THE BIODIVERSITY PROGRAM FOR GOLF COURSES

1st Seminary Acts

Vidauban golf club

14th – 16th November 2017

Golf and Biodiversity

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Editorial work

UMS Patrimoine Naturel « PatriNat » – Centre d'expertise et de données sur la nature
(Agence Française pour la Biodiversité -Centre National pour la Recherche Scientifique-Muséum national d'Histoire naturelle)

French Agency for Biodiversity (AFB) - National Center for Scientific Research (CNRS) – National Museum of Natural History (MNHN)

Océane Roquinarc'h, Aurélie Lacoeuilhe, Philippe Gourdain

Publication work – March 2018

English translation – Nathalie Annequin & Catherine Fournil

Preamble

More and more French Golf stakeholders are committed into sustainable actions. Water resource preservation, inputs reduction and biodiversity conservation are at the core of their reflexions.

Over the last fifteen years, the actions in favour of the environment were leveraged and led to major improvements. From now on, the whole golf branch will have to follow these improvements to reach the target of excellence.

Yet, some technical solutions and research topics still need to be enhanced and carried out for a better understanding on how golf courses and biodiversity manifestation are tightened. Beyond these matters, it will be necessary to identify and then foster the good practices to submit an action framework dedicated to the golf sector.

Biodiversity as such, as well as appraisal and research studies in this field are more an opportunity than a constraint for the golf industry. This opportunity needs to be understood as an upgrading of the golf courses in their wide diversity. Moreover, technical solutions may emerge from the observation and a proper usage of this biodiversity.

The first seminary workshops « Golf and Biodiversity » were founded from these initial postulates.

The « Golf and biodiversity » seminary was held from the 14th to the 16th of November 2017 at Vidauban Golf Club. The property of Vidauban is far more than a prestigious site. Thanks to the Foundation for the environment, the Club has acquired a strong knowledge about biodiversity and a sharp awareness about its preservation too. It now carries a symbolic image of commitment.

Thus, based on a shared will, Vidauban foundation for the Environment, French Golf Federation, National Golf, Golf de Chantilly, the natural heritage department (UMS PatriNat) of national Museum of natural History, joined together for three days to share their experiences and put forward action plans in favour of biodiversity.

These thoughts rely on studies carried out over the five last years by the Museum and Vidauban Foundation on one hand and then by the Museum and the French golf federation on the other hand.
The target of these extended approaches is meant to deal with two complementary geographical scales:

- A local approach on Le Domaine du Bois de Bouis, which plays the role of a natural outdoor laboratory.
The site provides a scientific opportunity of experimentation and data collect and also a wide sharing and distribution of the results.

- A national approach, in partnership with the French Golf Federation. The strategy is to provide a wide action plan promoting and magnifying, the best eco-friendly practices, the whole will contribute in injecting a very positive approach regarding environmental topics.

The working session aimed at keeping a strong link between the management imperatives of golf courses maintenance and a better understanding of scientific ecology. The objective being that pragmatism and realism need to be connected to any action recommendation.

Thus, these workshops have enabled the different partners to raise some topics such as the organic material composting, flora transformation, the choice of local seeds species in a framework of a planting project, biodiversity studies in the roughs areas and innovations regarding golf courses management. Talks were also dedicated to the implementation of "Biodiversity program for golf courses" which will be officially initiated in France in January 2018. Before ending the working session, a workshop was settled in order to present some tools and actions in communication and valorization, on a local and a national level.

The flagship ideas and conclusions expressed during these workshops are listed in these proceedings.

We wish you all a pleasant reading.

Workshop 1. The Museum's partnerships: ffgolf (French golf federation) & FEGVE (Vidauban Foundation)

Presentation of the partnership between the Museum (MNHN) & the French Golf Federation (FFG).

The French Golf Federation, under France's 1901 association act recognized for public utility, is in charge of organizing and promoting the practice of its discipline in France, under the tutorship of the Sports Ministry. The French Golf Federation has engaged with the MNHN into a study convention aiming at identifying the ecological stakes and improving the knowledge of the species existing on the French golf courses. France counts 700 golf structures among them, 650 are equipped with a golf course. That represents about 30 800 hectares on metropolitan land. Stimulated by the FFG, these structures are urged to initiate a strategy based on the biodiversity knowledge of their sites.

The fauna and flora data acquired from these golf facilities will then be integrated into the **National Natural Patrimony Inventory** (**INPN**).

The FFG committed into a framework-agreement with the Environment, Agriculture and Sports Ministries, to carry out biodiversity preservation and awareness actions inside its federated golf clubs.

In addition, the "Environment and Golf National Charter" (Management of the water resource) is under the process of being renewed.

The FFG's actions aim at:

- Reducing the sanitary pressure,
- Enhancing bio-remediation process supporting the selection of plant species,
- Releasing scientific information regarding the golf clubs' ecological stakes,
- Boosting fauna and flora preservation.

This agreement led to the publication of two brochures in 2009 « Naturellement golf -la biodiversité » and « Golf National naturellement» scientific writing support from the MNHN.

As a matter of fact, from 2007, the French Golf Federation, in partnership with the MNHN, conducted an independent diagnosis at the National Golf in Saint-Quentin-en-Yvelynes. This diagnosis assessed the environmental quality of the site, its function in the ecological continuities, the management practices and natural heritage valorization. Since then and thanks to the added-value of the work delivered by the MHNH, new ambitions have emerged in the FFG's strategy.

