, and highly dependent on the local context.

We will accordingly be aiming to:

- Devise multidisciplinary local studies, making use of the tools of the various disciplines that are involved.
- use the results and reports from the previous programme to defend the cause of wetlands vis-à-vis decision-makers (particularly but not exclusively with MedWet and wetlands stakeholders in the Mediterranean region).

A number of projects are currently being developed. They relate to:

- services that could be useful in adapting to climatic change at four Mediterranean wetlands (study in progress, being run by the Blue Plan),
- the potential role of wetlands in reducing the risks associated with flooding (to be developed),
- the use of field data and remote sensing data in evaluating services in protected areas (H2020 project started in July 2015).

For both these axes, with a view to obtaining reliable, easily-communicated results, the chosen methodology is to work solely on the biophysical evaluation of services. The methods of monetary evaluation are often controversial and not very robust. But they can be interesting for communication under certain conditions.
In addition, the study of ecosystem services is by definition multidisciplinary as it includes the study of natural habitats (ecology, but also hydrology, agronomy, fisheries, epidemiology, etc.), the evaluation of human well-being (social sciences), and their interactions. To obtain the indispensable expertise in the social sciences and the other natural science disciplines, this project will therefore depend to a very large extent on setting up collaborations with the other TDV Departments and/or external research bodies.
We will also be very careful here to distinguish between potential ecosystem services and those actually being provided. Both will be studied, since potential services are directly linked with the ecological condition of a habitat, while services provided depend on their effective exploitation, sometimes requiring specific management and developments (for example a major development of tourism at a wetland may take place through a massive artificialisation of banks and flooding operations). The concepts of thresholds and overexploitation are thus also crucial since a high level of provided ecosystem service is not necessarily positive for the habitat, if it exceeds a threshold for sustainable exploitation. An increase in an indicator of provided ecosystem service is not necessarily a positive sign for conservation.

The results in this area of research will be transferred through the Department's transfer and communications activities.

Expected results

The anticipated results in terms of management are a better awareness among policy makers of the importance of wetlands for nature and also for human beings in the long term, leading to decisions in favour of wetlands.

Expected results in terms of research

Research in this area remains very exploratory. Our goal is to assess what could be developed with our current data.

Results indicators

- Studies and papers published in journals with a high IF, if the results obtained are interesting and publishable.
- Awareness-raising talks / advocacy in favour of wetlands at different events.

Projects and Study site(s)

We will work at the scale of the entire Mediterranean Basin, but some studies will take place at a few sites/catchment areas, whether to improve the understanding of certain factors and interrelations or for exploratory work to define particular indicators. An international project contributes to this axe.

Project 2A : Ecopotential (H2020)

This project aims to improve the use of satellite data, combined with field data to create a unified framework for the study of ecosystems and management of environmental services in protected areas. In this axe, the objectives are to contribute to the evaluation of ecosystem services and transfer and capacity building.

Possible funding

Some projects are being devised and requests for funding have been submitted or are planned:

- Wetlands and climate change project (*Plan Bleu*): MAVA Foundation and Prince Albert II Foundation (funding obtained for 2014-2016),
- Project on Potential ecosystem service indicators using species data: Total Foundation (funding obtained for 2014-2016)
- European research project 'Horizon 2020 ECOPOTENTIAL': the use of remote sensing data to evaluate ecological services in European protected areas, including 5 wetlands (funding obtained for 2015-2019)
- European research project Horizon 2020 SWOS: the use of remote sensing data to evaluate ecosystems and ecological services in European wetlands (funding obtained for 2015-2019)
- Project on the impact of the condition of wetlands and of their biodiversity on health: possible funding options exist on the theme 'Ecological services and health' with a project to be set up in collaboration with the IRD in function of the initial results.
- Project 'Wetlands and reducing the risk of floods': AXA Foundation (to be developed).

Axe 2.

Biodiversity monitoring in Mediterranean wetlands

Thomas Galewski, *Coralie Beltrame, Christian Perennou*

Environmental issues

Assessing the status of biodiversity is not an easy thing to do in a region where there is wide geographical variation in the quantity and quality of data available. While networks for nature study and monitoring have been set up in most of the countries in the European Union, this is not the case for the countries in North Africa, the Balkans, and the Middle East. In addition, while birds have been relatively well studied for several decades, information about the conservation status of other groups is much patchier.

During the last programme, the creation of a database containing nearly 60,000 sets of monitoring data for wetland vertebrates in Mediterranean countries enabled the steady decline of many species over recent decades to be confirmed, although this is offset by spectacular increases among others, in particular colonial waterbirds such as herons and cormorants.

The direct causes about the root causes of these contrasting trends need to be tested. For instance, the continuing deterioration of some habitats such as temporary pools, wet grasslands, and water courses, but improvements in the ecological condition of others (some lakes); the replacement of “natural” wetlands by artificial habitats, which benefit the more generalist species; and the effectiveness of systems of protection.

In addition to species, the OZHM has also been studying habitats, a higher organisational level of biodiversity. An estimate of the surface in wetlands in Mediterranean countries was produced, while the use of satellite images has enabled changes in land cover to be characterised for 284 wetlands around the Mediterranean. The main results reveal a steady decrease in wetland surface area between 1975 and 2005, including in the north side of the Mediterranean, as well as the increasing proportion of artificial wetlands (reservoirs, artificially flooded crops, and irrigation channels). They have also enabled the relative impact of predicted major factors (agriculture, urbanization) to be quantified, which are themselves the results of territorial planning policies and decisions.

Thanks to the OZHM’s work, the condition of the biodiversity in Mediterranean wetlands is better known today than it was five years ago. However, it is necessary to refine our assessment so as to clarify which elements of biodiversity are under most threat at present. In addition, our ability to interpret trends is restricted by the difficulty in establishing clear links between pressures, conservation actions, and the condition of wetlands and their biodiversity. By combining data on land cover and species population monitoring, which have been accumulated by the OZHM, with the information contained in other databases (Ramsar Sites, Important Bird Areas, Key Biodiversity Areas, Important Plant Areas, IUCN Red List), we can improve our understanding of the subject and clearly identify the causes of the problems faced by biodiversity as well as the solutions that will be effective in remedying them.

Objectives (conservation)

The overall objective of the project is the same as that of the Department, i.e., to better protect and manage Mediterranean wetlands. In the case of these wetland habitats and their species, it is crucial to halt the observed negative trends, and restore the most highly degraded parts of this biodiversity.

To help attain this objective, we will focus on three major themes:

1. To generate knowledge about the condition of the biodiversity in wetlands;
2. rank the pressures they face, and evaluate the effectiveness of the conservation actions that are being undertaken at the Mediterranean level
3. To ensure that the results of this research are disseminated, understood, and taken into consideration by decision-makers décisions (in the framework of the Department's transfer and communication activities).

Strategy and targets

The strategy of this project will be based around three main themes:

1. A more precise evaluation of biodiversity status and trends

To identify the elements that are most at risk and avoid the pitfalls of an evaluation that is too general, which could lead to false conclusions, biodiversity conservation status will be assessed for different categories of wetlands: coastal lagoons, freshwater lakes and marshes, wet grasslands, riparian woodlands and for different groups of species – taxonomic or ecological. The assessment will be carried out directly for habitats or for the species communities that are characteristic of these habitats.

To achieve this goal, our work will be based in particular on the use of:

- the MWO "Population monitoring" database, which it will be necessary to continue to build up;
- the MWO land cover records for 284 wetlands in the Mediterranean Basin;
- a MWO "sites" database that will cover important characteristics (superficy, habitats, threats, protection status) for a large selection of wetlands important for biodiversity;
- the IUCN World, Mediterranean, and National Red Lists;
- the assessments of the conservation status of habitats covered by the Directive that are undertaken regularly by national experts in the member states of the European Union;
- the Ramsar database;
- the UNEP/World Conservation Monitoring Centre (WCMC) databases.

The task of inputting data and managing the databases is costly in terms of time, and can only be done with the help of students. A collaborative effort for sharing data with the project on "International Waterbird Counts" will be considered, since our databases are quite similar. In addition, the Species Department will be asked to help create databases, and assist in remote sensing and mapping activities.

In the framework of this project, we will remain very attentive to changes in the "Ecosystem Red List" initiative being undertaken by the IUCN and the national/regional wetlands inventories. The data being produced will be of the highest importance for the MWO's evaluation work.

2. Developing our knowledge about pressures and responses

During the last programme, some hypotheses were developed to explain the biodiversity trends observed. In the next programme, we aim to test them statistically with the newly available data sets ("population monitoring" and "land cover" databases), and those that will be built up over the period, notably the "sites" database, which will provide various kinds of metadata such as human activities, protection status, and existence of a management plan for a large sample of wetlands that are important for biodiversity.

In practice, this will involve studying the relationships between:

- the disappearance of natural wetlands and communities of species;
- the increase in artificial wetlands (including associated changes in hydrological management) and communities of species;
- international or national protection status, management plans, and the conservation status of wetland habitats;
- the designation of protected areas and communities of species;
- the banning or not of hunting (or other types of exploitation) and species dynamics.

The technical issues for this strategic theme include the work required to bring our partners' databases back up to date (Ramsar Sites Factsheets, Important Bird Areas). Some of the site-related information in them is old. There is therefore a need for preliminary investigative work to record conservation and management status for the sample of wetlands chosen for this study. It will also be necessary to have the national or regional equivalents of for example IUCN protection levels, for each of the countries in the region, in order to be able to compare the data from different countries.

Statistical skills must be mobilised, either internally (Species and Ecosystems Departments) or via collaboration with research groups outside the TdV, which are also interested in a macro-ecological approach to conservation (e.g. Centre d'Ecologie Evolutive et Fonctionnelle, Institut des Sciences de l'Evolution, Muséum National d'Histoire Naturelle).

3. Made-to-measure information for our targets

The transfer of results in this area will take place in the framework of the Department's transfer and communication activities.

Our monitoring of biodiversity will enable us to define biodiversity status indicators (species, habitats, and ecosystems), as well as pressure and response indicators. In these latter cases, biodiversity will be used as a proxy for wetlands to measure the effectiveness of a protected area designation (comparison of biodiversity trends inside/outside protected areas), or the impact of a given activity (for example, comparison of trends in areas subjected v. not subjected to the activity). This family of indicators will become the MWO's favoured method for dealing with the socio-economic issues (notably pressures/responses) that have only been touched on so far.

Table 3 : Non-exhaustive list of possible MWO indicators, which could be developed according to this principle, using biodiversity data collected by the project, and which would contribute to CDB and Ramsar objectives:

CONDITION	CBD Objective
Living Planet Index for wetland species; Status and trends among waterbirds Red List Index for wetland species (including at least fishes, bird amphibians, and dragonflies)	*Prevention of extinctions*
Impact of climate change on wetland species	*Vulnerable ecosystems*
Trends in communities of specialised species (according to wetlar type); Index of trends in the amount of wetland (a. total; b. according wetland type);	*Loss of natural habitats*
PRESSURES	
Conversion of wetlands to agricultural and urban areas	*Loss of natural habitats*
Index of trends among alien invasive species	*Invasive species*
IMPACTS (= Ecosystem services)	
Trends among species that are at the heart of an economic activity	*Use of natural resources*
RESPONSES	
Area of wetland (a. Ramsar site; b. protected at the national level)	*Protected areas*
Effectiveness of protection measures in maintaining wetlar biodiversity	*Protected areas*

In conclusion, this project's databases will be the focus for collaborations with teams that are carrying out more fundamental research. This is already the case with the Species Department, with which a project is in progress to work out the link between biodiversity status and the emergence of epidemiological hotspots. There is also the potential for further projects looking at the relationship between the status and trends in bird populations and various life history traits.

Expected results

The expected environmental outcomes are to halt the degradation of biodiversity linked to wetlands, and improve the conservation status of threatened species and habitats. There are several MWO indicators among the identifiable outcome indicators, which will enable us to monitor any possible improvements in terms of 1) biodiversity trends in Mediterranean Basin wetlands, 2) decreased pressures, and 3) additional responses put in place by decision-makers.

These long-term results will be achieved if the decisions made take account of biodiversity conservation, based on scientific results and the recommendations made by the MWO, which include 1) actions to decrease the pressures identified as being detrimental to biodiversity and the services it provides, 2) conservation measures in favour of the most vulnerable species and habitats, and 3) good practices for the sustainable use of biological resources.
The results indicators include 1) the number of communication documents by MedWet, Ramsar, and NGOs that cite our observations on biodiversity in Mediterranean wetlands, 2) the number of press articles that focus on our technical results, and 3) the number of papers published in scientific journals.

Study site(s)

The Mediterranean Basin is the principal scale of this study, and more specifically, the 26 MedWet initiative countries as well as the Palestinian territory. . In some of the studies, a broad selection of wetlands will be chosen, with priority given to those recognised as being important for biodiversity and located in the Mediterranean climatic zone. Depending on requests, more specific studies could be carried out at the scale of a single site or a particular country, in link to the "Local and national Observatories" project. A special effort will be made to ensure that all Mediterranean sub-regions (European Union, Balkans, Middle-East, and Maghreb) are represented.

Possible funding

- Fondation Prince Albert 2 de Monaco
- Fondation Total
- L'ASE ou le CNES, pour des indicateurs spatiaux à partir d'images satellitaires ;
- des projets européens LIFE+ ou Horizon2020
- financements de type ANR via des collaborations avec laboratoires de recherche publique
- bourse de thèse via l'école doctorale du MNHN / Université Paris 6
- Région Provence-Alpes-Côte d'Azur
- Fondation OAK
- Ministère de l'Ecologie et du Développement Durable.

Axe 3.

Water monitoring

Christian Perennou, *Coralie Beltrame*

Environmental issues

Despite the importance of water issues for wetlands, and the monitoring that is carried out in some countries, a general overview of water in the Mediterranean basin, from an ecosystem-based perspective, is still lacking[41]. The only available summaries (cf. Mediterranean Wetlands Outlook 2012) relate to:

- The quantitative level of pressure on the resource, in snapshot form (no trends available), particularly subsequent to research within the Plan Bleu;
- Water quality, solely for the European part of the basin (trends over the last 10-15 years) and only for significant water bodies (large rivers, lakes, lagoons, etc.) monitored in the context of the Water Framework Directive.

Objectives (conservation)

The specific objective of this project is the sustainable management of water resources, including wetlands. The major attitude which has to change to achieve this is the very widespread view that water is simply a physical resource, available in its entirety for human uses. The management of water thus needs to be extended to include:

1) the water requirements of ecosystems (e.g. “environmental flow rates”) and
2) the contribution of ecosystems to the maintaining a high-quality water resource (“green infrastructure”).

In addition, for the effective monitoring of the condition of water resources, some more specific practices/attitudes also need to be developed, such as a culture of sharing water data between countries, and others stopped, such as the wariness of official bodies about sharing data with environmental and/or non-governmental players.

The practical objective of the project is to set up water monitoring programmes based on a few key components which are compatible with the globally-coordinated systems like UN Water and the World Water Council, or currently taking shape (Ramsar, CBD)[42], and which also allow explanatory analyses to be undertaken in combination with the MWO data on biodiversity and ecosystems services *(cf. the 2 relevant project sheets).*

[41] une abondante information sur l’eau existe déjà, mais son lien avec les zones humides est le plus souvent faible. Sur la dimension « Pression sur les quantités d’eau », voir par ex. Gassert et al. 2013, Hoekstra 2012, IWMI 2005 ; IWMI 2007 ; JRC 2012 ; Margat 2008 ; Mekonnen & Hoekstra 2011 ; OECD 2012; Plan Bleu 2009 ; Smakhtin et al. 2004 ; Vorosmarty et al. 2010

[42] Which however have not yet specified their indicators

Strategy and targets

The levers available to the MWO for this project are of various types:

- the new MedWet setup may enable contact to be made with the national institutions in charge of water in the Mediterranean, and especially those which make practical decisions affecting wetlands - a crucial flaw in the MWO up to now;
- the partnership with EMWIS (Euro-Mediterranean Water Information System), and its long-term initiative to get national water monitoring systems in the Mediterranean basin to adopt common standards;
- as a result of technical developments, monitoring that can increasingly be carried out using our involvement in the Ramsar/CBD collaboration, which is working to unify the monitoring systems in the knowledge that water monitoring is set to take on a dominant role for Ramsar [43], and therefore for MedWet.
- Mediterranean NGO networks that are greatly interested by the links between water and wetlands, such as the IUCN, WWF, and BirdLife. The Observatory can help them to develop more coherent arguments by providing them with accurate technical data. The future IUCN-Med Biodiversity Platform could be a key component in this process.

The principal targets for the project are territorial decision-makers (Ministries affecting wetlands, particularly those other than the Environment Ministry; local elected representatives, etc.). The economic stakeholders associated with water (agriculture, big water companies, etc.) are a secondary target, capable of being affected by changes in decisions taken by the primary targets, but not targeted directly by the MWO.

In terms of **strategy**, the question of choosing between (or balancing) the production of new information (e.g., new monitoring activities / indicators), the synthesis of already existing information, and a more convincing transmission of our current messages remains open. Nevertheless we think that temporal monitoring of certain aspects (quantities, quality, pressures) is still likely to be necessary on a pan-Mediterranean scale, but that it must link water and wetlands more explicitly and target the components that are easily communicable to decision-makers (e.g., the 'water footprint', flooding of wetlands and biodiversity). 'Water data' must also be compared with other Observatory data, because of their potential explanatory value. Finally, monitoring activities enable contacts to be reinforced with the socio-economic stakeholders causing the pressures. As the MWO does not have its own technical capacity in terms of 'water' issues, or any foreseeable substantial resources that would allow it involve technical partners to any great extent, the **strategy** of the MWO will therefore be:

- to make the best use of the information from the Blue Plan, Water Footprint Network, EMWIS (eventually), European Environment Agency, Wetlands International etc. about the "Water" aspects that they already cover, as crucial context factors, but *which are not measured by the MWO itself;*
- to focus on devising indicators that can be measured using trans-national, pan-Mediterranean data: increasingly accurate satellite images or international databases such as those of the Water Footprint Network, FAOClim-Net etc.
- in particular, *to avoid working with indicators that need field survey networks in the countries:* the experience of EMWIS shows that the subject is very political and sensitive and is technically complex (trans-national standardisation of data), that progress is necessarily slow because of this sensitivity, and that to approach the same players for their data in an unsystematic way is counter-productive. To maintain a close link with EMWIS, which dominates the political side of national water monitoring, and to pay careful attention to the results of its initiative,[44] which has been running for a few years, therefore seems more promising.
- to be involved in the development of CBD + Ramsar's "water" indicators by the BIP2010 partners, and undertake a test implementation at the regional scale, in the Mediterranean

[43] Cf. "Ramsar Draft Strategy for Engaging in the Global Water Debate"
[44] Project in progress on the harmonisation of water monitoring among test countries in the Mediterranean basin

basin. The Mediterranean region could thus become a regional centre for testing and applying worldwide mechanisms; and

- in close association with MedWet (+ Ramsar/CBD), to identify other possible aspects linked with water for which improved information would help to get wetlands taken more into account, and what form it should take; it is very probable that the ecological services associated with water would figure strongly here (cf. relevant Project-sheet), but *not necessarily in the form of* the monitoring of indicators over time).

Not all the components can be covered from the outset; the priority will be to get to the point where the following indicators can be monitored:

- the extent of flooding of wetlands by use of remote sensing, as a proxy for the amount of water really available for ecosystems;
- implementation through the Mediterranean of 2 of the world-wide indicators of the Water Footprint Network: “Blue water scarcity” which measures the overall human pressure on water resources (abstraction + pollution), and “Grey water footprint”, which measures the quality of water in general.
- water quality for the parameters that can be analysed using remote sensing (cf, SWOS project and Mapping project described below)

It should be noted that all these strands depend on technical and financial partnerships which do not exist at present but are in the process of being developed.

Expected results

The principal environmental result to be hoped for is, eventually, a halt to the loss and degradation of Mediterranean wetlands. The anticipated result in the nearer future, whose impact will not however necessarily be noticeable in the short term, is decision-making in the field of water management that pays more respect to wetlands and their water resource, on the part of the decision-makers who influence the management of this resource.

The anticipated results in terms of output are summaries of the situation relating to water in the Mediterranean region, and scientific publications on the new indicators (or metrics).

Results indicators

- Number of Water indicators, for which the calculation or geographic coverage has significantly improved since 2015 (including new indicators).
- Number of Water indicators established by the MWO that are coordinated or in common with those adopted by the major international framework agreements (Ramsar, CBD, UN-Water, etc.).
- Number of partners really involved in the research area (significant contribution in terms of time/budget).

Study site(s)

The work scale was the entire Mediterranean Basin; however, any subsequent refinement or adaptation of certain indicators/measurments could require in-depth exploratory work in more limited areas.

Two projects contribute to this axe « Water monitoring ».

Project 3A: Mapping temporary and permanent wetlands in the Mediterranean basin
This project aims to develop a remote sensing monitoring of flooded areas in the Mediterranean basin, using test sites to assess the potential gap between "wetlands" and "flood zones" and to test an eutrophication indicator over a sample of large bodies of water (ponds, lakes, lagoons...). The feasibility of this project will be tested on all Mediterranean coastal watersheds

Project 3B: Satellite observation system of wetlands (SWOS)
The project (H2020)SWOS aims to provide methods for monitoring, conserving and restoring the integrity of wetland ecosystems, their biodiversity and the services they generate for human well-being perspective. It will help to provide data using remote sensing techniques to monitor wetland ecosystems and their trends. The project targets 4 types of users at different levels : local , national, regional and global.

Possible funding

Possible sources of funding include the European Space Agency and the French National Centre for Space Studies, for the spatial indicators based on satellite images, as well as the European LIFE+ and Horizon2020 projects, and the Total and Prince Albert II Foundations.

References

Gassert F., Reig P., Luo T., Maddocks A. 2013. *Aqueduct country and river basin rankings. A weighted aggregation of spatially distinct hydrological indicators.* World Resources Institute Working Paper, Washington DC, 28p.

Hoekstra A. 2012. *Global Monthly Water Scarcity: Blue Water Footprints versus Blue Water Availability*. PLoS One 7:e32688.

IWMI. 2007. *Water for food, water for life - A comprehensive assessment of water management in agriculture - Summary*. IWMI, London, 48 p.

JRC/ European Commission. 2012. *Current water resources in Europe and Africa. Matching water supply and water demand.* Joint Research Centre, Ispra, Italy, 40 p.

Margat J., Treyer S. 2004. *L'eau des Méditerranéens : situation et perspectives.* MAP Technical Report Series N° 158, UNEP/MAP, Athens, 366 p.

Mekkonen M.M., Hoekstra A.Y. 2011. *National water footprint accounts : the green, blue, and grey water footprint of production and consumption.* UNESCO-IHE, Delft, NL, 50 p.

OECD. 2012. *Chapter 5 : Water.* pp. 207-273 in OECD Environmental Outlook to 2050. The consequences of inaction. OECD, Paris.

Plan Bleu. 2009. *State of the Environment and Development in the Mediterranean*. UNEP/MAP Plan Bleu, Athens, 200 p.

Smakhtin V. *et al*. 2004. *Taking into account environmental water requirements in global-scale water resources assessments*. IWMI, 32 p.

Vörösmarty C., Green P., Salisbury J., Lammers R.B. 2010. *Global threats to human water security and river biodiversity*. Nature 467: 555-561.

Axe 4.

Local and national observatories

Christian Perennou, *Coralie Beltrame, Thomas Galewski, Laurent Chazée*

Environmental issues

Faced with the widespread loss and degradation of wetlands, various organisations dealing with the environment or water at various geographical scales (national, major catchment areas, provinces/regions, etc.) have decided to set up Observatories (for biodiversity, wetlands, water, etc.). These often include at least one “wetlands” component. At the same time, NGOs are developing citizen networks to monitor wetlands in some countries (for example, in the Maghreb). The motivation behind these two types of initiatives is similar to what drives the MWO: to better inform decision makers at their own scale (plus sometimes, in their specific case, site managers and the general public as well) to enable decisions to be taken that are better for these habitats. The questions facing the people running these observatories or systems of surveillance are often the same as the ones facing the MWO: governance, choosing a logical framework and a coherent set of indicators, partnerships, sharing source data, communications, and the capacity to influence those who really make decisions… The high visibility of the Tour du Valat and the MWO means we are often seen as having a head start. This fact leads to requests for support from these many initiatives, both in France and in Mediterranean countries: Ministries, catchment area agencies, Regional authorities, and managers of major sites (Prespa, Camargue, NGO networks (the Maghreb). What is therefore needed is a way to transfer and share the initiative developed by the MWO since 2008 and to make it available at smaller scales, so that other schemes can benefit from the positive or negative lessons we have learned, whether they come from official organisations or civil society. Meanwhile, these local observatories [45] are likely to be able to help in the long term with gathering data and providing some modest information to the MWO

Objectives (conservation)

The specific objective of the project is to help local/ national observatories to inform their specific targets on the status and trends in “their” wetlands, so as to facilitate beneficial changes in attitude in the Mediterranean Basin. To achieve this goal, the decision makers need to make more use than they do at the moment of the available information about the condition of wetlands and water resources, and to take it into consideration at least as much as they do the socio-economic aspects. Depending on the degree of democracy, pressure brought to bear on them by a better informed and more active

[45] Pour alléger le texte ultérieur, nous désignerons sous le terme collectif « observatoires » tant les « vrais » observatoires que des « systèmes de surveillance citoyenne de zones humides », tels que développés par ex. par BirdLife International (IBAs caretakers), le WWF-MedPo, etc.

civil society can help move things in the right direction - albeit with no guarantee of success - hence the importance for some of the national/ local observatories of also informing their general public, their media, intermediary NGOs etc., although these are not key targets for the MWO. In addition to transmitting information, NGOs can also play an active role in monitoring and surveillance initiatives.

The approach will therefore be to help with setting up wetland observatories (or observatories with a "wetlands" component), which are as compatible with / similar to the MWO as possible: consistent framework (DPSIR[46] or other); clarification of objectives before indicators are defined; indicators identical with those of the MWO or capable of being interchanged, etc. However the CU/MWO can only play a role to incite or advise, those running the observatories will still have to make the ultimate decisions.

Strategy and targets

The MWO's principal levers within the framework of this axe are its technical and and methodological credibility, which prompts requests from others with observatory projects. This reputation is the result of good, regular communication by the MWO of its results for the Mediterranean, particularly via MedWet including where possible local/national case studies showing how dialogue/transfer between different scales can be achieved. The targets for this communication must therefore include those organisations running or developing environmental observatories in the Mediterranean countries, at various geographical scales.
Beyond the key question any observatory has to raise *("Under which conditions is the provision of technical information, even in the most appropriate form, capable of really influencing decisions?"),* another important question is to know if the change of scale is purely homothetic. In other words, is it adequate to simply transpose the approach, methods and lessons of a pan-Mediterranean observatory to another scale (indicators; level at which decisions are made, e.g., local elected representative vs. minister)?

The favoured criteria in choosing Observatories to work with will be:

- motivated people behind projects, which have been sufficiently thought about / set up in advance;
- a location in the priority areas of the TdV Strategic Plan for 2016-20, and in particular at pilot sites;
- ability of those proposing the projects to provide at least part of the resources required by the Tour du Valat; and
- a clear commitment to participate within the MedWet framework and to share information with other observatories.

The main pitfalls to be avoided will be trying to do too much -- if there are too many requests for our small team, and a possible lack of communication of MWO results (resulting in a loss of credibility), which we seem to be resolving thanks to our new synergy with MedWet.

Expected results

The principal environmental outcome hoped for is an eventual halt to the loss and degradation of Mediterranean wetlands. The anticipated result in the nearer future (although its effects will not necessarily be visible in the short term) is the taking of decisions that have more respect for wetlands (or water in general), in line with the recommendations of the MWO (cf., conclusions of its main publications). The technical results coming from the observatories have received substantial input from

[46] Driving Forces-Pressures-State-Impacts-Responses : a framework adopted by the European Environment Agency

the MWO, and they could potentially give rise to scientific data (macro-ecology at various scales), and to publications, on subjects to be defined case by case.

The MWO cannot hope to obtain data in quantity or on a significant scale via these observatories, at least in the short/medium term. There would have to be many observatories throughout the region, collecting their data in a consistent way. In addition, the costs of managing the local data are considerable (compared with the databases to which we have access). The indicators are also often not the same for different scales. On the other hand, these observatories have a number of potential benefits for the MWO:

- enabling it to keep in touch with what is happening on the ground, in areas with which they have closer contact;
- involvement in networks; benefiting from the lessons they have learned;
- enabling the MWO to spread its messages and publicise its approaches, and giving it visibility; and
- presenting case studies for testing the development of various indicators.

De plus, ces observatoires apportent des bénéfices plus généraux pour les zones humides méditerranéennes: généralisation des démarches de suivi (or surveillance at least initially) de ces milieux et de leur biodiversité ; sensibilisation de décideurs/ grands publics locaux, involvement of the civil society ... L'OZHM peut leur apporter un plus en les aidant à être rigoureux et cohérents, à faire le lien avec les différentes échelles (CBD, OZHM, Observatoire National des Milieux Humides de France, BirdLife network …), et les faire bénéficier de son expérience.

Results indicators

- Number of observatories supported by the MWO
- Number of observatories that adopt and reuse MWO indicators at their scale
- Number of MWO indicators considered to be useful and adopted by at least one of these observatories

Study site(s)

Depending on requests, the study areas could range from large sites (Camargue, Prespa) to the national or sub-regional scale (Maghreb, Balkans). For example, requests in 2012-14 came from the National Wetlands Observatory (France), the Environment Observatory (Tunisia), the PACA Regional Biodiversity Observatory, the Sustainable Development Observatory (Morocco), the Nador Lagoon Observatory (Morocco), the Banc d'Arguin Observatory (Mauritania), WWF network of NGOs for wetlands in the Maghreb, the Environmental Observatory (New Caledonia) and the Rhone Basin Wetlands Observatory / RhoMeO.

Possible funding

This part of the Department's work is by its very nature relatively opportunistic, and reactive rather than proactive. One of the major criteria -- apart from a satisfactory partnership environment -- for agreeing to become involved is that a significant part of the necessary work (usually >75%) is covered by those running the Observatory that is requesting our assistance. The funding pathways are therefore varied, but to a large extent unpredictable. Some that were still looking definite for the mid-term until recently (National Wetlands Observatory, PACA Regional Biodiversity Observatory) may no longer be, in the present context of cuts in public funding.

Axe 5.

Wetlands in the framework of sustainable development in the Mediterranean

Laurent Chazée, *Christian Perennou, Thomas Galewski*

Environmental issues

The underlying causes and responses affecting Mediterranean wetlands

As is the case with other natural ecosystems, wetlands are given very little consideration or greatly underestimated in the national and local development choices made by countries. Consequently, they face pressures stemming from decisions made by key institutional bodies and decisions-makers that are often difficult to identify when we attempt to offset these pressures. The responses in favour of wetlands are made most often very late after the consequences of the degradations disturbing natural resources, ecosystem functions, and socio-economic development are already having an effect. Yet, the wetlands monitoring indicator 'Major causes, responses, and impacts' remains very underdeveloped in the framework of the Ramsar and CBD conventions or the Mediterranean Strategy for Sustainable Development of the Barcelona Convention. The issue here is to develop this indicator within the Observatory's conceptual DPSIR framework, and to articulate it closely with the Observatory's current indicators, to provide more complete monitoring of these habitats.

Conservation objectives

A better understanding of the macro causes and responses in decision-making processes affecting Mediterranean wetlands

In the framework of the MWO's DPSIR programme, efforts have focused until now on status and pressure indicators (areas 1 to 3). However, indicators are lacking and must be developed concerning the underlying causes of changes (drivers), the consequences on the means of existence of populations (indicators analysed in area 1), and the responses of the countries concerned.

Our specific objective is therefore to produce knowledge and studies for national and local decision-makers on these different indicators. These indicators will be defined at the macro level, because wetland-specific indicators have not yet been consolidated by Ramsar or the CBD at these particular levels. Their monitoring will be combined with policy analyses when they are pertinent for explaining wetland dynamics, because the major causes having an impact on wetlands, identified by the MWO since 2012, seem to be linked to supranational and national political agendas. At the national level, these agendas are linked to socio-economic considerations, governance, the legal framework, the status of countries, and levels of wealth/poverty and human development, which we can attempt to correlate with the status and trends of wetlands.

These indicators will enable the other MWO research teams (areas 1 to 3) to study the correlations between these macro indicators and those concerning ecological services, biodiversity, and water. Conversely, this team could propose macro correlations with research areas 1, 2, and 3.

On the one hand, this research will lead to the production and updating of macro indicators and analyses concerning the causes and responses affecting wetlands; and on the other hand, to forward-looking analyses at the level of the Mediterranean Basin, and when possible, by country or subregion. These forward-looking analyses are based on a methodology studying scenarios that focus on trends, alternatives, or abrupt changes and will review the situation and political orientation, the models of development and macro-economic indicators chosen by the countries, and the correlations obtained with wetland status indicators. Based on the analysis of these indicators, the forward-looking analysis approach could identify the items required at the country level to really take account of environmental issues in decisions made concerning development and territorial planning, or on the contrary, those that do not yet enable such action, and even those that do not permit countries to even express the conservation efforts they are making. For example, countries with a GDP per inhabitant of less than 2000 dollars are unable to finance or implement environmental programmes unless they receive substantial foreign aid. These items can be influenced by regional or global forces such as market forces, security, and fluctuations in the price of energy, or binding international commitments that must be analysed.

Strategy and targets

Research in this area will build on the preparatory work conducted in the previous programme on international conventions, macro indicators that are potentially pertinent for wetlands, the political and legal frameworks, and socio-economic issues.

The strategy in this area consists in:

1. **Compiling already existing monitoring and evaluation data on the most probable underlying causes** of the status and trends of Mediterranean wetlands--as well as the responses provided--, and regularly updating this database.

The goal will be to identify the **potential** underlying causes (anthropogenic and natural) of the status and trends of wetlands, as well as the possible responses by human societies. We will accomplish this goal by using data series concerning regional and national macro indicators (demography, HDI, GDP, etc.). This work will be complementary to the MedWet country profiles and will be carried out in conjunction with institutions like the *Plan Bleu*, *IAM*, *IRD*, and *IDDRI*.

Some examples of possible macro indicators that were identified in 2012 and 2013 as potentially pertinent include the following:

1. Ecological footprint index, Biocapacity/Person
2. Environmental performance index (EPI)
3. Demographic growth, density, rural-urban change, rate of urbanisation
4. Rate of emigration/immigration
5. Economic returns from migration/person
6. Global GDP, GDP per sector, GDP per inhabitant,
7. Human development index
8. Status of countries (developed vs developing)
9. Poverty index/rank and value
10. Perceived corruption index (‘good governance’ value)
11. Number of countries with a wetlands strategy/policy
12. Number of countries with a cross-sectoral wetlands committee.
13. % of people with access to a source of improved water
14. % of national budget allocated to the environment
15. Participation of the civil society, number of NGOs/associations officially involved
16. % of 2015-2020 CBD targets implemented, particularly those for the protection of wetlands
17. Trends in the area of Natura 2000 sites and proportion of wetlands concerned.
18. Singapore index (on urban biodiversity)

This list may be adjusted in function of the needs of the different areas of research in the Department, Ramsar orientations, and the need to harmonise with the SDGs, IPBES, and other institutional frameworks.

2. **Contributing to requests from other research teams** for their studies on the status and trends of wetlands, which are measured with MWO indicators.

The goal will be to help the project leaders on the other research teams (biodiversity, water and ecological services), at a certain phase in their studies, to correlate their results (MWO indicators) with:

- certain macro indicators monitored because they are assumed to be relatively probable underlying causes of change, such as demographic pressure, and urban development.
- potentially complementary indicators, which these project leaders may suggest are possible underlying causes (or consequences) of the variations in their thematic indicators. Appropriate data series will be gathered, their pertinence will be verified, and the list updated, while ensuring good coordination with those supervising the different research areas so that they enable the trends in the MWO thematic indicators to be interpreted individually or by cluster.