Today, pressures on the biodiversity are increasing and natural environments are intensely used. Therefore it is vital for the users and the managers of the territory to make sure they have got:

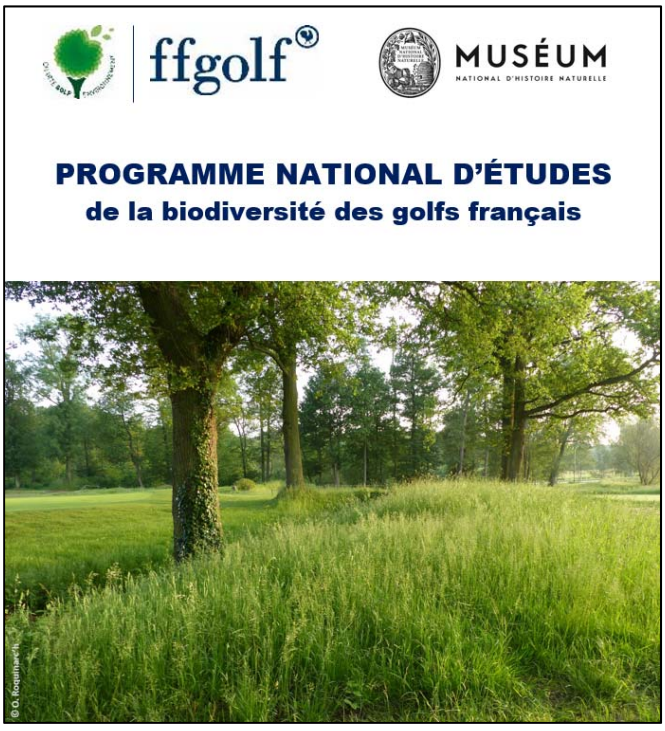
- A proper knowledge of the ecological challenges on their land influence,
- A proper control of the assessment of their actions on the biodiversity,
- A proper capacity to implement adapted practices supportive of the biodiversity.

At the end of 2016, a four-year study agreement was signed between the FFG and the MNHN aiming at improving the knowledge about biodiversity, preserving and fostering the natural heritage on the French golfs sites.

The entire golfing profession represented by 7 contributors expressed the desire to support this partnership: The Royal and Ancient (Saint Andrews), The European Tour, The Vidauban Corporate Foundation for the environment, The French golf Managers Association, The French Associative courses and French Greenkeepers association.

This partnership aims at:

- Identifying golf structures' biodiversity and assessing its challenges,
- Upgrading biodiversity management processes,
- Fostering biodiversity preservation,
- Guiding the FFG in the implementation of innovative and experimental approaches,
- Outlining the coordination between the scientific research, the developers and the managers of natural spaces.



Thus, the partnership also aims at:

- Providing methodological tools to evaluate and feature golf sites biodiversity and the associated challenges,
- Leveraging the implemented management measures.

Furthermore, this collaboration will help the FFG and the golfs facilities to improve their knowledge and practices.

It will foster a participatory and ongoing dialogue inside the golf clubs and between the golf structures and the local stakeholders.

The actions conducted within the framework of the partnership are forming "The National Study Program – French golf sector biodiversity" and articulated around 6 axes:

- Creation of a methodological support and development of a tool for biodiversity monitoring and assessing on the national scale ("Biodiversity program for golf courses" *see working session 2)*.
- Establishment of a national mapping for biodiversity challenges,
- Specific follow-up of pre-and-post Ryder Cup 2018 at The Golf National.
- Constitution of a collection of good management practices and sharing of the experiences,
- Scientific expertise and punctual consulting,
- Communication and training sessions.

Partnership between the Museum (MNHN) and Vidauban Golf club Foundation for the environment (FEGVE).

Vidauban Golf Club Corporate Foundation for the Environment was created in 2007. The structure aims at protecting and supporting the actions in favour of the preservation of the natural patrimony of The Domaine du Bois de Bouis situated in Vidauban in the Var department (83). Nestled in the heart of La Plaine des Maures, the site consists of a golf course over around one hundred hectares, a hamlet and more than 700 hectares of natural spaces.

In 2011, Vidauban Golf Club Foundation and the Museum entered into a first study agreement for 5 years. The objective was to feature the local biodiversity and associated issues on Vidauban Golf Course and the whole property.

Thus the foundation's will is to:

- Reinforce and expand its knowledge regarding the fauna and the flora on the property,
- Upgrade its management in favour of biodiversity,
- Engrave its action over time and promote the property as a permanent biodiversity observatory in la Plaine and Massif des Maures.

As a first step, the study has contributed to strengthen and enrich the knowledge about the biodiversity challenges on the site.

As a second step, it has provided the Foundation with a management plan and a support for the operational implementation of this plan.

The natural diversity of the property's spolights reconfirmed the description of the site as a "pure open-air laboratory in the heart of La Plaine and Massif des Maures". This unique natural wealth has led to more accurately targeted experimental studies mainly oriented to the featuring of the habitats conservation status.

In May 2017, a second study agreement was signed between the partners in order to pursue the undertaken works.

This new partnership over the five years to come will support the Foundation in:

- The capitalization and enhancement of the scientific knowledge acquired on the Property's natural areas,
- The refocusing of the scientific studies on the golf course in order to assess its influence on the natural areas, equally in and out of its fence,

- The positioning of the golf course as a reference site regarding virtuous practices in favour of biodiversity, taking the golfing activities into account.
- The sharing of the acquired experience with other golf courses in order to positively influence the golfing world, on a national and/or international scale, thanks to the implemented management actions.
- Engraving the Foundation's actions in the long run turning the property and the course into a permanent biodiversity observatory.