The programme of this research will be discussed regularly within the Department to ensure that it is complementary with research areas 1 to 3. It can then be adjusted according to the needs of the other research areas, Ramsar orientations, and the need to harmonise with the SDG, and IPBES framework agreements.

3. **Contributing to disseminating the information** in the Observatory's monitoring studies into national political agendas and supranational agreements

The transfer of results from 'Sustainable development' research will be achieved through transfer and communications activities. The transfer will begin after the work completed in the first two components of this research area has matured to a certain extent.
Transfer in this area will target political decision-makers, particularly those in charge of land-use planning and sustainable development strategies, as well as sectoral policies. This includes development and conservation stakeholders and networks. The results will be exploited in function of the political agenda. The right moment for disseminating MWO messages may be a Ramsar or CBD COP, a strategic CBD or SDG evaluation, or a national process for evaluating and planning development. The agenda in which it may be integrated could be human development, food, agricultural development, tourism, urbanisation, rural development and the fight against poverty, access to drinking water and irrigation, climate change, and energy, which all have a direct or indirect impact on wetlands.

Expected results

The results in this area will contribute to MWO outcomes, which include halting the loss and degradation of Mediterranean wetlands by taking better account for development activities. In the shorter term, the expected results in this area (as in the other four areas) are political, strategic, and operational decisions related to development, which are more favourable to officially protecting wetlands and other natural areas.

These results are not only dependent on the MWO, but require a critical mass of joint influence by the network of partners working with our Department, in particular MedWet, Ramsar, and the civil society, vis-à-vis key targets and during key events for Mediterranean countries. This critical mass of partners has been coming together since 2009 thanks to the active involvement of MedWet and the Tour du Valat in Ramsar activities and various countries through capacity building for the civil society and the setting up of partnership projects for wetlands.

The results of our research and macro analyses linked to wetlands will be published as scientific papers and comprehensive reports, and their key messages will be disseminated by MedWet to decision-makers and partners. Some papers will be written in close collaboration with the other

research teams in the Department due to their obviously complementary nature. Others will be conducted with partners like the ICAMAS (International Centre for Advanced Mediterranean Agronomic Studies) and the *Plan Bleu*, which are also involved in research on the Mediterranean region.

Results indicators

To measure the performance in this area of research, four indicators will be monitored:

1. Number of macro indicators adapted and applied at the Mediterranean level and then updated, with a distinction between (1) indicators taken from the UN, *Plan Bleu,* etc., and (2) the new macro indicators defined by the MWO itself.
   Means of verification: Number of indicator sheets and values updated per year.

2. Number of indicators used by the biodiversity, water, and ecosystem services research teams
   Means of verification: Categories of macro indicators used in the inter-thematic analyses between the three research areas; Number of monitoring results studies for the three research areas that include macro indicators;

3. Studies produced showing links between macro indicators and the status/trends of Mediterranean wetlands
   Means of verification*:* Number of studies produced by the Department that include macro indicators.

4. Publications and technical documents produced
   Means of verification: Number of publications and technical documents produced by the Department

Study site(s)

The scale of our research is the entire Mediterranean Basin. According to how we approach these activities, this scale could also be the local implementation of an international agreement (Ramsar, CBD, UN), an adaptation of a Mediterranean network project (Barcelona Convention, SEMIDE) or a study of national or subregional data. In some cases, the results of a site-based approach or a sample of countries could be used, in particular to focus on situations and causes of successes and failures.

Possible funding

- Prince Albert II Foundation
- Life+
- UNDP

TOUR DU VALAT

Organisation and Ressources

Governance and internal organisation

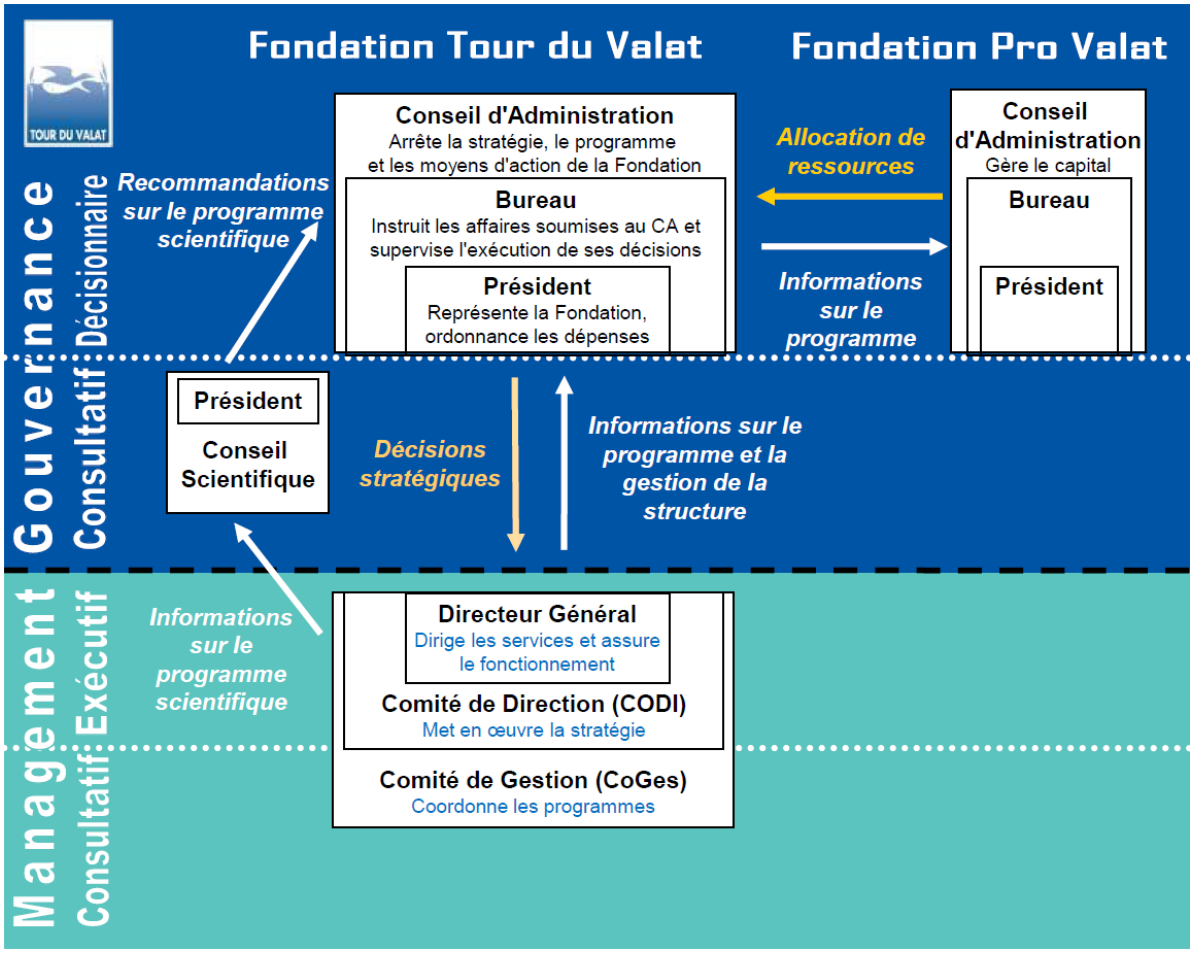
The programme described above can only come to fruition if the appropriate governance system and internal organisation are put in place, and the necessary human and financial resources corresponding to our ambitions are mobilised, which requires the effective management of our assets and the development of targeted partnerships. Furthermore, our communications, making our daily actions consistent with our values, and anticipating risks are essential for guaranteeing the pertinence, effectiveness, and exemplarity we are aiming to achieve.

Gouvernance et organisation interne

Tour du Valat governance is handled by two foundations that work in close collaboration:

- The Tour du Valat Foundation, a French non-profit public benefit organisation whose articles of incorporation were validated by the French Council of State in 2008, which manages all Tour du Valat activities.
- The Pro Valat Foundation, a Swiss legal entity, which is charge of managing and protecting the capital devoted to the Tour du Valat and annually allocates the revenue from this capital to the Tour du Valat Foundation, within the framework of their close ongoing relationship.

The diagram below represents the governance and internal organisation of the Tour du Valat Foundation's management structure, as well as its relationships with the Pro Valat Foundation:



Today, this mode of governance and internal organisation appears to be perfectly suited to the Tour du Valat's activity and size, as we imagine it to be for the 2016-2020 period. No important reforms are envisaged in this domain: at the most some slight adjustments will be made to

- optimise the relationships between the various bodies, in particular, between the Board and the Scientific Council (SC).
- to take account of the increasingly important role to be played by the Pro Valat Foundation in funding the Tour du Valat, due to the fact that the MAVA Foundation (today the main funding body) is expected to stop its activities in 2022.

The Tour du Valat Foundation's statutes and rules and regulations, the terms of reference of its various governance and management bodies, and its organisational chart are in the appendices of this document.

Partnerships

The partnership, keystone of our action

The Tour du Valat has an ambitious mission corresponding to the current challenges, but beyond its own capacities.
For practical reasons and out of a desire to be effective, as well as our profound convictions, all our actions are carried out in partnerships with research centres, NGOs, and governmental or supra-governmental organisations.
Providing realistic responses to issues in the Mediterranean region, promoting and implementing integrated management processes, mobilising the most pertinent expertise, and financing projects--all our actions require the development of strategic relations with various organisations.

Implementation of the 2016-2020 programme requires:

- Strengthen key scientific and technical partnerships
- Broaden our base of financial partners, in order to reduce our dependence on the MAVA Foundation and to increase our capacity for financial resilience in a global economic context that promises to be difficult.

Our communication strategy specifically targets these different groups.

Stronger and more targeted scientific and technical partnerships

Scientific organisations: build a common scientific foundation for action

Scientific partnership building is a key element for implementing the 2016-2020 programme, and more generally for maintaining and improving the quality of our research. The ambitions of the 2016-2020 programme are indeed largely beyond the team's capacity, both in terms of skills and staff. Therefore, we must establish solid partnerships to attain our goals. In this perspective, all researchers have a two-fold mission: 1) carry out their own research, and 2) attract teams in the same field or in complementary fields to contribute to their programme. The Tour du Valat is a small, relatively isolated research organisation for which building partnerships and making scientific exchanges will favour the flow of ideas and the constant improvement of our expertise. In addition, getting involved in setting up new projects with these partners will enable us to participate in projects that we could not have completed alone.
The Tour du Valat also has assets explaining the interest of our partners in maintaining or developing a collaboration with us: a strong identity and originality, which are expressed by our transdisciplinary expertise, wetlands experience, and high quality researchers, the Tour du Valat estate as a real-life research area, and the capacity to maintain long-term projects and databases that do not depend on short-term funding are certainly characteristics that differentiate the Tour du Valat from many other research and conservation organisations.
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Currently, the most active scientific partnerships are with the Centre of Functional Ecology and Evolution (CEFE/CNRS) and more generally speaking with University of Montpellier, the Mediterranean Institute of Ecology and Paleoecology (IMBE), University of Marseille, the French National Office of Hunting and Wildlife (ONCFS), the CNRS/UMR MIVEGEC (Montpellier) the Universities of Burgundy, Leuven (Belgium), and Rabat (Morocco).

Organisations involved in conservation: Facilitate Mediterranean cooperation, foster dialogue between wetland stakeholders

Our mission requires us not only to produce knowledge, but also to make use of it to develop management methods, transfer them to various stakeholders, contribute to and influence policies and, *ultimately*, ensure the conservation and sustainable use of wetlands. Here again, the Tour du Valat cannot pretend to carry out these activities alone, and must create strategic partnerships for that purpose with key organisations in four groups of stakeholders:

Conventions and international initiatives and their agencies

In 2013, the Advisory Board concluded that we must focus our efforts on two international agreements particularly relevant to our areas of expertise:

- the Ramsar convention along with its Scientific and Technical Review Panel,
- African-Eurasian Waterbird Agreement (AEWA)

We also agreed that the Barcelona convention is not a priority target, but must nonetheless be taken into consideration, because it is the only environmental agreement that concerns the entire Mediterranean Basin. In particular, our actions take places within the scope of a collaborative project with three regional activity centres of the Mediterranean Action Plan (the Blue Plan: an analysis and forecasting centre -- an excellent development and environmental observatory; the RAC/SPA, which is in charge of implementing the protocols on specially protected areas and biodiversity; the RAC/PAP, which is in charge of implementing the protocol, currently being ratified, on the integrated management of the coastal zone). Finally, the MedWet initiative and its Secretariat are historically closely linked to the Tour du Valat. Its Secretariat is currently hosted by the Tour du Valat, and a close partnership has been established via the Mediterranean Wetlands Observatory.

Ministries and agencies of Mediterranean countries

In general, these institutions are targets (beneficiaries) of Tour du Valat actions, but they can also be its technical and financial partners. This is the case in France, where there is particularly close collaboration with the French Ministry of the Environment (MEDDE) as well as the ONCFS. The future French Biodiversity Agency should become an important, partner after the disappearance of the ATEN. This represents an important stake considering that our presence in ATEN gave us a privileged position with French environmental institutions. It is our strategy to create a constructive relationship with the future French Agency for Biodiversity (Agence Française pour la Biodiversité).

At the Mediterranean scale, collaboration has been developed for many years with institutions in various countries, particularly in the Maghreb, which must be continued.

Non-governmental organisations

In this new programme, the Tour du Valat's ambition is to bring together the community of Mediterranean stakeholders engaged in the conservation of wetlands. This undertaking seems to be essential, particularly due to the fact that the MAVA Foundation, which currently plays this role, will soon be stopping its activities. We will focus on two points to achieve this goal:

- provide support for the creation and development of NGOs, particularly in the southern and eastern parts of the Mediterranean Basin, and help them to strengthen their capacities in technical fields as well as in terms of advocacy;
- strengthen the synergies between the major conservation stakeholders in the Mediterranean (the IUCN Centre for Mediterranean Cooperation, WWF MedPO and WWF France, BirdLife and its national partners, in particular the LPO, Doğa Derneği (Turkey), FOB (Tunisia), and MedPAN).

Finally, the Tour du Valat has been a member of the Wetlands International European Association since 2014, and we must use this "platform" as well as we can to inform and influence European policies.

The management structures and their networks

Critically comparing and exchanging practices, transferring skills and knowledge, and capacity building presuppose a close partnership with natural area site management structures and their networks. In the first place:

- Locally, the Camargue Regional Natural Park, as well as Camargue natural area site managers, but also the SPP in Prespa (Balkans), Doga Dernegi in the Gediz delta (Turkey), the Tunisian Environmental Protection Agency (ANPE) and the Directorate of Forests (DGF) for Ichkeul Lake (Tunisia)
- nationally, the French Biodiversity Agency and the "cooperation units" it must set up with the organisations that are not members of the FBA;
- Internationally, Eurosite and MedPAN.
- The private management businesses (The group SALINS, the Large Maritime port of Marseilles (GPMM), …

Multiple, consolidated financial partnerships

In order to implement the programme described in this document, significant funds must be mobilised. Our own funds, coming from the Pro Valat Foundation, must cover 13 or 14% of the budget, whereas the MAVA Foundation must contribute 50% of the budget depending on the year. In addition to the contributions coming from the Pro Valat and MAVA Foundations, we must obtain 1.4 to 1.5 million euros annually, which come from various financial and institutional partners. These funds will be acquired by winning bids for projects launched by sponsoring organisations, such as the European Union, the French National Research Agency, and the Biodiversity Research Foundation, submitting projects to bi- or multilateral sponsors, such as the French Global Environment Fund (FFEM), and the Global Environmental Facility (GEF), and by signing contracts with targeted financial partners (MEDDE, PACA Region, …. In recent years, we have successfully developed partnerships with some foundations and institutions. Nonetheless, while the various experiences undertaken so far have had positive results, these partnerships are still too limited in scope and fragile, and agreed upon for relatively short periods of time. Today, we have two complementary objectives: 1) diversify the partnerships in order to be less vulnerable in case of the loss of an important partner, and consolidate key partnerships through formal medium- or even long-term agreements.

MAVA Foundation for Nature

For the 2016-2020 programme, the MAVA Foundation will remain the Tour du Valat's primary financial partner. However, the decision taken by the MAVA Foundation to stop its activities at the end of 2022 will have major consequences on the future of the Tour du Valat. Reflections engaged since 2013 by the advisory boards of the Tour du Valat, MAVA, and Pro Valat Foundations have resulted in the conclusion that it would be a good idea to maintain the same overall strategy and a volume of activity comparable to today. That would require the recapitalisation of the Pro Valat fund, an offensive, proactive campaign to obtain new sources of funding internationally, and the search for synergies with other organisations to mutualise our means. Having recently defined our strategy for taking action in the Mediterranean, it is crucial to ensure that these two strategies remain coherent and to optimise the Tour du Valat's contribution to the priorities established by the MAVA Foundation. Therefore, the following activities will be given special attention:

- increased support for civil society organizations working on subjects related to the conservation of wetlands (see "NGOs", above)
- enhanced synergies with the main environmental NGOs working in the Mediterranean basin,
- creation and animation of a "wetlands platform" creating alliances and synergies between Mediterranean actors ,
- strengthening interventions in the south and east of the Mediterranean basin

Institutional organisations

Because of its 'status', the Tour du Valat, does not have an immediately clear identity in the institutional landscape, particularly in France. Our relations with institutions have developed and exist today essentially because of interpersonal relationships, which make them extremely vulnerable. It is therefore crucial to formalise our relationships with a few key organisations and to precisely define our reciprocal medium-term commitments (at least 3 years). Our financial partnerships with the French Ministry of Ecology, Sustainable Development, and Energy (MEDDE), the *Provence Alpes Côte d'Azur* Region and the Rhone, Mediterranean and Corsican Water Agency concern very significant amounts of money and must be perpetuated, particularly with regard to upcoming elections and their consequences in terms of changes in the political teams.

As for European Union funding, it depends less on interpersonal relations, because it is based on project proposals.