As a whole, the fauna and flora data collects, taken before and during the study agreements, are also nurturing the Natural National Patrimony Inventory (INPN).

The Museum/FEGVE partnership aims at:

- Unifying Vidauban Golf Club and UMS Patri Nat teams to enhance the knowledge, improving the preservation and valorization of biodiversity.

- Setting an example in terms of biodiversity integration within golfing activities.

The studies are articulated around 5 axes:

- Vidauban golf course, a biodiversity observatory in favour of an adaptative management,
- Ecological challenges knowledge,
- Data collect valorization and communication,
- Staff training and awareness-raising,
- Advice, support and punctual expertise.

The icon of la plaine des Maures - The Hermann tortoise

Annual daisies

A bunker at Vidauban golf club

Workshop 2. Biodiversity Program for Golf Courses

© Océane Roquinarc'h

PROGRAMME GOLF POUR LA BIODIVERSITÉ

Avec l'appui scientifique et technique
MUSÉUM
NATIONAL D'HISTOIRE NATURELLE

What are the targets of the "Biodiversity program for golf courses"?

Aurélie Lacoeuilhe (UMS PatriNat) Thomas Charrier and Pierre Lasfargue (FFGolf)

The program aims at upgrading the knowledge about biodiversity, its preservation and valorization on the French golf courses.

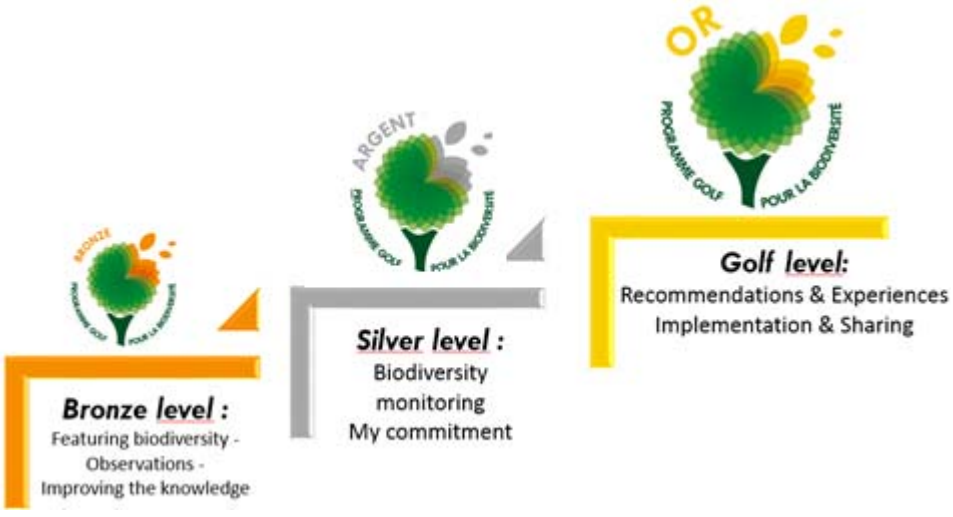
Entering this program, golf clubs will get:

- a better assessment of the biodiversity on their own golf course,
- a monitoring of this biodiversity evolution over the years,
- an opportunity to adapt their management practices,
- a wider capacity of experience sharing, with other golf structures,
- new connections with local stakeholders and naturalist structures, guiding them in the preservation process to leverage their natural patrimony,
- their results integrated into the national data collect of the French golf courses biodiversity.

Progressive, Conscious and Voluntary

The program relies on an **ongoing upgrading approach supported by the French Golf Federation and built with the scientific and technic expertise of the MNHN.** Golf facilities are proposed three levels of commitment: bronze, silver and gold.

The process, content and relevant documents are available on the FGF web site.



Commitment Process

Phases - Steps to follow - Actors and communication

(Poster enclosed – the *"Biodiversity Program for golf Courses")*

A tool box adapted to each level

Bronze - Silver - Gold (level being under process)

- Program leaflet,
- Clubs commitment letter,
- Questionnaire,
- Guideline for the clubs,
- Technical framework document, to the attention of the naturalist structures involved in the program,
- Copy of the charter signed between the French golf Federation and the National Inventory of the Natural Patrimony,
- Expertise report template,
- Standardized document from the National Inventory of the Natural Patrimony (INPN) dedicated to the naturalist data collect.

These different documents are available on the following links:

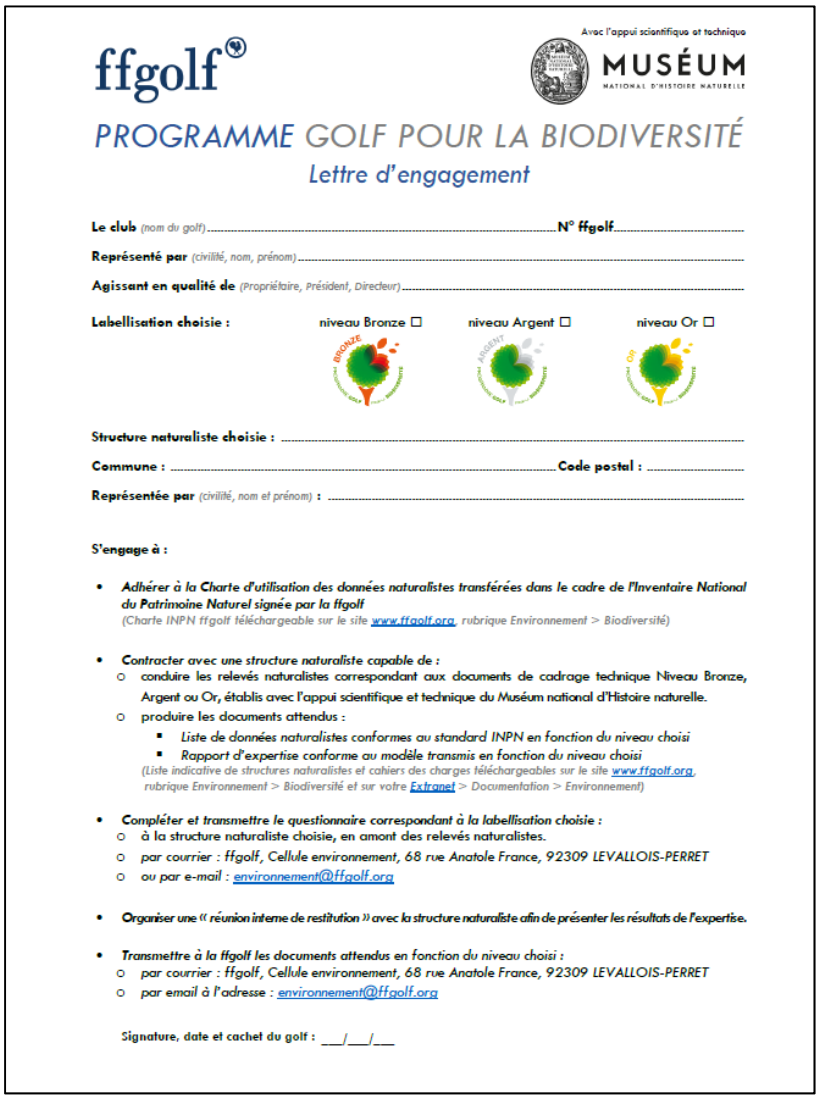
Bronze level: https://goo.gl/2DVqS3

Silver level: https://goo.gl/pE5zfE

Gold level – *under process*.

The whole of the scientific collected data is stored and available on the National Inventory of the Natural Patrimony site

https://inpn.mnhn.fr/accueil/index



ffgolf

Avec l'appui scientifique et technique
MUSÉUM NATIONAL D'HISTOIRE NATURELLE

PROGRAMME GOLF POUR LA BIODIVERSITÉ

Lettre d'engagement

Le club *(nom du golf)* ..... **N° ffgolf** .....

Représenté par *(civilité, nom, prénom)* .....

Agissant en qualité de *(Propriétaire, Président, Directeur)* .....

Labellisation choisie : niveau Bronze ☐ niveau Argent ☐ niveau Or ☐

Structure naturaliste choisie : .....

Commune : ..... **Code postal :** .....

Représentée par *(civilité, nom et prénom)* **:** .....

S'engage à :

- ***Adhérer à la Charte d'utilisation des données naturalistes transférées dans le cadre de l'Inventaire National du Patrimoine Naturel signée par la ffgolf***
  (Charte INPN ffgolf téléchargeable sur le site www.ffgolf.org, rubrique Environnement > Biodiversité)
- ***Contracter avec une structure naturaliste capable de :***
  - conduire les relevés naturalistes correspondant aux documents de cadrage technique Niveau Bronze, Argent ou Or, établis avec l'appui scientifique et technique du Muséum national d'Histoire naturelle.
  - produire les documents attendus :
    - *Liste de données naturalistes conformes au standard INPN en fonction du niveau choisi*
    - *Rapport d'expertise conforme au modèle transmis en fonction du niveau choisi*

  (Liste indicative de structures naturalistes et cahiers des charges téléchargeables sur le site www.ffgolf.org, rubrique Environnement > Biodiversité et sur votre Extranet > Documentation > Environnement)
- ***Compléter et transmettre le questionnaire correspondant à la labellisation choisie :***
  - *à la structure naturaliste choisie, en amont des relevés naturalistes.*
  - *par courrier : ffgolf, Cellule environnement, 68 rue Anatole France, 92309 LEVALLOIS-PERRET*
  - *ou par e-mail : environnement@ffgolf.org*
- ***Organiser une « réunion interne de restitution » avec la structure naturaliste afin de présenter les résultats de l'expertise.***
- ***Transmettre à la ffgolf les documents attendus en fonction du niveau choisi :***
  - *par courrier : ffgolf, Cellule environnement, 68 rue Anatole France, 92309 LEVALLOIS-PERRET*
  - *par email à l'adresse : environnement@ffgolf.org*