Foundations and companies

Because of the prospects of a drop in the funding capacity of government agencies, the overly strict rules imposed by institutional sponsors, and the growing interest of companies for sustainable development, partnerships with private organisations must become an essential component of our financial strategy. Two very positive partnerships were established recently with the TOTAL Foundation and with the Prince Albert 2 of Monaco Foundation. Thanks to these successful experiences, we are convinced that there is a good potential to develop this type of partnerships. To accomplish this goal, we must develop a proactive strategy focusing on three key areas:

- pursue and organise the partnerships (Fondation TOTAL, Fondation Prince Albert-II de Monaco, Fondation de France, Fondation du Patrimoine, Fondation François Sommer, CEPAC), and attempt to obtain their long-term support for certain strategic projects.
- develop strategic partnerships, not only with company foundations (Institut Klorane, Fondation GECINA, Fondation RTE...), but directly with companies with a goal corresponding to our mission. This category concerns in the first place stakeholders involved in water-related issues, but other groups strongly committed to sustainable development will also be approached. We will propose to undertake medium-term strategic actions with them.
- develop community-based partnerships and establish privileged relationships with local economic stakeholders, in particular those in the Fos-Marseille area.

Financial management and projected budget

The 2011-2015 budget was intended to stabilise staff numbers, operating expenses, and investments. These expenses were covered by: (1) a stable contribution from the Pro Valat Foundation, (2) a slight increase in the allocation from the MAVA Foundation (aimed at compensating for inflation), and (3) maintaining external income at a high level, despite the crisis in public funding.
Cost control and successful fund seeking enabled these commitments to be achieved.

Financial management, which was already excellent, has been reinforced in recent years in order to provide:

- clearer, more regular, information for users;
- planning and financial monitoring arranged in function of the operational programme, facilitating the work of project leaders;
- better checking of commitments through consolidated internal procedures;
- more effective time-management monitoring, particularly in the context of external agreements, aimed at reducing the extra hours worked, and therefore the time savings account.

The recent reports of the statutory auditor testify that our financial management respects every aspect of the standards applicable to an enterprise of our size.

In terms of budgetary efficiency, the following three ratios illustrate recent developments:

- the capacity to mobilise external funding has increased considerably over the last 15 years, going from 18% of the total budget for the period 2001-2005 to 27% for the period 2006-2010, to 29% for the 2011-2015 programme;
- within the wage bill, the Programme/support functions ratio has been improved over the last 5 years, going from 59% programme and 41% support from 2001-2005 to 62% programme and 38% during the 2006-2010 programme, to reach 67% programme and 33% support, which shows the emphasis we place on the programme.
- The wage bill / operating expenses ratio shows an increase in favour of the wage bill due to raised salaries, with stable staff numbers, and reduced operating expenses. The ratio has gone from 60/40 (2001-2005) to 65/35 (2006-2010) then to 70/30 (2011-2015).

Aspects of the budgetary guidelines for the 2016-2020 programme

The strategic priorities of the programme have been defined on the basis of the analysis of the issues faced by Mediterranean wetlands (cf. first part of this document). Their implementation within our three departments and the different projects requires various reallocations and reorganisations of resources.

Un champ très stratégique doit être renforcé : l'Observatoire des zones humides méditerranéennes pour faire face aux 2 projets H2020 obtenus en 2015, et devant se poursuivre au moins jusqu'en 2018.
One particularly strategic area needs to be reinforced: the Mediterranean Wetlands Observatory, in particular to allow for the two H2020 projects obtained in 2015, which are set to continue until at least 2018.

All projects need to mobilise external funding to cover between 20 and 50% of their budget, with the rate fixed in function of their attractiveness to potential financial backers, and the extent to which they match the subject areas of the main calls for projects. Subject areas such as modelling, health, risks, adaptive management, agro-ecology or site restoration should therefore receive a good level of external funding.

In addition to the programme described in this document, we intend to maintain our capacity to develop new projects during the coming period, seeing it as an opportunity to improve the position the Tour du Valat and its activities at the national and international level, in particular on the southern shore of the Mediterranean, in support of MAVA partners.
Projects outside the scope of the "programme core" need to satisfy three conditions: contribute explicitly to our work, be linked to one or more projects for which they provide added value, and receive a high level of external funding (80% minimum).

Budgetary hypotheses

To draw up the budget for the 2016-2020 programme, we used the following hypotheses.

Expenses

Inflation

- We have incorporated inflation in our forecasts in order to avoid significantly weakening our capacity to ensure sufficient levels of investments and operating costs. A fairly low inflation rate of between 1 and 2% per annum for the 5 years of the programme was built into our forecasts.

Wage bill

- Increase the staffing levels allocated to the programme, enabling us to satisfy the contractual commitments of the Mediterranean Wetlands Observatory;
- Several retirements will enable a slight reduction in the wage bill through more junior profiles for the staff hired to replace those who retire;
- A constant and regular increase in the wage bill over the next 5 years (2.5% p.a.) to cover inflation, the "age and job-skill coefficient", and individual pay rises;
- Maintain, largely through external funding, from 6 to 8 doctoral (3-year contracts) and post-doc students (1 to 2-year contracts), essential players in our substantial scientific output. To this end, three half-grants for doctoral theses are budgeted on our own funds each year, augmented by the attribution of a full thesis grant to a subject of our choice;
- Reinforce the communication team to implement the new communication strategy.
- Prolong the post of the Friends of the Tour du Valat association facilitator;
- End the secondment of Emmanuel Thévenin at ATEN, due to the creation of the French Biodiversity Agency (AFB), in early 2017.

Operating expenses

- Operating expenses for the scientific programme and support services to be maintained constant (€1400 K p.a.). This total includes the additional expenses for the new communication strategy.

Investments

- Scientific programme: stabilised at approximately €50 K p.a.
- Considerable increase in investment for the Estate and the refurbishment of buildings, at both the TdV and Petit Saint Jean

Income

External agreements

We decided to set a level of external funding amounting to 35% of total income. We consider this objective (1.5 million euros per year) This objective represents an ambitious level of performance as part of the move to develop our financial partnerships in spite of the economic and financial crisis, and its probable repercussions on public funding in the coming years. It does seem realistic because this takes into account the development and diversification of financial partners.

MAVA Foundation

We have based our funding request on the value of the MAVA Foundation's allocation in 2015, i.e. €2400 K, to which we have added the €130 K p.a. of the additional contract for the funding previously assumed by Luc Hoffmann for the Verdier site, the President's assistant, the partnership with the Ilotopie performing arts company, and the salary of the Friends of the TDV facilitator, i.e. a total of €2600 K in 2016. This sum will increase by €50 K per year, reaching €2800 K in 2020.
In parallel, in order to limit the impact of its termination at the end of 2022, the MAVA Foundation will progressively augment the capital of the Pro Valat Foundation so that the latter's income covers at least 50% of the Tour du Valat budget starting in 2023.

Miscellaneous income

This budget line is made up of a heterogeneous set of incomes, rents (hosting of employees and organisations), various services (canteen) and reimbursement by ATEN. The budget line is set to be

€140 K for 2016, before falling to €100 K p.a. due to the stopping of the reimbursement of a 1/2 post for Emmanuel Thévenin by ATEN.

Agricultural income
This budget line is the income of the Estate and Petit Saint Jean (sales of agricultural, livestock, and viticultural produce), rising steadily at €10 K p.a., together with CAP grants, which are set to increase significantly (+€20 K p.a.), i.e. a total that will rise from €230 K in 2016 to €350 K in 2020.

Pro Valat Foundation
The contribution of the Pro Valat Foundation will be capped at €750 K in 2016 then fall regularly to reach €660 K in 2020, in function of the progressive increase in supplementary external agreements generated by the new communication strategy. We shall endeavour, through rigorous budgetary management, to limit this allocation as much as possible in order to strengthen the capital of the Pro Valat Foundation.
Finally, due to the very considerable augmentation from the MAVA Foundation (see above), the capital of the Pro Valat Foundation is set to rise very fast. Given that transfers of these funds are to be limited during this period, as specified above, the income on the capital is to be much greater than the transfers out, thus reinforcing it further.

On the basis of these hypotheses, the projected budget for 2016-2020 is as follows:

BUDGET en K€

	Budget 2015	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Budget 2020
Expenses						
Investissment	181	193	180	180	180	180
Operating expenses	1 455	1 529	1 400	1 430	1 430	1 430
Salaries	3 400	3 731	3 740	3 800	3 890	3 860
Total Expenses	5 036	5 453	5 320	5 410	5 500	5 470
FTP	59	64	64	64	64	62
Income						
MAVA	2 530	2 600	2 650	2 700	2 750	2 800
Pro-Valat	765	758	740	720	700	660
Ext Conventions.	1 403	1 636	1 570	1 600	1 630	1 560
Others (not agricultural)	137	229	100	100	100	100
Agricultural	201	230	260	290	320	350
Total Income	5 036	5 453	5 320	5 410	5 500	5 470

Communication

Key elements of the Communication strategy

SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) confirmed the quality of the Tour du Valat's past communication especially in the area near the Camargue, but it also highlighted the importance of increasing and diversifying Tour du Valat communication throughout the Mediterranean, internationally, and the need to touch certain key targets, particularly decision-makers.

In the future, we must reach out beyond France to strengthen the credibility of the Tour du Valat, particularly by increasing our visibility in Mediterranean and international bodies and forums. These efforts can be made either alone or by working on multilateral initiatives with recognised stakeholders that have clout, in order to more rapidly reverse the current trend of degradation facing Mediterranean wetlands.

Due to its 60 years of experience, the Tour du Valat can now legitimately claim leadership in a context in which the condition of wetlands in the Mediterranean Basin remains critical.
The Tour du Valat must necessarily increase its communications activities and speak out louder on behalf of wetlands at the numerous events indicated on the calendar below.

Goal of our Communications

The ultimate goal of Tour du Valat communication is to 'Firmly establish the TdV's credibility as a leading research institute in the field of Mediterranean wetlands, by effectively promoting its results to increase its impact in favour of these areas and strengthen its reputation as a historical actor that can bring together the Mediterranean community to convince decision-makers.'

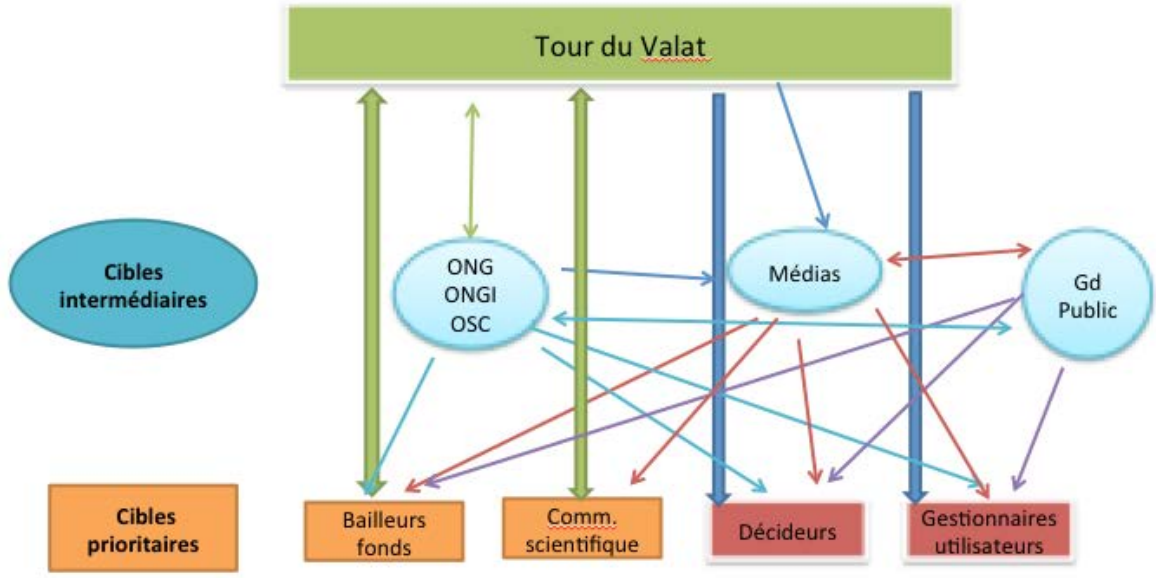
To achieve this goal, four communication objectives have been established:

1. **Scientific credibility**: Strengthen and improve the Tour du Valat's credibility by promoting its scientific results and transferring them to others.
2. **Reputation and Leadership**: Firmly establish the Tour du Valat's leadership by improving its reputation and bringing together a community of stakeholders from throughout the Mediterranean Basin
3. **Value of Mediterranean wetlands**: Advocate the importance of wetland functions, values, and services to ensure a good understanding of them, and help to influence decisions that favour their sustainable management and effective restoration.
4. **Attractiveness for financial backers**: Convince new financial partners and reinforce existing partnerships by means of reciprocal communication.

For each of these objectives, communication activities and tools as well as the corresponding performance indicators have been defined. The principal ones figure in the various sections below. Most of them will be developed in French and English.

Audience – priority targets

In line with the Tour du Valat position stated above, its priority targets are decision-makers as well as wetland users and managers, who will ultimately make it possible to halt the loss and degradation of Mediterranean wetlands.
The scientific community and financial backers are also important targets, because they make it possible for the Tour du Valat to increase its capacity to produce results. Interaction with these two target groups will enable the Tour du Valat to enrich and focus its programmes.
National and international NGOs and SCOs (civil society organisations) and the media are our intermediate targets, because they can put direct pressure on our priority targets. The general public must also make demands, or even put pressure on our priority targets. However, for reasons of capacity as well as effectiveness (it is better to work with partners who already have direct access to this target group), it is not considered to be a direct target for the Tour du Valat beyond the Camargue.



We have recently completed in-depth work for each of these target groups to better define the Tour du Valat's objectives with respect to each of them, and also to better understand their expectations and the best way to "touch" them.
These considerations are presented in a document that will be placed in Appendix 1 of the final version of the Communication Strategy.

Principles of Communication

These principles are linked to TdV values for developing, presenting, and concretely embodying the messages and stories that will make these target groups remember the TdV:

1. **Scientific credibility**: highlight scientific data and objectives and link them to successful conservation projects;
2. **Historical reputation**: recall the TdV's legitimacy because of its 60 year experience and track record;
3. **Speak with a tone that is open and participative, and especially not conflictual**: invite stakeholders to speak (on both sides of the Mediterranean as much as possible);
4. **Broad geographic coverage:** link the two sides of the Mediterranean (do not focus only on the Camargue);
5. **Graphic images for educational posters and photos for emotions:** make people want to understand;
6. **A TdV team that works closely with its partners:** committed scientists and naturalists.

1. Communication Objective 1: Scientific credibility

Strengthen and improve the Tour du Valat's credibility by promoting its scientific results and transferring them to others.

Scientific credibility is the Tour du Valat's fundamental asset. The Communication team must assist the scientific team and promote its research and scientific expertise.
To strengthen and improve the Tour du Valat's scientific reputation vis-à-vis students and researchers who have a job, we must:

- keep them informed about the Tour du Valat's scientific production;
- secure their support for Tour du Valat research activities;
- train them (and ensure knowledge transfer from the TdV. For the northern component: training in places where people are convinced and work with important engineering teams, (particularly in France), for the southern component: welcome students, and encourage the emergence of a team).

The principal communication activities envisaged for targeting scientists and students are as follows:

- **Work** actively with scientific media:
  - develop and update a specific press file;
  - disseminate press releases linked to certain TdV publications (support for the Communication team project leader). On average, about six of these press releases per year will be accompanied by either videos, photos, computer graphics and/or Webex conferences (on-line conferences) for the important results;
  - help to promote results on social media (key messages to be defined with TdV researchers): help TdV scientists make their personal or TdV web pages more dynamic and attractive;
  - contribute regular content to Wikipedia articles;
  - editorials and papers co-signed with other scientists (members of the Science Council or partners).
- **Visibility** at science conferences:
  - promote the TdV's Young Scientists Conference;
  - support for TdV staff to project a good image of the TdV at major conferences (talks, preparation of written and video materials, slideshows…), relayed on TdV media and its partners' media when appropriate.
- **Promote** the programmes and courses taught by the TdV team:
  - promote "turnkey" course for engineers (NB: this would suppose that this action is foreseen in the programme);
  - promote a MOOC (Massive Open Online Course) specifically focussing on Mediterranean wetlands for people in the South and engineers (NB: this would suppose a dedicated team and a specific MOOC budget allocated to the scientific management team, given that this project would have to be developed in partnership with a major institute or an internationally acclaimed training centre);
  - Promote the participation of the TdV at a TedEx (on-line discussions / conference for sharing ideas) organised by other partners;
  - Propose papers or news articles by TdV staff in the media of institutes/training centres.
- Systematically **promote**, or even "popularise" TdV results in all TdV institutional media to ensure coherency between communication about TdV projects and institutional communication (cf., Communication Objective 3 below).

2. Communication Objective 2: Tour du Valat Reputation and Leadership

Firmly establish the Tour du Valat's leadership by improving its reputation and bringing together a community of stakeholders from throughout the Mediterranean Basin.

This leadership requires high-quality institutional communication and fostering dynamics bringing together stakeholders focusing on Mediterranean wetlands so that the Tour du Valat's advocacy activities can be further developed.

a. Institutional communication with historic and scientific roots

Our goal is to ensure that institutional communication is complementary to the communication about our projects. The communication about TdV projects must add to and reinforce the credibility and legitimacy of institutional communication, which must itself improve the reputation of the TdV for all of its target groups and should make it possible to attract futures backers who will fund new research and conservation projects. Communication about TdV projects and institutional communication must be in synergy with each other, and the TdV management will be sure to ensure their internal coherency through the implementation of the communication strategy.