Signature, date et cachet du golf : __/__/__

Discussions

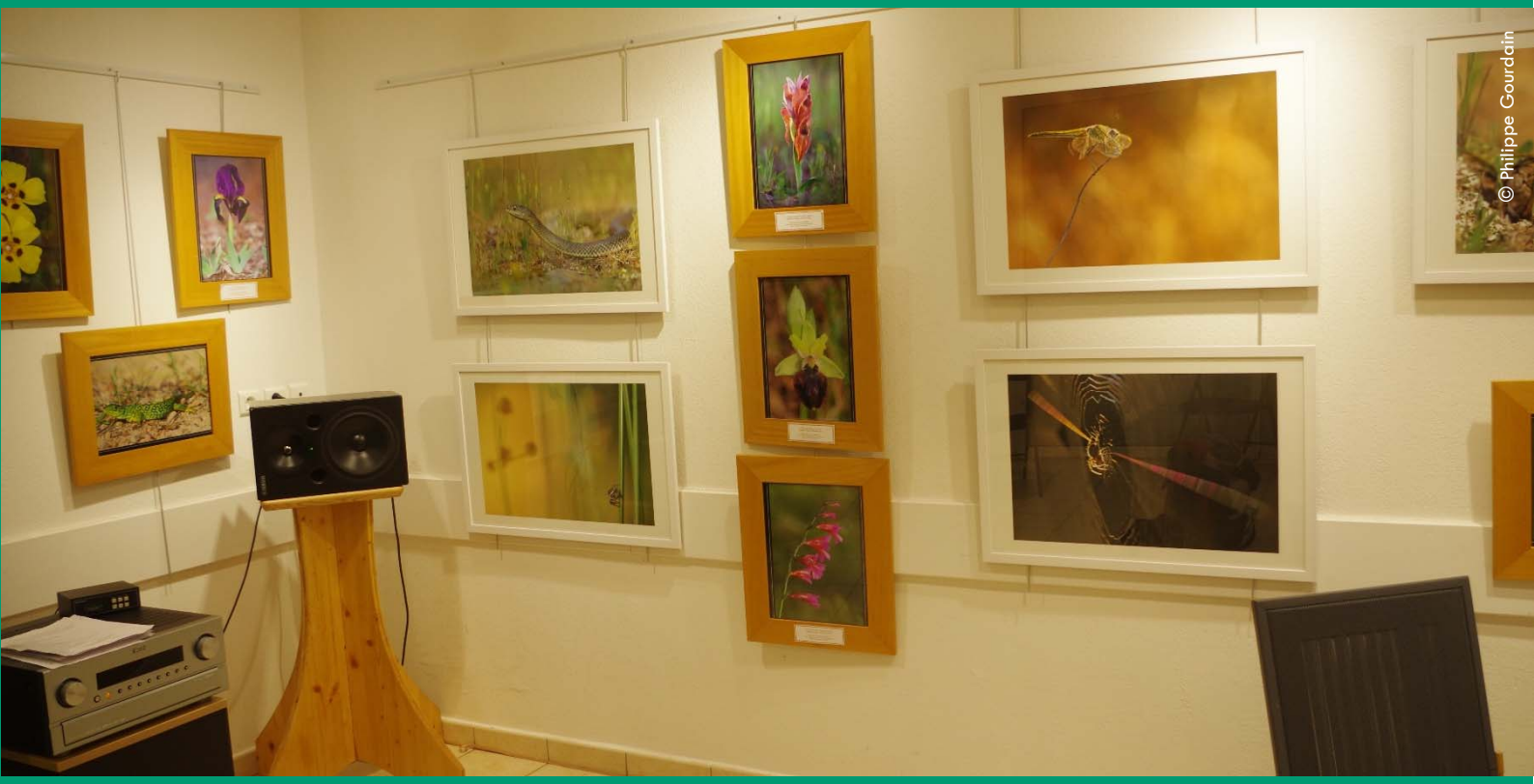
The workshop started with a presentation of

- the program process and content for the three levels,
- the available tools (see above tool box) and the ongoing ones,
- the communication tools and kit,

developed for the committed clubs.

The workshop was also the opportunity to discuss with the participants their potential involvement into the next step to reach: the gold level.

Workshop 3. Communication & Valorization



Presentation of Vidauban Foundation's communication actions

Catherine Fournil – Sustainability Executive Officer

Vidauban Golf Club Foundation has been developing numerous communication and valorization actions since 2007. This workshop was a good opportunity to present these actions directly related to the biodiversity preservation among the general public and also within Vidauban Golf Club members and staff.

External communication

- 2011 - As an opening to the outside world, organization of the first edition of "**Vidauban dialogues**" on the theme "Reconciling Golf and biodiversity". A second edition was held in 2013 devoted to three interactive round tables, the first one with the Museum and the Natural National Reserve of La Plaine Des Maures (RNNPDM), the second one with the institutional representatives and the third one with the national businesses.
- Since 2013, partnership with the **National Association for the Environmental Education "Les Petits Débrouillards"** created by Jacques Weber in line with Gilles Boeuf (MNHN). Implemented over the French territory, the association could be a coordinating partner for other French golf structures. The stress was set on the obligation for golf structures, to collaborate with professional organizations certified by the Ministry for
- Education, when dealing with schools.
- Since 2014, in partnership with "La Route Des Insectes" (*The insects' trail*) a local partner supported by the PACA region and the Var department general council.
- Designation of the site as a "Nature Info Point". In partnership with the Natural National Reserve of La Plaine Des Maures, installation on the property of 7 panels to inform the children, walkers and visitors about the Foundation's actions and biodiversity.
- Since 2013, organization of yearly Environmental awakening workshops for primary school pupils (about 600 children per year) either at the Foundation's shed, located on the property, or within the schools. The covered topics (living and non-living, the forest, the compost, the water…) are developed as part of school projects, in collaboration with the teachers and the animators of "Les Petits Débrouillards".
- 2017 patron of the international project "The water Explorers" to support a local school.