In terms of institutional communication activities, we propose to:

- **Strengthen** the visual identity:
  - Develop graphic style guidelines in which the logo and other key graphic items will be renewed;
  - Digitise the TdV's photographic heritage with annual additions to its collection (new reports linked to research themes (cf., Communication objective below), and photos of institutional events) up-date.
- **Events** at the Tour du Valat Estate and in the Camargue:
  - Organise and promote key events at the TdV linking them to TdV projects and the Friends of the TdV: ringing flamingos, open-day for World Wetlands Day, Camargue festival, nature day, science week...
- **Develop** "off-line" institutional documents that are more targeted and systematically distributed:
  - Dynamic management of contact files;
  - Institutional brochure renewed or updated every three or four years;
  - Annual report in a shorter version than today;
  - Project portfolio updated with new additions every year (in-house) ;
  - "Episodic" slideshow presentations for TdV teams with a list of Questions / Responses that are updated annually;
  - Banners and posters updated every three or four years (as often as the brochure).
- **Publish material** "on line" more systematically:
  - Define an on-line plan of action: revamp the internet site so it will be consistent with the official TdV position and updated regularly according to TdV and Mediterranean wetlands news events;
  - Newsletter linked to the internet site and to the social network strategy (frequency of publication to be defined);
  - TdV social network strategy targeted according to the networks: Facebook and Twitter, as well as LinkedIn.

b. Leadership by setting up a multi-partner platform for Mediterranean wetlands

Thanks to its reputation and credibility, as well as the wetlands conservation network it has helped to create over the past 60 years, the Tour du Valat's point of view is well respected and it can legitimately express its opinion to encourage and/or assist Mediterranean decision-making bodies in order to support the development and implementation of public policies that favour wetlands. The goal is to speak out higher and louder for wetlands so that the current trend resulting in the degradation of Mediterranean wetlands can be reversed more rapidly, which will require us to become more visible in Mediterranean and international bodies and forums. We must also create and catalyse a coalition of stakeholders united around a well-defined project and calendar. It could be launched at or before an important conference. It will be decisive to organise Tour du Valat actions around strong Mediterranean alliances reaching beyond the Camargue, while making sure to promote as much as possible the sites in North Africa, which could be "sponsored" by sites to the north of the Mediterranean (with common issues for instance).
The synergies with NGOs, INGOs, and SCOs in the Mediterranean Basin must be strengthened to mutualise resources and skills throughout the Mediterranean, which will better serve the cause of wetlands, provide information to opinion formers, and touch decision-makers. These synergies could be united through a "Mediterranean wetlands platform", in the same way as campaigns are run by NGOs.

The principal communication activities foreseen for this purpose are as follows:

- **Provide support** for organising projects:
  - Contribute to devising a projects concept to be submitted to our partners, which is linked to current initiatives (MedWet in particular) (cf., Oceans platform experience);
  - Set up a "communications task force" bringing together the Heads of Communication of the different organisations involved in this platform;
  - Create a communications plan for the platform within the communications taskforce;
  - Cross-promote the different activities of each organisation in the various communication "documents".
- **Contribute** to organising communication events for the whole platform:
  - Organise a Mediterranean wetlands symposium just before an important international conference (such as a Ramsar COP), which targets all decision-makers involved in Mediterranean wetlands (every four or five years);
  - A summer retreat held at the TdV to bring together the different Mediterranean wetlands stakeholders to share and capitalise on their experiences – every three years (to think about in relation to the "Jean-Paul Taris colloquium" project;
    (NB: a summer retreat might involve the communications team, but it would also require the active involvement of the TdV's scientific teams and of the Secretariat for the logistics);
  - Provide support/capacity building for partners that organise events outside of the TdV (TdV's considerable experience > a way to replicate it in certain countries or strategic places);
  - Organise side events, such as stands with partners at major conferences and international colloquia (the leader in charge of organising the stand will be designated according to where the event is held and the principal theme explored);
  - Promote participation in meetings such as those held by the Wetlands International European Association, based in the Netherlands, and Ramsar France.
- **Contribute** to the development of communication "documents" for the whole platform:
  - Develop specific "media" (graphics, images, video) based on agreed upon graphic style guidelines;
  - Contribute to cross interviews, experience sharing, testimonials…
  - Contribute to drafting notes, position papers, special reports, and messages for social networks;
  - Contribute to orchestrating concerted relations with the press (greatly increase the impact by means of the geographic area of competence of each of the partners who belongs to the platform).

3. Communication Objective 3: Value of Mediterranean wetlands

Advocate the importance of wetland functions, values and services to influence decisions that favour their sustainable management and effective restoration.

Given the fact that wetlands generally have a rather negative image, the TdV Communications team must do its best to develop appropriate forms of communication that can improve the general understanding of the value of wetlands, making sure to highlight both their importance for biodiversity and for the human sciences. In this case, those to target directly are decision-makers and site managers and users, and more indirectly the media and the general public.
Obviously, most of the communication activities and institutional "documents" (cf. Communication Objective 2) will be used to promote these messages.

a. Decision-makers—the key audience that can improve the condition of Mediterranean wetlands

The current state of Mediterranean wetlands is an indicator of the lack of mobilisation of Mediterranean decision-makers who have not yet adequately understood their importance for biodiversity, or the importance of the many functions and services they provide for humankind, and therefore their true value.
Whether these decision-makers have an executive or legislative position locally, nationally, in Europe, the Mediterranean region or internationally, they have a key role to play in terms of improving the

condition of Mediterranean wetlands. They are in charge of drafting public policies that favour Mediterranean wetlands and of ensuring they are respected once they have been adopted.
The TdV pursues several objectives concerning them: we inform them about the value of Mediterranean wetlands, advise them and give them tools to encourage and facilitate their actions. To accomplish these goals, a network of well-disposed stakeholders must be developed to encourage them to make decisions that are favourable to Mediterranean wetlands within the scope of European directives, national strategies, and other legislation (cf., Communication Objective 2--platform).
Since they are THE key target for the TdV, these communication activities will represent a significant portion of all TdV communication activities:

- **Contribute** to the Tour du Valat's approach to advocacy (beyond the Mediterranean wetlands platform):
  - Provide support for the TdV advocacy project management team to help it to develop its work plan (create list of Mediterranean decision-makers, prepare material for meetings with teams and government cabinets);
  - Clarify the communication interface with MedWet and Ramsar – and even other partners;
  - Organise this interface within the framework of the project to organise a network of NGOs in the different countries concerned (MedPO/MedWet initiative with MAVA funds) (cf., Communication Objective 2).
- **Develop** thematic tools linked to the services/values of Mediterranean wetlands and Tour du Valat studies:
  - Draft summary notes on the themes and news items particularly significant for the TdV (six per year on average);
  - Produce two thematic videos per year (on average) to promote the solutions and actions proposed by the TdV (link biodiv/human dev, as well as with the scientific/projects communication);
  - Produce two photo and/or multimedia reports to illustrate our main themes of research.
- **Mobilise** a network of informed decision-makers:
  - Invite them to TdV events (ringing flamingos, open-day at the TdV for WWD...) ;
  - Draw attention to the participation of the TdV at international conferences and in organising specific side events when appropriate;
  - Mobilise members of the Friends of the Tour du Valat association ambassadors;
  - Organise an annual study trip to show TdV results to others (at the TdV or at sites in North Africa) – (+ logistical support for the secretariat and projects) ;
  - Organise a Mediterranean wetlands symposium with MedWet (decide if it should be organised within the scope of the Mediterranean wetlands platform—cf., Communication Objective 2).
- **Media relations**
  - Develop a press contacts file for each country (cf., Communication Objective 3);
  - Publish press releases linked to TdV production;
  - Publish press releases in reaction to national and international news;
  - Publish editorials/forums with messagers and partners in key media (France and other countries) + list of key messages;
  - TdV social networks: follow the Facebook and Twitter accounts of the principal decision-makers (link with Project Manager).

b. Site managers and users: stakeholders in the field who have a direct impact on Mediterranean wetlands

Given the kinds of stakeholders concerned, this is the most heterogeneous target group:

- **local level:** users and relay organisations (federations of hunters, irrigation coalitions, coalitions of farmers / chambers of agriculture, gardians, fishers, technical commissions of the Camargue Regional Natural Park...)
- **national level:** national users federations (hunters, farmers, certified French rice growers…), networks (e.g., ROZO network, *Acteurs Territoires Espaces Naturels* (ATEN), Lagoons Transfer Unit, French National Nature Reserves (RNF), veterinarians (+ health ecology).
- **Mediterranean/International level**: ELO (European landowners), FACE (European hunters). The TdV's objectives for this target group are to foster constructive dialogue between stakeholders, ensure the transfer of the results of the TdV's research and research from other stakeholders as well as a good understanding of the issues, and to promote a

network of allies so as to identify certain “ambassadors or Friends” that can help to spread the TdV message.

Possible TdV communication activities:

- **Provide support for communication that promotes the TdV** (at different meetings, to official bodies, for technical commissions of networks of stakeholders, editorial boards (for example, through the *Revue Espaces Naturels* (natural areas journal), *Zones humides Info* (wetlands info)).
- **Participation in forums of site managers**: TdV participation on the Administrative Council of different organisations and networks, such as the *Centre Français du Riz* (French rice centre), and the executive water commission of the PNRC;
  - provide techno watch and info (via the *Lagoons newsletter*, notes, special reports);
  - provide support for the development of specific multimedia documents: slideshows,…
  - put in place training modules, technical workshops (in collaboration with organisations such as the Lagoons Transfer Unit, the ATEN, and the Sommer Foundation;
  - organise thematic visits of certain TdV projects (at the TdV or in other places).
- **Create documents:**
  - Create new "science and management" brochures (sustainable hunting, Greater Flamingos...);
  - Provide and distribute the collection of “MedWet Mediterranean wetlands conservation” booklets : 13 booklets on paper that are now available in an electronic version;
  - Draft new position papers (distributable to several target groups according to the themes addressed).

c. Media-- opinion makers to be reminded of our activities

The media will be touched differently according to the level concerned:

- **local level (Camargue/PACA):** the daily regional press, and radio/TV news have been directly contacted by the TdV Communication team for the past 12 years;
- **national level (France)**: the daily national press, radio/TV news, thematic show, specialised press (hunting, health, naturalist issues…), associations of journalists, scientific media, web press, Twitter accounts, and journalists will be contacted by the TdV and its French partners according to the themes concerned and the communication protocol defined for the Mediterranean wetlands platform.
- **Mediterranean/International level:** associations of Mediterranean environmental journalists, scientific media, the principal Francophone and Anglophone media can be directly targeted by the TdV, but out partner organisations will be in charge of targeting the national media in their own countries.

For the Tour du Valat, the objectives for this target group will be to provide them with knowledge about Mediterranean wetland issues and the results of TdV research, to "hook" them and maintain ongoing relations with the journalists who know how to effectively communicate these issues to the general public (also via Mediterranean wetlands platform), and to present and show our "solutions for wetlands".

We propose the following communication actions:

- Organise the Tour du Valat’s approach for working with the press:
  - Develop an annual press plan according to an annual calendar;
  - Develop and update a press file for France and a press section on our website;
  - Develop a MED press file (cf., MedWet and partners) standard press kit and modus operandi defined with our partner organisations;
  - Regular information for our partners so that it can be relayed in their media;
  - Organise a "media training" session for TdV Directors and Project Managers (cf., if adequate training budget);
  - Create a TdV institutional press kit: file, photos, video (also for our partners);
  - Crisis communication kit;
  - Annual assessment of press operations (quantitative and qualitative).

- Mobilise the media:
    - Design and distribute regular press releases and newsletters with a two-way approach (pro-active with TdV newsletters and reactive according to the news) ;
    - Make targeted propositions for forums or editorials co-signed by well-known figures (cf., targets--decision-makers and scientists);
    - Encourage “storytelling” by stakeholders and beneficiaries in the field (on both sides of the Mediterranean);
    - Follow and react to the Twitter and Facebook accounts of key media and journalists.
- Showcase wetlands so people will better understand them:
    - Organise an annual trip for the press linked to the TdV’s research priorities and/or a symposium–four to six journalists accompanied by Mediterranean partners with the presence also of journalists from North Africa (according to the theme presented, this event could be organised in conjunction with the trip targeting decision-makers–cf. below).
    - Produce copyright-free photos, films, and multimedia materials to be used in the media (cf., Communication Objective 2, institutional communication).

  NB: The idea of a Mediterranean Wetlands Living Planet Report was mentioned, but it will not be pursued at the present time.

d. 4- The general public and civil society: a lever for influencing decision-makers

In terms of the general public, the Tour du Valat will focus its efforts on Camargue inhabitants (100,000 people) and to a lesser extent, all French people.
More generally speaking, in terms of its Mediterranean audience, the Tour du Valat will approach conservation NGOs and SCOs via the Mediterranean wetlands platform (cf., Communication Objective 2).
The Tour du Valat’s objectives for this target group are 1) to raise its awareness about the value of wetlands, 2) to reconnect it directly to wetlands through events and activities with a concrete link to these environments, 3) to foster the expression of a demand from society as a whole for the conservation and sustainable management of wetlands.

Communication activities proposed for Camargue inhabitants:

- Organise events at the Tour du Valat (ringing flamingos/ biodiversity message, open-day for World Wetlands Day (WWD), *Envies Rhônements Festival* / cultural message, Camargue festival / cultural message, as well as science week, and visits with the local nature guides office);
- Support for participation in local conferences organised by the CPIE--centre for environmental initiatives, and the PNRC;
- Create, update, and disseminate various documents for the general public: leaflets (with an offer to become a sponsor), video, internet site, Facebook page;
- On-line media relations with TdV news (cf. above).

At the French scale, the Tour du Valat’s actions, combined with those of the Mediterranean Lagoons Transfer Unit could be included within the scope of the CESP (Communication, Education Awareness-raising Participation) programme sponsored by the French Ministry of Ecology and Sustainable Development (MEDDE) in the framework of the National Action Plan for wetlands. Two major events for the general public are organised in this framework for World Wetlands Day and European Heritage Days.
At the Mediterranean level, WWD is also one of the main communication tools created by the Ramsar convention and MedWet. In the framework of the Barcelona convention and the Mediterranean Action Plan, Coast Day is another event open to the general public in which the TdV participates, and through which it plans to raise awareness about the integrated management of coastal zones, particularly coastal wetlands.

4. Communication Objective 4: attracting financial backers

Convince new financial partners and strengthen existing partnerships through reciprocal communication.
In an extremely competitive environment in terms of fund raising, our search for funding will require a more strategic approach vis-à-vis public and private backers whether institutional partners in France (MEDDE, Regions, water agencies), bilateral and multilateral agencies (EU, GEF, FFEM, AFD, GIZ, CEPF), philanthropists (company foundations, private foundations, and others) or companies.

To convince them to support us, the Tour du Valat must be identified as a world-renowned expert on Mediterranean wetlands questions, and completely reliable in terms of project management. We must also build relationships based on trust, which enable us to engage in medium- or long-term relationships and to offer them visibility within the scope of Tour du Valat communication activities so that in exchange they will also promote the Tour du Valat in their own communication documents.

To accomplish these goals, we propose to engage in the following communication activities:

- The Communication team will support the Tour du Valat strategy for raising funds (prospecting)
    - Provide support to develop communication for the Friends of the Tour du Valat;
    - Provide support for specific products used for the prospecting activities (slideshows, press files, promotional products);
    - Propose to host events organised by our partners (provide support for communication according to the needs) (NB: ad-hoc cost paid for by partner or via a partnership budget established with the Tour du Valat).
- Enhancing our partnerships (loyalty development)
    - Develop specific communication plans with each partner to ensure the visibility of the Tour du Valat and its results in the partners' communication "documents" and vice versa;
    - Develop specific communication "documents" funded by our partners in the framework of projects (NB: ad-hoc cost paid for by partner or via a partnership budget established with the Tour du Valat);
    - Promote our partners in TdV institutional events and documents and in those produced by partners (anniversary events…);
    - Invite partners to Discovery Days at the Tour du Valat or other Tour du Valat activities (ringing birds...) proposed for the employees of our partners;
    - Promote our partners in Tour du Valat institutional communication products (cf., Objective 3 above).

Calendar of events and key dates

A list of key dates and events that the Tour du Valat is likely to promote for its own communication can be found in the Appendix of the communication strategy document.
This list indicates the major events to not be missed at the different levels (Camargue, France, Mediterranean, and international) and should be completed in the upcoming months in conjunction with key Tour du Valat partners (particularly those in North Africa) in order to optimise the use of the resources and strengths of each organisation.
Every year, an annual plan of action will highlight the major events to be used or organised by the Tour du Valat for its communications.

Resources and organisation of the Communication team

a) Budget and human resources

Given the future communication issues and activities, the communication team will be reinforced with the following skills:

- Strategy skills (vision, institutional communication), lead a team, facilitate the activities of a network of communication partners, provide support for TdV advocacy activities;
- Internet/social network skills - graphics (photos and video);
- Writing skills: writing or editing notes, booklets, the Annual Report, a portfolio of projects, web pages;

- Skills to organise events and handle press relations

Support from trainees (from communication or photography schools, EVS (European Voluntary Service or civic service) will be enlisted systematically so we can delegate work to these people who are completing their training. However, we will also try to improve the communication capacity of our partners throughout the Mediterranean (we may set up a sponsorship programme if this proves to be legally possible), to be coherent with TdV communication objectives and values.

a) Modus operandi

Insofar as it is a strategic axis in the 2016-2020 Plan, Communication must be included in the important internal decisions made, and clearly promoted so that everyone will understand the issues and constraints facing the Communication team.
The Communication team already attends the regular Management Committee meetings; however, it would be a good idea to also have weekly meetings with the Management team, monthly meetings with the Department Heads and quick weekly information meetings with the Executive Assistant to review the situation so as to anticipate any oral interventions to be made by the Management team in meetings, conferences or colloquia.
All communication projects will be systematically and regularly reviewed with the teams concerned so they can think ahead about how they will handle the communication action themselves.
All institutional communication will be developed in close collaboration with the Tour du Valat's Management team, especially when it concerns general advocacy activities.
The Head of Communication will be in charge of developing an annual communication plan and evaluating it regularly. For the sake of good internal communication and especially to mobilise the entire Tour du Valat staff, it will be presented to the whole Tour du Valat team. The Communication team will meet on a weekly basis to ensure good relations within the team.
Synergies will be sought with other key Tour du Valat partners (MedWet, Ramsar, French water agency, French wetlands stakeholders and WWF MedPO, IUCN Malaga, Prespa Protection Society, Izmir University, Doñana Biological Station, and/or other partners in North Africa). The idea of a communications task force could be explored to optimise communications efforts throughout the Mediterranean.
The evaluation of the strategic plan will give us the occasion to also assess how successful the Communication team is compared to the predefined strategy.
In terms of governance, the current and future communications plan will be presented systematically to the Advisory Board and Science Council.

Environmental management and risk management

Eco-responsability is at the heart of our practices

Eco-responsibility: making our daily actions live up to our mission is central to the environmental management strategy we have been pursuing since 2006. Our ambition is of course to reduce our ecological footprint, but we are also striving to be exemplary and to integrate an educational dimension into our programmes with respect to site users, and more generally speaking people living in the Camargue.
Our strategy is articulated in four areas of varying complexity: 1) waste, 2) renewable energies and infrastructure, 3) supplies for the canteen, and 4) travelling.