- 2017-2018 partnership with The Departmental Cultural Division for the organization of a Photo Exhibition (February,10, 2018 to May,20, 2018) from the book " Le Petit Peuple Des Maures". The photo exhibition was held in The Natural National Reserve office room but also in the four Departmental multi-media centers of: Draguignan, Salernes, Figanières and Vidauban aiming at informing a large public (teachers, children, families, researchers, institutional structures). Different fauna and flora workshops animated by scientists will be offered to the public during the exhibitions. A film dedicated to the Hermann Tortoise will be presented in Salernes's multi-media center, followed with a debate animated by the scientific Director of the Natural National Reserve of La Plaine des Maures.
- Development of the Foundation's website. For more information, click on http://fondation-plainedesmaures-environnment.fr/.
- 2016, partnership with the Museum's sound library. Releasing of 3 sounds environment CDs (amphibians, crickets and "Sounds partition in La Plaine Des Maures").

Photos exhibition and broadcasting of the natural sounds CD "sounds napping"

- 2016 - Contributor to the study convention with the French Golf Federation and the National Museum of Natural History.

Biodiversity workshops with local schools

Internal communication

- 2010 – Appointment of a biodiversity referent in the green-keeping team – Mr Didier Novelli. Steve Byrne - Head greenkeeper, confirms the important role played by Didier in the maintenance team.
- Since 2011 – Enrolment of the Foundation to the Biodiversity National Strategy. Recognition commitment under process.
- 2013 – Information board – installed in the Club House during the Herman Tortoise study launched on the golf course over 3 years: maps and pictures displayed.
- Staff training sessions about the biodiversity:
    - In 2013 one day conducted by the MNHN about the local biodiversity on the course,
    - In 2014 conducted by the Birds' Alliance, a session dedicated to the biodiversity living in the buildings and on the course.
- 2016 – installation of waste recycling dust bins, in the houses and offices in addition to a waste recycling training session for the staff.
  Remark: the recycling process can be different from one commune to another and between private homes and work places.
- 2016 – Appointment of the Foundation as a Bird's Alliance shelter. Settlement of 16 birdhouses around the village, inside the fence.
- Instalment on the main access to the property of two big information panels dedicated to the collaboration of the Foundation with the Museum from 2011 to 2022 and the Birds Alliance

Information panels about
the FEGVE-MNHN Convention & the FEGVE-Birds Alliance partnership

2017 – Staff study trip to Paris –

- Objective: Staff awareness raising to get all staff members involved and committed to the Foundation's strategy. Visit of the private collections of the National Museum of Natural History and of the Grande Galerie de l'Evolution du Jardin des Plantes.

2017 - Creation of communication brochures regarding the environmentalist inventories (Malaise traps for examples) to highlight the scientific results using plain language to inform the staff, the members and the golf players. The brochures can be found in French and English.

2017/2018 – Film shooting conducted by Bertrand Mussotte on the following topic. "How to integrate biodiversity into the golfing activities".

Shooting at golf de Vidauban (Director Bertrand Mussotte – 2017/2018)

Perspectives and new paths to develop

- Creation at the hamlet of a curiosity chamber equipped with a microscope available for the club members, their guests and the visitors,
  The environmental management manual of the course will also be displayed there,
- Stroke-saver booklet: Seasonal update, with biodiversity aspects, areas at stake, etc….A souvenir to bring back home!
- Design of an educational trail, in collaboration with the Natural National Reserve.
- Organisation of golf game and practice discovery sessions dedicated to children,
- Dialogues de Vidauban, edition 2018,
- Installation of a king-size screen at the club-house broadcasting information regarding the activities of the Foundation, the course management and or the ecological areas at stake,
- Development of either a tailor-made app for each hole or a web site inspired by https://www.theopen.com/TheCourse, to develop a web-site visualising the course and focusing on natural aspects : identified biodiversity challenges and remarkable or ordinary species for example.

  According to Stephen Byrne such a process has already been experimented at Wisley golf club.

  Creation of a think-tank on that topic: participants Catherine, Rémy, Stephen and Cyprien.

Raising awareness

- Anne-Caroline Prévot - researcher at the National Center for Scientific Research (CNRS) at the MNHN and her team of co-researchers have studied the presence or lack, of nature in Walt Disney's cartoons[1]. They have demonstrated that nowadays, the Nature is :

  - less represented in the cartoons and in a much simpler way than it was in the past, revealing the "extinction of experience" or loss of Human–Nature interactions. Yet, other studies have also demonstrated that the less human beings are in contact with the Nature, the less they are willing to protect it, in other words: "the one who doesn't know doesn't care". It is then of the utmost importance to call on other scientific disciplines such as the "environment psychology", to :
  -
    - raise awareness,
    - communicate with golf players and golf clubs,
    - adapt the different scientific messages to get them understandable.

In that perspective, it could be of high interest to take inspiration from the thesis work of Aurélie Lacoeuilhe[2]. She has studied how biodiversity-friendly initiatives (management of green areas, information panels, photographic exhibitions about the Nature) can influence staff members' knowledge, attitude and behaviour.

The study has been based on an enquiry launched before and after the implementation of the initiatives. (Cf Perspectives – **Workshop n°5**).

- Design and creation of a welcome booklet for the staff members with information about the specific environment and the local biodiversity.
- Downloading of the INPN-Species App. to identify the local fauna and flora (fun application)

More informations at: https://inpn.mnhn.fr/informations/inpn-especes

[1] Prévot-Julliard, A. C., Julliard, R., & Clayton, S. (2015). Historical evidence for nature disconnection in a 70-year time series of Disney animated films. *Public Understanding of Science*, *24*(6), 672-680. http://journals.sagepub.com/doi/abs/10.1177/0963662513519042?journalCode=pusa

[22] Lacoeuilhe, A., Prévot, A. C., & Shwartz, A. (2017). The social value of conservation initiatives in the workplace. *Landscape and Urban Planning*, *157*, 493-501. https://www.sciencedirect.com/science/article/pii/S0169204616301785

Presentation and experiences of a biodiversity golf course referent

Arthur Lecomte - Biodiversity and landscape Manager – Le Golf National

Arthur Lecomte has embraced his appointment as a biodiversity golf course referent. His function helps him to raise a sensitive-oriented awareness among the greenkeepers' team and members of the Club. As an example, the documents issued by the Museum are available for golf players at the reception desk.

Since Arthur Lecomte's appointing, 300 to 400 young trees, shrubs or herbaceaous plants have been planted along the golf course. In the perspective of the Ryder Cup event the carpark rockfill, raised issues from the players. Sometimes the development actions implemented by Arthur Lecomte provoke questioning among the team, leading to discussions and then to support. Golf players appreciate the land development and now stop there, to take pictures of it. Arthur is always available to answer questions regarding biodiversity integration, especially when it is "out of the bounds" of the traditional maintenance. He also acts as a warden to communicate on the Museum's messages.

Bucher's broom at Le Golf National

Perspectives and new paths to develop

- Our think-tank should propose the AGREF (Greenkeepers' French Association) to initiate "Biodiversity" and "Biodiversity Referent" training sessions, into their annual training program.
- In addition, golf coaches and golf volunteers, who are in direct contact with the future generations, tomorrow's stakeholders, should be trained to forward biodiversity messages to children. (Cf. Sports studies schools)
- A union with the Sports Ministry was also suggested.

Illustrating the topic, Rémy Dorbeau, states that during the operational discussions at the club with new members the sustainable maintenance rules (long roughs, summer time yellow turf) are highlighted.

These topics have created a real boost among the attendees.

French Golf Federation's Communication actions –

Pierre Lasfargue & Thomas Charrier – French Golf Federation Sustainability department representatives.

The working session has also been the opportunity to talk about the environment communication actions, led by the French golf Federation in partnership with the Museum, to develop tools in order to encourage golf clubs to commit in the environment preservation.

Some documents from the « Biodiversity Program for golf courses » can now be uploaded. In addition, the French golf Federation will produce new appropriate supports customised to each targeted public.

The main idea is to offer the clubs with different communication resources: digital tools, communication kit such as models of standardized and tailor-made "Biodiversity Program for golf courses » certified panels.

The « communication » section in the manual **« Golfing areas environmental management »** provides the clubs with a list of the available communication tools adapted to their profile:

Physical communication supports:

- Information graphic-designed panels raising the public awareness and encouraging them to seek for further data. The panels could be found in the Clubhouse, at the golf restaurant room or on the golf course depending on the forwarded messages and the specificities of each site.
- A photo exhibition: the exhibition at « Le Jardin des Plantes » regarding the greenkeepers' know-how was given as an example. « Le Jardin des Plantes » greenkeepers' work was then spotlighted (sickle-cutting practice, hedgerows maintenance), displaying pictures and interviews of greenkeepers. This idea may be copied in the golf sector in order to highlight the greenkeepers at work.
- TV in the Clubhouse for interactive topics,
- Brochures, leaflets…
- Stroke-saver booklets: Dinard Golf has released a stroke-saver with a description for each hole of the fauna and flora species that could be observed.
- Digital communication : web-sites, social networks, blogs.

Perspectives and new paths to develop

- Organization of thematic competitions in connection for example with biodiversity, water resource management…
- Photographic exhibition at the Clubhouse and/or at the club restaurant displaying the fauna and flora, habitats, greenkeepers' work, golf through-out the seasons …
- Children and golf coaches' biodiversity handbooks: course and water management teaching content with a section mainly dedicated to biodiversity.
- Creation of a video library in the perspective of releasing a compilation of interviews and detailed topics regarding biodiversity integration (for example, compilation of scenes shot at Le Golf de Chantilly in 2017) and other media supports.
- Convincing a "biodiversity Ambassador" present at the Ryder Cup event in 2018: one or several personalities, a sportswoman or a sportsman, or a golf passionate icon.
- Organization of lectures in the greenkeepers' workshop during the Ryder Cup event. As organized in the past, superintendents, managers and technicians will be able to attend these conferences. Yet doubts are expressed regarding the attendance as everybody will be more interested in the competition itself…….

Naturalist inventories shooting at golf de Chantilly (Directors Camille Chignac et Philippe Lanoue -2017)

Workshop 4. Management

Objectives

This workshop has been dedicated to the sharing of experiences on, daily management operations and innovations in the maintenance of a golf course, focused on the implementation of best practices in favour of sustainability.

Within their context, the criteria of success of such best practices, has also been discussed to evaluate the feasibility of their implementation on other courses. The following themes were addressed:

- Bunkers and environment – at le golf de Vidauban
- Flora conversion– at le golf de Chantilly,
- Sustainable landscaping and judicious management – at le golf de Vidauban.

The following sections present a synthesis of discussions and power-point presentations.

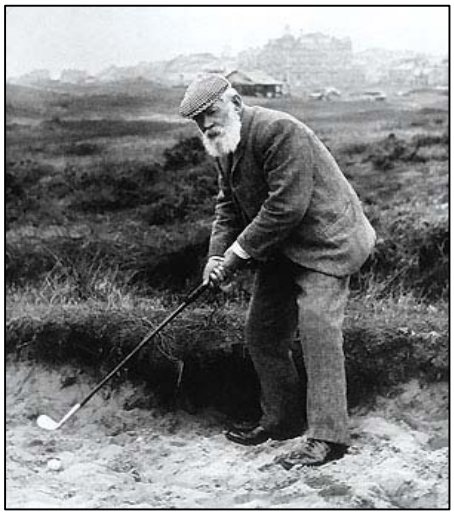
Bunkers and environment

Discussions with Stephen Byrne (Vidauban golf Club Super-intendant)

Originally, Scottish courses were located in dunes and bunkers were defined as sandy depression zones meant to protect sheep from the climate elements. Bunkers are still today sandy depressions but created and maintained on purpose, to remain, in various contexts, golf players feared obstacles.