In terms of **waste**, the objectives are to reduce the amount of waste produced and optimise its treatment by organising its recycling and collection, while reducing costs. Today, the following items are in place:

- All our wastewater is treated in a macrophyte-based wastewater treatment.
- Two 1000-litre composters enable us to intelligently recycle our organic waste.
- A sorting platform enables us to store different kinds of waste, sorted by nature and treatment category, until they can be recycled.
- We have undertaken negotiations with various recycling specialists in different areas.
- Training and awareness raising of the Tour du Valat staff and our service providers has been undertaken and must be continued.

Our '**renewable energies and infrastructure'** objectives are more ambitious and complex: we would like to reduce the energy consumption in our buildings and the CO_2 produced to 25% of what they were. To reach these objectives, we are working on four issues at the same time:

- Wise use of energy by changing practices and installing more efficient equipment
- Increased energy efficiency by optimal insulation of our buildings
- Environmental responsibility: we are now producing all the energy we need for heating and hot water with renewable energies (solar and biomass)
- Locally pertinent actions: we are using local biomass sources, such as locally produced wood chips, farming waste products from the Camargue (rice hull and straw) and privileging replicability by adopting solutions that are adapted to the widely-dispersed Camargue habitats

By installing a 160 kW multiple fuel biomass boiler that replaced 8 heating oil or natural gas boilers, a heating network, and insulating our buildings, we have:

- cut our energy consumption by 50%,
- decreased our CO2 emissions by 85%,
- cut our heating costs by 67%, for an annual savings of €22,000 on fuel.

These very impressive results must be further improved in upcoming years with new renovation work, which include replacing the window units in the old school and laboratory, and installing external insulation on the laboratory and archives buildings.

The supplies for our canteen must also correspond to our values, with a low cost.We have therefore defined a policy based on:

- Use food products that are in season,
- Privilege locally produced foods to reduce transport,
- Replace certain food items or products that come from endangered species or for which the production processes are incompatible with our values,
- Use organic products as much as possible.

This approach must be continued and further reinforced, while remaining vigilant in terms of a satisfactory number of people eating at the canteen, so that the price per meal will remain reasonable.

Finally, our "**sustainable travelling**" policy was recently defined and it must be fully implemented for the 2016-2020 programme, in four specific areas:

- **Travelling around the Tour du Valat Estate**: the aim is to use clean modes of transport as much as possible (electric vehicles, bicycles...)
- **Management of the Tour du Valat vehicle fleet**: the aim is to choose a type of engine based on environmental and economic criteria, to optimise the size and the management of this fleet in terms of our needs, and to monitor and optimise the distribution of petrol.
- **Commuting to and from work**: public transport and carpooling will be encouraged.
- **Local, national, and international travelling**: the aim is to encourage the use of public transport for local and regional trips, and to limit the number of long trips by developing the use of videoconferencing,

Taking into account and anticipating risks

The future of an organisation like the Tour du Valat is certainly conditioned by its own actions and the strategy it develops, but also by various external and internal factors that can affect its activities as they are envisaged in this document, including legal, financial, and climatic risks, or ones linked to human resources... Since 2006, a risk management plan has been set up and updated annually. The principal risks have been identified according to how likely they are to occur and their potential impact, and preventive measures and curative actions have been put in place and defined to respond to or minimise each of these risks. The risk ratings are re-assessed as the preventive actions are being implemented. The risk management plan, as it was updated in 2015, figures in the appendix. It will be reviewed and updated annually during the 2016-2020 period.

Appendices

Sommaire

TOUR DU VALAT

SOMMAIRE ANNEXES

Statutes

I – Aim and means of action of the Foundation

Article: 1 Aim

The Foundation called the "Tour du Valat Foundation", previously named the "Sansouire Foundation", was founded in 1978.

The aim of the "Tour du Valat Foundation" is as follows:

1) Research and the hosting of scientists in order to improve the interdisciplinary understanding of wetland ecosystems and the ecology of the species that inhabit them,

2) Making good use of research results and transferring them to any organisation or person involved in the management of such habitats so as to promote their conservation and wise use.

3) Managing the Tour du Valat Estate, property of the above-mentioned Foundation, in view of conserving its flora, fauna and habitats, and maintaining or even enhancing its biodiversity.

The headquarters of the Foundation are at the Tour du Valat, Le Sambuc, 13200 Arles, France.

Article 2: Means of action

The Foundation's means of action are as follows:

1) Management of the sites owned by or entrusted to the Foundation,
2) Scientific research carried out within its facilities or on its sites, and also elsewhere in the Mediterranean Basin, or even beyond. To that end, the Foundation facilitates a network of partners within the Mediterranean Basin and if necessary beyond, and plays an active part in the various forums concerned,
3) Assistance provided to third parties for work carried out in the field of nature protection, such as environmental expertise, training, and the transfer of conservation techniques,
4) Publications.

II - Administration and operations

Article 3: Composition of the Board of Directors

The Foundation is administered by a Board of Directors made up of 12 members as follows:

- 4 from the College of Founders;
- 4 from the College of Ex-officio Members;
- 4 from the College of Qualified Personalities;

In addition, it is assisted by at least one statutory auditor and a substitute statutory auditor, appointed in accordance with the conditions stipulated in Article 5-II of the amended French law of 23 July 1987 concerning the development of patronage.

The College of Founders, in addition to the Founders, that is to say the descendants of Luc Hoffmann, Founder of the Foundation previously named the "Sansouire Foundation", also includes a member appointed and renewed by the aforesaid Founders. In the event of the definitive absence of one of the Founders, his/her replacement is chosen by the other members of the College. In the event of disagreement within the College, the replacement is co-opted by the whole Board of Directors.

Luc Hoffmann, Founder of the Foundation previously named the “Sansouire Foundation”, although no longer member of the College of Founders will nonetheless exercise the function of Lifelong Honorary President of the Foundation. In that capacity he will be invited to attend, with consultative voting rights, all meetings of the Board of Directors.

The College of Ex-officio Members is comprised of the French Minister of the Interior or his/her representative, the French Minister of Ecology, Sustainable Development and Energy or his/her representative, the French Minister of Higher Education and Research or his/her representative, and the Mayor of the City of Arles.

The College of Qualified Personalities is comprised of persons selected on the basis of their expertise in the Foundation’s field of activity, in particular Research. These persons are co-opted by the other members of the Board of Directors.

With the exception of the Ex-officio Members, the members of the Board of Directors are appointed for a period of 4 years. Their mandate is renewable, in compliance with the terms and conditions mentioned in the Internal Regulations.

With the exception of the Ex-officio Members and the Founders, membership of the Board can be revoked for just cause by the Board of Directors, in compliance with the right to defend that membership.

In the event of the decease, resignation, definitive absence or revocation of a member of the Board of Directors, a replacement will be sought within a period of two months. The functions of the new member will come to an end on the date at which the mandate of the member he/she replaced would normally have expired.

The members of the Board of Directors are expected to attend in person the meetings of the Board. In the event of unavoidable absence, a member can give his/her voting right to another member, in compliance with the conditions laid down in the Internal Regulations. However no member can hold more than one voting right in addition to his/her own.

In the event of repeated absences without a valid reason, members of the Board of Directors, other than the Ex-officio Members and the Founders, can be declared to have automatically resigned, in compliance with the conditions laid down in the Internal Regulations and the right to defend that membership.

Article 4: Bureau

The Board of Directors elects a President from amongst its members. It also designates a Bureau, which is comprised of the President, a Vice-President, a Treasurer, and a Secretary. The Bureau is elected for a period of 2 years. The mandate of the Bureau officers is renewable, in compliance with the terms and conditions in the Internal Regulations.

The Bureau may, for the exercising of its missions, with the authorisation of the Board of Directors, be joined by one or more collaborators recognised as experts in their field.

Membership of the Bureau can be revoked for a valid reason by the Board of Directors, in compliance with the right to defend that membership.

The Bureau holds meetings, convened by the President, at least three times a year.

Article 5: Meetings of the Board of Directors

The Board of Directors meets at least once every six months. It is convened at the request of the President or at least a quarter of its members.

It deliberates the questions included in the meeting's agenda by its President together with the questions that at least one quarter of its members ask to be included in the agenda.

The effective presence of the majority of the current members of the Board of Directors is required for the deliberations to be valid. If this quorum is not achieved, a new meeting will be convened, in compliance with the conditions laid down in the Internal Regulations. The deliberations of the Board of Directors will then be valid provided at least a third of its current members are present.

The deliberations of the Board of Directors are decided on the basis of the majority of votes cast. In the event of an equal number of votes for and against, the President holds the deciding vote.

Minutes of the meetings are taken, and signed by the President and Secretary or, if absent, by another member of the Bureau.

Employees paid by the Foundation or any other persons whose opinion is useful can be called upon by the President to attend meetings of the Board of Directors, with consultative voting rights.

Article 6: Composition and powers of the Science Council

The Foundation has a Science Council made up of at least four leading scientists from France or abroad, qualified in the Foundation's field of activities.

The members of the Science Council are nominated by the Board of Directors after being proposed by the President of the Foundation.

The mandate of the members of the Science Council is for a period of four years. Their mandate is renewable, in compliance with the terms and conditions in the Internal Regulations.

The Science Council holds meetings, convened by the President of the Foundation, at least once a year.

During the first meeting of its mandate, the Science Council designates one of its members as candidate President, and submits that candidature to the Board of Directors for acceptance. This newly elected President of the Science Council is then invited to sit permanently on the Board of Directors of the Foundation, without voting rights.

The Science Council issues and delivers an opinion to the Board of Directors concerning the multiannual action programme. It validates the programme guidelines before actions are carried out and draws up an annual report to assess them. When the Foundation's means of action include the possible financing of teams or researchers from its own funds, it gives an opinion regarding their requests. In this case, the researcher or scientist concerned is not allowed to sit on the Science Council while the request is being considered.

In addition, the Council can carry out occasional, specific tasks at the request of the Board of Directors.

The Foundation's scientific personnel can be invited by the President of the Science Council to participate in the Science Council's work, with consultative voting rights.

These operating rules are laid down in the Internal Regulations.

Article 7: Unpaid membership and reimbursement of expenses

The functions of members of the Board of Directors, Bureau and Science Council are unpaid.

Expenses can only be reimbursed on presentation of supporting documents, within the conditions laid down by the Board of Directors, and according to the terms and conditions defined by the Internal Regulations.

III - Powers

Article 8: General Powers of the Board of Directors

Through its deliberations, the Board of Directors regulates the operations of the Foundation.

In particular:

1. It finalises the Foundation's action programme;
2. It adopts the Foundation's annual status and financial report submitted by the Bureau ;
3. It votes the budget proposed by the Bureau, and any modifications, together with provisions in terms of personnel;
4. It receives, deliberates and approves the financial statements for the closed fiscal year, presented to it by the Treasurer with the accompanying supporting documents;
5. It adopts the Internal Regulations proposed by the Bureau;
6. It accepts donations and bequests, and authorises, beyond the scope of day-to-day management, the acquisition and transfer of tangible and intangible assets, public contracts, leases and rental contracts, the establishment of mortgages and loans, and the securities and guarantees accorded in the name of the Foundation;
7. It designates one or more statutory auditors chosen from the list provided in Article L. 822-1 of the French Commercial Code;
8. It sets the conditions for the appointment and remuneration of personnel;
9. It is kept informed by the President of any draft agreement involving the Foundation and deliberates with regard to any agreements falling within the scope of Article L. 612-5 of the French Commercial Code; in this case, it pronounces its decision without the person concerned being present.

The Board of Directors can create one or more committees charged with assisting it in any of the actions carried out by the Foundation. Their powers, structure and operating rules are laid down in the Internal Regulations.

It can permanently delegate to the Bureau, within the limit of a total that it determines, the authorisation to acquire and transfer tangible and intangible assets, and accept donations and bequests, with the latter responsible for reporting on these activities at each meeting of the Board of Directors.

The Bureau compiles the information concerning all issues submitted to the Board of Directors and provides for the execution of its decisions.

Article 9: President, Treasurer, and Director General

The President of the Foundation is elected by the Board of Directors, by majority vote of its members.

The President represents the Foundation in all civil acts. He/she oversees expenses. He/she can delegate authority within the scope of the conditions laid down in the Internal Regulations.

The President can only be legally represented by an authorised proxy acting pursuant to a special mandate. However, the President can grant the Director General a general mandate to represent the Foundation in litigation concerning day-to-day management, within the scope of the conditions laid down in the Internal Regulations.

After consulting the Board of Directors, the President appoints the Director General of the Foundation, and can terminate the Director General's mandate under the same conditions.

The Director General of the Foundation directs the departments of the Foundation and ensures that they operate correctly. He/she is delegated by the President all the powers required for carrying out his/her mission. He/she attends ex-officio the meetings of the Board of Directors and Bureau, with

consultative voting rights. He/she is given a job contract in compliance with the rules and regulations in force in France.

The Treasurer registers receipts and settles expenses, or has it done under his/her supervision.

The representatives of the Foundation must have full exercise of their civil rights.

Article 10: Transfer of assets - acceptance of donations and bequests

With the exception of operations regarding the day-to-day management of the funds comprising the endowment, the deliberations of the Board of Directors regarding the transfer of the tangible and intangible assets comprising the endowment fund are only valid after administrative approval. The same condition applies to the Board's deliberations concerning the establishment of mortgages or loans.

The deliberations of the Board of Directors with regard to the acceptance of donations and bequests must comply with the requirements defined by Article 910 of the French Civil Code and any other text applicable under the abovementioned article.

IV – Endowment fund and resources

Article 11: Composition of the endowment fund

The endowment fund consists of:

The Tour du Valat Estate, in the Camargue, made up of the initial donation of the estate by Luc Hoffmann 15 November 1978, with a surface area of 1501 ha, evaluated at the time of the donation at fifteen million French francs (15 000 000 FF), i.e. two million two hundred and eighty-six thousand seven hundred and thirty-five euros and twenty-six centimes (2 286 735.26 €), together with the additions to the estate made since that date (with an acquisition value of two million six hundred and one thousand five hundred and ninety euros (2 6015 90 €), extending its surface area to 2547 ha 60 a 08 ca, which also include the work and accommodation facilities, and a livestock herd.

The endowment is increased by the gifts authorised without particular attribution plus a fraction of the surplus of the annual resources required to maintain its value. Its absolute value can be increased by means of a decision of the Board of Directors.

Article 12: Investment of endowment funds

The endowment funds are invested in securities, which may or may not be listed on an official stock exchange in France or abroad, in negotiable debt securities, in fungible Treasury bonds (OATs), in property required for the aims of the Foundation, or in income property.

Article 13: Resources

The Foundation's annual resources consist of:

1. The income derived from the endowment;
2. The subsidies and financial aids of all kinds that it is granted;
3. The donations it is authorised to use, including in particular the income from sponsorships by organisations or private individuals;
4. The resources created on an exceptional basis, if they take place, with the agreement of the proper authority;
5. The sales and compensations received for services rendered.

Within six months of the end of each financial year, the Foundation establishes annual financial statements certified by a statutory auditor in compliance with accounting rule 99-01 laid down on 16th February 1999 by the French accounting regulation committee with regard to the terms and conditions for the establishment of the annual financial statements of associations and foundations, homologated by inter-ministerial decree on 8th April 1999.

V - Modification of the Statutes and Dissolution

Article 14: Modification of the Statutes

The Statutes can only be modified after two deliberations of the Board of Directors held at least two months apart, voted by a three-quarters majority of the current members.

However, only one deliberation is required when a modification is decided unanimously by the current members.

Article 15: Dissolution

The Foundation is dissolved by decision of the Board of Directors or in the event of its recognised public benefit status being revoked.

The Board of Directors then designates one or more statutory auditors to carry out the liquidation of the Foundation's assets, to whom it confers all the powers required to accomplish that mission. The Board of Directors attributes the net assets to one or more analogous establishments, either public or of recognised public benefit, or to one or more establishments covered by Article 6 Paragraph 5 of the amended French Law of 1st July 1901.

These deliberations are addressed without delay to the French Interior Minister, Minister of the Environment and Sustainable development, and Minister of Research.

In the event of the Board of Directors not taking the measures indicated above, those measures will be taken by decree. Funds, securities and archives belonging to the Foundation will be validly withdrawn from their holders by the statutory auditor designated by the above-mentioned decree.

Article 16: Government approval

The deliberations of the Board of Directors mentioned in Articles 14 and 15 of the Statutes are only valid after approval by the French Government.

VI - Inspection and Internal Regulations

Article 17: Inspection

The annual report, provisional budget, and accounting documents mentioned in Article 13 of the Statutes are sent every year to the Prefect of the Bouches-du-Rhône Department, French Interior Minister, Minister of the Environment and Sustainable development, and Minister of Research.
The Interior Minister, Minister of the Environment and Sustainable development, and Minister of Research have the right to send delegates to visit the various departments depending on the Foundation in order to inspect the way they are operated.

Article 18: Internal Regulations

Internal Regulations specifying the terms and conditions for applying the Statutes are drawn up in compliance with Article 8 of the Statutes. They can only come into force or be modified after approval by the French Interior Minister.

These Internal Regulations are transmitted to the Prefecture of the Bouches-du-Rhône Department.

Arles, 9 June 2008

Jean-Paul Taris
President

Règlement intérieur

Article 1 : Objet du Règlement Intérieur
Le présent Règlement Intérieur a pour objet de compléter les dispositions des statuts de la Fondation "Tour du Valat", reconnue d'utilité publique, afin de préciser, entre les fondateurs, certaines modalités internes de son fonctionnement.
Il ne saurait créer de dispositions dont le principe ne figurerait pas dans les statuts de la Fondation reconnue d'utilité publique.

Article 2 : Membres du Conseil d'administration de la Fondation
Les modalités de désignation des membres du Conseil d'administration sont stipulées à l'article 3 des statuts de la Fondation.
Le mandat des membres du collège des fondateurs est indéfiniment renouvelable. Le renouvellement se fait exclusivement au sein de leur collège, à l'unanimité de ses membres.
Le mandat des membres du collège des personnalités qualifiées n'est renouvelable immédiatement qu'une fois. Le renouvellement se fait à la majorité simple, par un vote à main levée.
Pour ces deux collèges, les mandats sont renouvelés par moitié tous les deux ans, lors du premier renouvellement, les noms des membres sortants sont désignés par tirage au sort.

Article 3 : Participation aux réunions du Conseil d'administration
Les membres du Conseil d'administration autres que les membres de droit sont tenus d'assister personnellement aux séances du conseil. En cas d'empêchement d'assister à l'une d'elles, un membre peut donner son pouvoir à un autre par écrit en utilisant le formulaire mis à sa disposition par le secrétariat de la Fondation. Le pouvoir doit parvenir au secrétariat au plus tard trois jours avant la tenue de la réunion.

Au bout de trois absences consécutives sans motif valable, un membre du collège des personnalités qualifiées sera considéré comme démissionnaire. Mention en sera faite dans le procès-verbal de la réunion au cours de laquelle aura été constatée cette démission. Le bureau de la Fondation signifiera cette décision à la personne concernée par courrier recommandé.

Article 4 : Convocation du Conseil d'administration
Le Président convoque le Conseil d'administration un mois avant la tenue de la réunion. Cette convocation peut être faite par tout moyen écrit.

La documentation relative à l'ordre du jour de la réunion est envoyée aux membres du Conseil d'administration au moins quinze jours avant la tenue de la réunion.

Lors de sa réunion le Conseil d'administration ne peut délibérer valablement que si la moitié plus un des membres est présente ou représentée. Si ce quorum n'est pas atteint, le Président doit ajourner la réunion.
Il convoque alors les membres du Conseil d'administration à une réunion qui ne saurait se tenir moins d'une semaine après la date initiale.
Le Conseil d'administration peut alors valablement délibérer si le tiers au moins de ses membres est présent ou représenté.

Article 5 : Frais exposés par les membres du Conseil d'administration
Le remboursement des frais exposés par les membres du Conseil d'administration se fait sur la foi de factures adressées à la comptabilité au plus tard trois mois après leur établissement.

Article 6 : Bureau de la Fondation
Le Bureau de la Fondation est élu par le Conseil d'administration à la majorité de ses membres. Le mandat des membres du Bureau est indéfiniment renouvelable.
Les fonctions de membre du Bureau sont gratuites, seuls les frais exposés à l'occasion de ses travaux pouvant être remboursés dans les conditions stipulées à l'article 5 du présent Règlement Intérieur.

Les experts se joignant aux travaux du Bureau pourront, le cas échéant, percevoir une juste rémunération de leurs offices.

Article 7 : Président de la Fondation
Le Président de la Fondation reçoit du Conseil d'administration une délégation générale en ce qui concerne l'élaboration de la stratégie de la fondation. Cela concerne tant la stratégie générale nationale et internationale, que la stratégie de communication.
Conformément à l'article 9 des statuts, il représente la Fondation dans tous les actes de la vie civile. Il peut notamment la représenter dans tout litige de nature contractuelle, dans tout litige avec des tiers affectant ou susceptible d'affecter un immeuble de la Fondation, ainsi que pour la constitution de partie civile à l'occasion d'infractions aux législations et règlementations, tant nationales qu'internationales, dans le domaine de la protection de la nature et de l'environnement. Dans ces matières il peut décider de donner une délégation au Directeur Général de la Fondation.

Article 8 : Directeur Général de la Fondation
Le Directeur Général de la Fondation est nommé par le Président après approbation du Conseil d'administration. Il est révoqué en cas de faute, d'incapacité ou d'inadaptation à ce poste dans les mêmes conditions.
Conformément à l'article 9 al 4 des statuts, il dispose d'une délégation du Président pour assurer le fonctionnement de la Fondation. Il est notamment pleinement responsable de:

- La mise en œuvre de la stratégie de la Fondation,
- La gestion interne de la Fondation,
- La politique de recherche de fonds et de demande de subventions dans l'exécution du programme approuvé par le Conseil d'administration.
  Toutefois ses pouvoirs se trouvent limités dans les cas suivants:
- Tout engagement de dépense de la Fondation pour un montant supérieur à 25 000 € (vingt-cinq mille euros) doit être cosigné par le Président, à l'exception des versements sociaux et fiscaux,
- En matière de stratégie générale, tant nationale qu'internationale, et de stratégie de communication, le Directeur Général agit sous le contrôle du Président de la Fondation,
- Il ne peut représenter juridiquement la Fondation que selon les modalités suivantes:
  - Concernant tous les actes de la gestion courante, il bénéficie de la part du Président d'une délégation générale,
  - Concernant les faits exceptionnels, il ne pourra représenter la Fondation que sur délégation expresse du Président

Les frais exposés par le Directeur Général dans l'exercice de son mandat sont imputés sur une ligne "Direction Générale" inscrite au budget de la Fondation.

Article 9 : Conseil scientifique de la Fondation
La composition et les attributions du Conseil scientifique sont stipulées à l'article 6 des statuts de la Fondation.
Les membres du Conseil scientifique sont renouvelés par moitié tous les 2 ans. Lors du premier renouvellement, les noms des membres sortants sont désignés par tirage au sort. Le mandat des membres du Conseil scientifique ne peut être immédiatement renouvelé qu'une fois.
Le Conseil scientifique ne peut valablement délibérer que si la majorité de ses membres sont présents ou représentés. Si le quorum n'est pas atteint, son Président doit ajourner la réunion.
Il convoque alors les membres du Conseil scientifique à une réunion qui ne saurait se tenir moins d'une semaine après la date initiale.
Le Conseil peut alors valablement délibérer si le tiers au moins de ses membres est présent ou représenté.
Lors de ses délibérations, le Conseil scientifique adopte les recommandations à faire au Conseil d'administration à la majorité de ses membres.
Les membres du Conseil scientifique pourront, le cas échéant, percevoir une juste rémunération de leurs offices.

Article 10 : Comités ad hoc
Le Conseil d'administration de la Fondation peut, conformément à l'article 4 al 2 des statuts, autoriser le bureau à s'adjoindre tout comité d'experts nécessaire à l'exercice de sa mission.
La délibération autorisant le bureau à créer un comité est prise à la majorité des membres du Conseil d'administration.

Arles, le 1er août 2006

Composition et termes de référence des organes de gouvernance et de management

Conseil d'Administration

Composition

Luc Hoffmann	*Président d'honneur, invité permanent*

Collège des fondateurs

André Hoffmann	*Président par intérim*
Maja Hoffmann	
Vera Michalski	
Isabel Hoffmann	

Collège des membres de droit

Le représentant le Ministère de l'Intérieur
Le Représentant le Ministère de l'Enseignement Supérieur et de la Recherche
Le représentant le Ministère de l'Ecologie, du Développement Durable, et de l'Energie (MEDDE)
Le Maire d'Arles

Collège des personnalités qualifiées

Lucien Chabason	
Antonio Troya	*Trésorier*
Tobias Salathé	
Thymio Papayannis	*Secrétaire*

Termes de référence

La Fondation est administrée par un Conseil composé de 12 membres dont quatre au titre du collège des fondateurs, quatre au titre du collège des membres de droit, quatre au titre du collège des personnalités qualifiées qui comprend des personnes choisies en raison de leur compétence dans le domaine d'activité de la Fondation et plus particulièrement celui de la recherche. Monsieur Luc Hoffmann, fondateur de la Fondation n'étant plus membre du collège des fondateurs, exercera néanmoins les fonctions de Président d'Honneur à vie de la Fondation. Le Conseil se réunit une fois tous les six mois.

A l'exception des membres de droit, les membres du Conseil sont nommés pour une durée de quatre années et renouvelés par moitié tous les deux ans. Le mandat des membres du collège des fondateurs est indéfiniment renouvelable. Le mandat des membres du collège des personnalités qualifiées n'est renouvelable immédiatement qu'une fois.

Le Conseil d'Administration arrête le programme d'action de la Fondation sur avis du Conseil Scientifique et adopte le rapport qui lui est présenté annuellement par le Bureau sur la situation morale et financière. Sur proposition du Bureau, il vote le budget ainsi que les prévisions en matière de personnel. Il arrête les comptes de l'exercice qui lui sont présentés par le trésorier. Il accepte les dons et les legs et autorise, en dehors de la gestion courante, les acquisitions et cessions de biens mobiliers et immobiliers, les marchés, les baux et les contrats de location, la constitution d'hypothèques et les emprunts ainsi que les cautions et garanties accordées au nom de la Fondation;
Il désigne un ou plusieurs commissaires aux comptes. Il fixe les conditions de recrutement et de rémunération du personnel.

Conseil Scientifique

Composition

Dr Patrick Dugan	*Président*
Dr Patrick Duncan	
Dr Jean-Dominique Lebreton	
Pr Jean-Claude Lefeuvre	
Prof. Laurent Mermet	
Pr William Sutherland	

Termes de référence

La Fondation est dotée d'un Conseil Scientifique composé d'au moins quatre personnalités scientifiques françaises ou étrangères, qualifiées dans le domaine d'activités de la Fondation. Les membres du Conseil Scientifique sont nommés par le Conseil d'Administration sur proposition du Président de la Fondation. Le Conseil Scientifique désigne l'un de ses membres comme candidat à sa présidence, et soumet sa candidature à l'acceptation du Conseil d'Administration. Le Président du Conseil Scientifique est alors invité permanent du Conseil d'Administration de la Fondation, sans droit au vote. Le Conseil Scientifique de la Fondation se réunit au moins une fois par an, sur convocation du Président de la Fondation.

Le mandat des membres du Conseil Scientifique est de quatre ans. Il ne peut être immédiatement renouvelé qu'une fois.

Le Conseil Scientifique émet et rend un avis au Conseil d'Administration sur le programme d'action pluriannuel. Il valide les orientations de ce programme en amont et établit un bilan annuel de ces actions. Lorsque les moyens d'action de la Fondation comprennent le financement de fonds propres pour des équipes ou à des chercheurs, il émet un avis sur leurs demandes. Dans ce cas, le chercheur ou le scientifique intéressé ne peut siéger au Conseil lors de l'examen de la demande. Sur invitation du Président du Conseil Scientifique, les personnels scientifiques de la Fondation peuvent être invités à participer aux travaux du Conseil Scientifique avec voix consultative.

Bureau

Composition

Luc Hoffmann	*Président d'honneur*
André Hoffman	Président par intérim
Antonio Troya	Trésorier
Thymio Papayannis	Secrétaire

Termes de référence

Le Conseil d'Administration élit en son sein, à la majorité des membres, un Président. Le Conseil désigne également un Bureau qui comprend, outre le Président, un Vice-président, un Trésorier et un Secrétaire. Le Bureau peut s'adjoindre dans l'exercice de ses missions la collaboration d'un ou de plusieurs experts reconnus dans le domaine de la conservation de l'environnement et du management d'entreprise. Le Bureau se réunit au moins trois fois par an sur convocation de son Président.

Le Bureau est élu pour une durée de deux années. Le mandat du Président est également de deux ans, il est indéfiniment renouvelable.

Le Bureau instruit toutes les affaires soumises au Conseil d'administration, et pourvoit à l'exécution de ses délibérations. Il peut recevoir du Conseil d'Administration une délégation permanente pour les

cessions et les acquisitions de biens mobiliers et immobiliers ainsi que pour l'acceptation des donations et des legs, à charge pour lui d'en rendre compte à chaque réunion du Conseil.

Le Président reçoit du Conseil d'Administration une délégation générale en ce qui concerne l'élaboration de la stratégie de la Fondation, tant la stratégie générale nationale et internationale, que la stratégie de communication. Il représente la Fondation dans tous les actes de la vie civile. Il ordonnance les dépenses. Il peut donner délégation dans les conditions définies par le Règlement Intérieur.

Comité de Direction, Comité de Gestion

Composition

CODI (COmité de DIrection)

Le Président par intérim, invité permanent	M. André Hoffmann
Le Directeur Général	M. Jean Jalbert
Le Directeur des Programmes	M. Patrick Grillas
Le Directeur Administratif et Financier	M. Jean-Jacques Bravais
Le Directeur du Domaine	M. Olivier Pineau

COGES (COmité de GEStion)

Le Directeur Général	M. Jean Jalbert
Le Directeur des Programmes	M. Patrick Grillas
Le Directeur Administratif et Financier	M. Jean-Jacques Bravais
Le Directeur du Domaine	M. Olivier Pineau
Le Chef du département « Espèces »	M. Arnaud Béchet
Le Chef du département « Ecosystèmes »	Mme Brigitte Poulin
Le Chef du département « Observatoire »	M. Patrick Grillas
La Chargée de Communication	Mme Coralie Hermeloup

Termes de référence

CODI

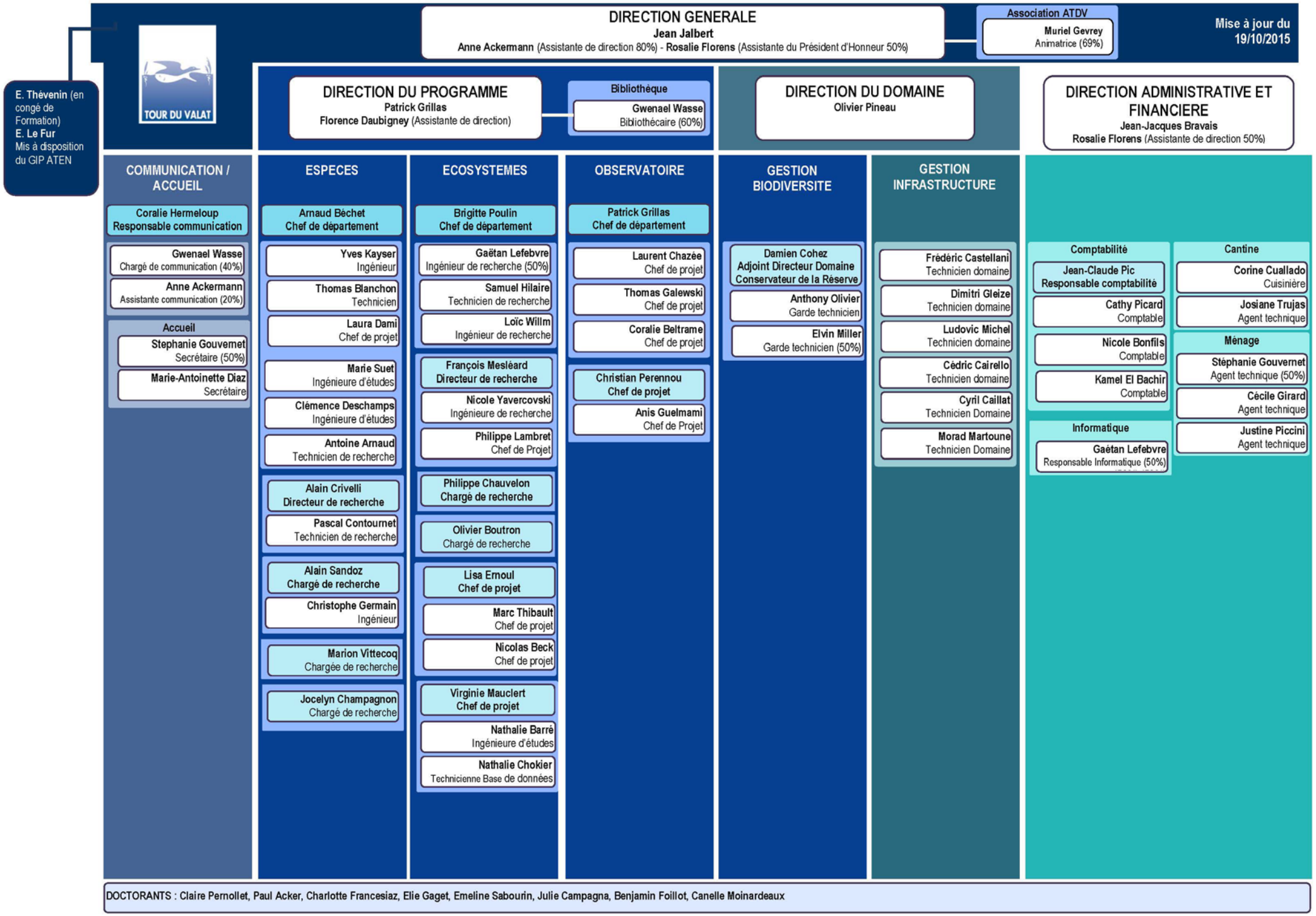
Il est composé du Directeur Général, du Directeur scientifique, du Directeur du domaine et du Directeur administratif et financier. Le Président est invité permanent. L'assistante du Directeur Général assiste aux réunions et rédige les comptes rendus. Le CODI peut être ouvert au besoin à d'autres personnes.
Le rythme des réunions est adapté aux grands rendez-vous stratégiques de l'année : augmentations salariales en janvier/février et préparation des Bureaux et Conseil d'Administration. Un calendrier est établi en début d'année. Le CODI peut également se réunir à la demande d'un ou plusieurs de ses membres.

Le CODI veille à la mise en œuvre de la stratégie définie par le Conseil d'Administration. Il s'assure de la planification des tâches opérationnelles à effectuer au sein des différents services. Il impulse l'application des préconisations dictées par le Conseil d'Administration et le Bureau et définit les moyens et les délais pour y parvenir. Il élabore les propositions en réponse aux recommandations formulées en conseil de Fondation.

COMITE DE GESTION

Le Comité de Gestion est composé des membres du CODI auxquels s'ajoutent les chefs de département et le/la responsable de la communication. Toutefois le Directeur Général peut à tout moment décider d'y intégrer ou inviter d'autres membres du personnel en fonction de l'ordre du jour. La fréquence de ses réunions est bimensuelle.
Le Comité de Gestion se voit attribuer un certain nombre de fonctions qui sont en prise directe avec les équipes opérationnelles :

- Il est l'organe de coordination des programmes. Tous les membres du Comité de gestion, ainsi que les responsables de projets, alimentent l'ordre du jour avec des propositions d'amélioration des programmes et du fonctionnement de la Tour du Valat.
- Il assure la liaison entre la direction et les équipes, chaque membre ayant pour mission de transmettre l'information ascendante et descendante.
- Il est un organe consultatif saisi par le CODI sur toutes les décisions relevant du management. A cet effet il donne son avis sur les questions traitées en CODI auxquelles il peut apporter des solutions alternatives sous réserve que celles-ci reçoivent l'approbation du directeur général et s'inscrivent dans les lignes directrices tracées par le conseil.


TOUR DU VALAT
DIRECTION GENERALE
Jean Jalbert
Anne Ackermann (Assistante de direction 80%) - Rosalie Florens (Assistante du Président d'Honneur 50%)
Association ATDV
Muriel Gevrey
Animatrice (69%)
Mise à jour du 19/10/2015
E. Thévenin (en congé de Formation)
E. Le Fur
Mis à disposition du GIP ATEN
DIRECTION DU PROGRAMME
Patrick Grillas
Florence Daubigney (Assistante de direction)
Bibliothèque
Gwenael Wasse
Bibliothécaire (60%)
DIRECTION DU DOMAINE
Olivier Pineau
DIRECTION ADMINISTRATIVE ET FINANCIERE
Jean-Jacques Bravais
Rosalie Florens (Assistante de direction 50%)
COMMUNICATION / ACCUEIL
Coralie Hermeloup
Responsable communication
Gwenael Wasse
Chargé de communication (40%)
Anne Ackermann
Assistante communication (20%)
Accueil
Stephanie Gouvernet
Secrétaire (50%)
Marie-Antoinette Diaz
Secrétaire
ESPECES
Arnaud Béchet
Chef de département
Yves Kayser
Ingénieur
Thomas Blanchon
Technicien
Laura Dami
Chef de projet
Marie Suet
Ingénieure d'études
Clémence Deschamps
Ingénieure d'études
Antoine Arnaud
Technicien de recherche
Alain Crivelli
Directeur de recherche
Pascal Contournet
Technicien de recherche
Alain Sandoz
Chargé de recherche
Christophe Germain
Ingénieur
Marion Vittecoq
Chargée de recherche
Jocelyn Champagnon
Chargé de recherche
ECOSYSTEMES
Brigitte Poulin
Chef de département
Gaëtan Lefebvre
Ingénieur de recherche (50%)
Samuel Hilaire
Technicien de recherche
Loïc Willm
Ingénieur de recherche
François Mesléard
Directeur de recherche
Nicole Yavercovski
Ingénieure de recherche
Philippe Lambret
Chef de Projet
Philippe Chauvelon
Chargé de recherche
Olivier Boutron
Chargé de recherche
Lisa Ernoul
Chef de projet
Marc Thibault
Chef de projet
Nicolas Beck
Chef de projet
Virginie Mauclert
Chef de projet
Nathalie Barré
Ingénieure d'études
Nathalie Chokier
Technicienne Base de données
OBSERVATOIRE
Patrick Grillas
Chef de département
Laurent Chazée
Chef de projet
Thomas Galewski
Chef de projet
Coralie Beltrame
Chef de projet
Christian Perennou
Chef de projet
Anis Guelmami
Chef de Projet
GESTION BIODIVERSITE
Damien Cohez
Adjoint Directeur Domaine
Conservateur de la Réserve
Anthony Olivier
Garde technicien
Elvin Miller
Garde technicien (50%)
GESTION INFRASTRUCTURE
Frédéric Castellani
Technicien domaine
Dimitri Gleize
Technicien domaine
Ludovic Michel
Technicien domaine
Cédric Cairello
Technicien domaine
Cyril Caillat
Technicien Domaine
Morad Martoune
Technicien Domaine
Comptabilité
Jean-Claude Pic
Responsable comptabilité
Cathy Picard
Comptable
Nicole Bonfils
Comptable
Kamel El Bachir
Comptable
Informatique
Gaëtan Lefebvre
Responsable Informatique (50%)
Cantine
Corine Cuallado
Cuisinière
Josiane Trujas
Agent technique
Ménage
Stéphanie Gouvernet
Agent technique (50%)
Cécile Girard
Agent technique
Justine Piccini
Agent technique
DOCTORANTS : Claire Pernollet, Paul Acker, Charlotte Francesiaz, Elie Gaget, Emeline Sabourin, Julie Campagna, Benjamin Foillot, Canelle Moinardeaux

Plan de gestion des risques

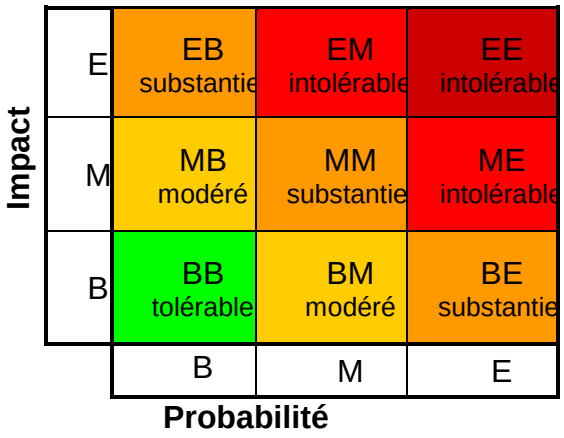
Rappel :

Estimation du niveau de risque

Il repose sur deux critères :

Impact **= effet si le risque se réalisait : BAS : peu d'impact sur la Tour du Valat**
MOYEN : le risque aurait un impact réel sur la Tour du Valat
ELEVE : le risque mettrait en péril la Tour du Valat

Probabilité **= vraisemblance du risque : BAS : 30% ou - de chance que le risque se concrétise**
MOYEN : 31-70% de chance que le risque se concrétise
ELEVE : + de 70% de chance que le risque se concrétise



1. Risques dont l'origine et les solutions relèvent du management (concerne exclusivement la Fondation Tour du Valat)

1.1. Risques traités par le « document unique d'évaluation des risques professionnels »

Catégorie d risques	N°	Description du risq	Estimation d risque 2006	2015	Respor sable	Actions préventives	Mesures curatives	Observations pour la période avril 14 - avril 15
RH	1.1.1	Accidents aux personnes	MM	MM	OMP	Prévention (Trousses de secours, personnes formées en secourisme, procédures d'évacuation établies…)	Mise en œuvre des mesures prévues dans le document unique	Formation d'une équipe permanente de secouristes + autres staffs faite en 2014
Infra-structur	1.1.2	Incendie	EB	EB	OMP	Prévention (extincteurs + lance incendies installés et fonctionnels, procédures établies…)	Mise en œuvre des mesures prévues dans le document unique	Révision des matériels de lutte contre l'incendie Formation incendie prévue en 2015

1.2. Autres risques

Catégorie de risques	N°	Description du risque	Estimation du risque 2006	Estimation du risque 2015	Responsable	Actions préventives	Mesures curatives	Observations pour la période avril 14 - avril 15
Financier	1.2.1	Réduction des financements sur convention externe	EE	ME	JJ	Action pro-active de diversification des bailleurs de nos projets, incluant quelques « gros » projets	Redéfinir le plan de financement de la TdV et/ou réduire les dépenses en conséquence	Risque élevé en 2015 de baisse des bailleurs institutionnels français. Cependant, les efforts des années passées pour sécuriser la contribution des bailleurs institutionnels et développer le recours au mécénat nous a permis d'étoffer notre carnet de commande et les perspectives pour 2015 sont bonnes.
	1.2.2	Réduction forte du soutien de la MAVA (liée à une qualité du programme jugée insuffisante)	EM	EB	JJ	Grande attention aux attentes de la MAVA et à la qualité des projets qui lui sont soumis	Reconsidérer la stratégie et le programme au regard des critiques de la MAVA	Dialogue engagé sur la "niche" de la Tour du Valat dans la perspective de cessation d'activité de la MAVA en 2022, à poursuivre en 2015.
	1.2.3	Equilibre des budgets annuels non atteint	EM	EM	JJB	Gestion rigoureuse du budget par la comptabilité et les opérationnels	Redéfinir les termes d'un équilibre budgétaire et ses conséquences	Risque limité pour 2015 du fait d'une prévision de dépenses stables et de bonnes perspectives de recettes extérieures. Incertitude cependant sur la poursuite du financement de certains projets (MEDDE, AFD).
	1.2.4	Non maîtrise des activités et de leur croissance, dispersion	MM	MM	JJ	Choix stratégiques clairs et partagés ; planification et suivi optimisés	Suppression « autoritaire » de certaines activités	Assez bonne maîtrise des activités, mais choix d'aller chercher des contrats hors de notre "cœur de cible" (ex : GlobWetlands Africa)
Opéra-tionn	1.2.5	Panne du système informatique		EM	JJB	Structuration et optimisation continue de notre système informatique	Compétence et réactivité en interne et de nos prestataires	Plusieurs pannes Internet pénalisantes en 2014. Interrogations sur la structuration et l'évolutivité de notre système informatique. Audit envisagé en 2016.

	1.2.6	Perte de données stratégiques	EM	EM	JJB	Procédures de sauvegarde informatique adaptées et mises en œuvre. Systèmes de pare-feu et anti-virus adaptés et mis à jour	Aucune ; tout réside dans la prévention	Investissement dans un nouveau système de sauvegarde en 2015
	1.2.7	Perte de qualité et de rendement scientifique	EM	EM	PG	Compenser la baisse d'effectif des chercheurs par des thésards et post-docs ; renforcer les partenariats avec les étab^{ts} de recherche ; établir des objectifs annuels de production scientifique	Redéploiement du staff sur les profils requis	Faible nombre de doctorants ; une relance est en cours notamment sur les ½ bourses TdV mais il doit être poursuivi et prolongé au-delà de ces cofinancements. Recherche active de partenariats scientifiques et financiers en cours. Bonnes perspectives avec le CNRS / INEE
	1.2.8	Dégradation des infrastructures		EM	OMP	Anticiper et programmer le renouvellement ou la mise aux normes des infrastructures sensibles (électricité et réseaux divers, bâtiments)	Effectuer les réparations nécessaires dans les meilleurs délais afin de limiter les impacts sur l'activité.	2 pannes électriques impactant fortement notre activité ont eu lieu cette dernière année du fait de la vétusté de la ligne électrique nous appartenant. La dernière section devrait être remplacée en 2016.
	1.2.9	Falsification de données scientifiques	EB	EB	PG	Suivi et validation par des personnes qualifiées des protocoles et publications scientifiques	Se défaire de la personne incriminée	RAS
Juridiques	1.2.10	Ecart majeur entre l'objet social de la fondation et les activités	EM	EB	JJ	Exercer une vigilance quant à nos activités au regard de notre statut	Limiter / stopper certaines activités présentant un risque juridique ou changer de statut pour permettre certaines activités indispensables à l'équilibre financier	RAS
	1.2.11	Non-respect des règles de transparences financières	EB	EB	JJB	Procédures agréées par le Commissaire aux comptes et suivies	Redéfinir les procédures ; se défaire de la personne incriminée	RAS

RH	1.2.1	Manque d'adéquation entre la mission de la TdV et les profils et qualifications du personnel	EM	EB	JJ	Profiter du turn over spontané du staff pour recruter les nouveaux profils souhaités ; soin dans les recrutements (TdR très clairs, ne pas hésiter à relancer un recrutement insatisfaisant…)	Promouvoir le turn over du staff -> nouveaux profils adaptés (peu de possibilités d'impulser ou de maîtriser ce turn over)	Bonne adéquation des compétences aux besoins lors des recrutements récents, en particulier de deux jeunes chercheurs prometteurs : Marion Vittecoq et Jocelyn Champagnon
	1.2.1	Clivage entre activités, services	MM	MM	JJ	Animation transversale des activités de la Station ; renforcement de la « culture TdV »	Animation transversale des activités de la Station ; renforcement de la « culture TdV »	Animation inter-service et synergies entre chefs de départements à poursuivre en 2015
	1.2.1	Perte d'éléments clés	MM	MM	JJ	Politique RH incitative pour attirer et garder les personnels clés	Pas de mesure curative ; retrouver une perle rare…	Michel Gauthier-Clerc, parti en 2013, est remplacé par 2 chercheurs juniors à très bon potentiel. Retraite d'Alain Crivelli probablement fin 2015. Le recrutement d'un jeune chercheur sur un profil "poissons" est programmé.
	1.2.1	Démotivation du personnel	MM/E	MB	JJ	Maintenir le plaisir et la fierté de travailler à la TdV (objectifs mobilisateurs, résultats probants, attention portée aux individus, gestion du temps pas trop en flux tendu…); renforcer la « culture TdV » ; Politique RH incitative (progression de carrière, salaires…)	Idem	Bon état d'esprit et forte motivation générale. Dialogue social constructif avec le CE et le syndicat. Préoccupation du personnel quant à l'évolution de la situation financière, en particulier dans la perspective de la cessation d'activité de la Fondation MAVA en 2022.

2. Risques dont l'origine est externe et dont les solutions relèvent principalement du management (concerne exclusivement la Fondation Tour du Valat)

Catégorie de risques	N°	Description du risque	Estimation du risque 2006	Estimation du risque 2015	Responsable	Actions préventives	Mesures curatives	Observations pour la période avril 14 - avril 15
Environnementaux	2.1	Submersion liée aux crues du Rhône	EB	EB	OMP	Pas de mesures spécifiques à la TdV ; Participation au « Plan Rhône » (rendre un espace de liberté au Rhône en préservant les biens et les personnes)	Evacuation temporaire	Les travaux du Plan Rhône sont basés sur des digues submersibles : inondation lente et laminaire, moins impactante qu'une rupture de digue
Financiers	2.2	Baisse des crédits destinés à la recherche et à l'environnement : incapacité à financer le staff "recherche" sur des activités de recherche	MM	MM	PG	Réduire la dépendance du staff "recherche" vis à vis de financements externes (moins de CDI, plus de CDD post-doc et thèses, plus facilement finançables)	Baisser l'objectif de financement ext. des activités de recherche ou orienter les chercheurs vers des activités rémunératrices hors recherche	Divers succès à des appels à projets de recherches ont permis d'obtenir de bons taux de financement pour 2014 et 2015. En revanche, nous sommes en deçà du nombre de doctorants que nous nous sommes fixé, faute de financements.
Communication	2.3	Conflits locaux (chasseurs, salins,…)	MM	MM	Président	Entretenir un relationnel aussi étroit que possible avec les responsables et « la base »	Communication de crise, à destination des principaux acteurs locaux	Chasse : Arrêt de la procédure judiciaire engagée par la Fédé des chasseurs 13 sur la régulation des sangliers. Relations positives rétablies avec le GCA Riziculteurs : Grande sensibilité liée à la réforme de la PAC défavorable au riz et aux pollutions agricoles de l'eau. Dialogue permanent avec le Président du syndicat des riziculteurs, mais certains s'en prennent aux acteurs de l'environnement.

3. Risques dont l'origine est externe et dont les solutions relèvent principalement des organes de gouvernance

Catégorie de risques	N°	Description du risque	Estimation du risque 2006	Estimation du risque 2015	Responsable	Actions préventives	Mesures curatives	Observations pour la période avril 14 - avril 15
Financiers	3.1	Réduction forte du soutien de la MAVA (indépendamment de la qualité du programme soumis par la TdV)	EM	EM	CA MAVA, Famille Hoffmann	Augmenter la flexibilité structurelle, diversifier les sources de financement	Redéfinir le plan de financement et/ou réduire les dépenses en conséquence	Dialogue engagé avec la MAVA en 2014 sur la "stratégie de durabilité financière" de la TdV dans la perspective de la cessation d'activité de la MAVA en 2022
	3.2	Objectif de rendement du capital Pro Valat non atteint	MM	ME	Board Pro Valat	Augmenter la flexibilité structurelle, diversifier les sources de financement	Redéfinir le plan de financement et/ou réduire les dépenses en conséquence	Rendement moyen de 2,8% sur la période 2005-2012 (0% en 2014), loin des 6% escomptés et inférieurs aux prélèvements, pourtant modérés (équivalent à un rendement de 3,6%)
Juridique	3.3	Responsabilité civile et pénale du Président de la Fondation en cas de manquements à la législation	EB	EB	Président	Appliquer les législations en vigueur	Avoir un bon avocat	RAS
Gouvernan-	3.4	Crise au sein des organes des gouvernances, CA, Bureau, CS	EB	EB	CA TdV, Famille Hoffmann	Statuts et termes de référence des organes de gouvernance clairs et validés	Reprise en main par le Président, voire révocation de membres (Art. 3 des statuts) ou démission collective puis refondation (non prévu dans les statuts)	RAS

	3.5	Disparition soudaine de membres de la famille Hoffmann impliqués dans la gouvernance	EB	EB	Famille Hoffmann	Anticiper la communication de crise	Nouveau partage des responsabilités et mandats au sein de la famille	RAS
	3.6	Empêchement ou disparition d'autres personnes clés de la gouvernance		MM	CA TdV	Partager et conserver les informations	Remplacement à partir d'une liste de candidats actualisée régulièrement	Jean-Paul a été empêché d'exercer pleinement ses fonctions de Président, mais sans conséquences particulières en termes de gouvernance, André y ayant suppléé en tant que Vice-Président
	3.7	Perte d'implication de membres du CA		MM	CA TdV	Maintenir l'intérêt des membres d CA par une information régulière ciblée. Clarifier leurs engagemen Evaluer tous les 2 ans leur engagement et contributions	Révoquer le(s) membre(s) ayant failli à leurs engagements (Art. 3 des statuts)	Les engagements des membres du CA ont été formalisés et la première évaluation du CA a été conduite.
	3.8	Perte d'intérêt ou d'implication de la jeune génération de la famille		EM	Famille Hoffmann	Tenir la jeune génération informe des activités de la TdV ; les fair participer à nos travaux (stage… ouvrir informellement les organes gouvernance à des représentan de la jeune génération	Modifier les statuts pour augmenter le nombre de membres (passer de 12 à 15, voire 18) et offrir des sièges à des représentants de la jeune génération	Echanges activés dans le cadre des 60 ans de la TdV. Soutien très apprécié au programme "flamants" dans le cadre du mariage de Kasia et Julien.
	3.9	Evolutions législatives préjudiciables à une gouvernance jugée bonne pour la TdV		EB	CA TdV	Veille des évolutions législatives réglementaires via le Centre Français des Fondations et le Centre Européen des Fondation	S'adapter si jugé opportun, sinon changer de statut	RAS