The management of bunkers is time consuming and request a non-negligible work force specifically when the management is done manually (without pesticides). Each bunker is different and its longevity depends both, on the time dedicated to the management and on the allocated budget.

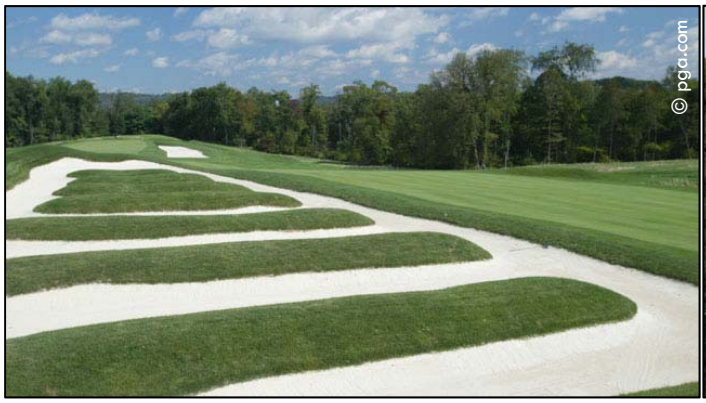
Generally speaking, bunkers represent approximately 2% for the overall surface of a golf course and 20% of the shots during a round of golf.



Item	Useful Life (years)	Item	Useful Life (years)
Greens	15-30	Cart Paths (concrete)	15-30
Bunker Sand	5-7	Practice Area Tees	5-10
Irrigation	10-30	Tees	15-20
Control System	10-15	Corrug. Metal Pipes	15-30
PVC Pipe	10-30	Bunker Drain Pipes	5-10
Pump Station	15-20	Mulch	1-3
Cart Paths (asphalt)	5-10+	Grass	Varies

Notes on the above estimates and additional information can be found on the ASGCA website at: http://www.asgca.org/free-publications. Look for "Life Cycle Chart"

**« Bunkers are not meant to be places of pleasure.
They are prisons for punishment and repentance" Old Tom Morris
(Greenkeeper & professional golf player 1821/1908)**



**Scaring bunkers –
on the left "the church pews" Oakmont Country Club – USA
on the right "the big Bertha" Royal Portrush golf club - Ireland**

In 1999, approximately 57 million of golf players could be found on the 32 000 courses over the planet.

According to a report, issued by KPMG in 2011, Europe has got 6 740 courses, out of which 1 867 are located in England, generating a financial contribution to the economy of 3.4 billion pounds and providing 48 500 job opportunities.

Another study carried out in 2007 by the Golf Course Superintendents Association of America (GCSAA) indicated that the total surface occupied by golf courses on the North-American continent was of 2 244 512 acres with 74 382 acres devoted to bunkers (a little bit more than 3 %).

In Europe, bunkers represent in general 1 to 2% of a golf course surface and their costs of maintenance are very often disproportionate, (European Institute of Golf Course Architects EIGCA) - 15% to 25% of the maintenance budget. (James Moore – USGA 2008).

During competitions, more than a quarter of the preparation time is dedicated to the quality of the bunkers: playability, sand's quality …

In the bunkers, the drainage efficiency remains the main concern, but:

- the contamination by silt, clay or the stone contained into the underlying material,
- the clogging of the main drain-pipe inside the bunker,
- the mixing of waters,
- the fading of the sand,

induce

- the decline of the aesthetic aspect of the bunkers' areas,
- erratic shot performances,
- and high maintenance costs.

Damages of a bunker after heavy rains

Different types of bunker coatings - What are the differences in terms of sustainability?

A wide range of porous and non-porous materials can be found on the market now. A lot of assertions have been claimed regarding their effectiveness and adequacy function as bunker coatings.

They can be listed under 3 types:

- Natural-sub-base or “turned-over” coating turf.
- Woven and non-woven fabrics,
- Tied aggregates.

The coating turfs are very often contaminated by particles. The bunkers filtering effect and durability are then reduced, inducing frequent rehabilitation operations in comparison with other coatings.

The porous concrete permanently keeps the humidity. The benefit of this material is to impregnate from the top to the bottom. But then the natural ground humidity levels up and contaminates the sand from below. This process makes the sand too wet and non-playable.

Generally speaking, when regularly watered, bunkers made of porous cements have a longer lifetime and porous cement remain the favourite material used by many golf courses. In 2015, heavy rains badly damaged the bunkers at the Golf Club Cannes Mougins. The water penetrated under the bunkers and lifted them up.

Practical experiments

Stephen Byrne collected some sand samples to hand them out to a certified European Scottish laboratory well-known in the golf industry. Tests were conducted on the sand capacity to drain water depending on the different materials added to the sand.

As a result, the sand drainage process will be quicker if a filtering element is added.

Laboratory tests – Sand capacity to drain water with an asphalted coating

Buried balls

Another problem unique to bunker sands is the potential for golf balls to partially bury in a fried-egg lie. Golfers tend to complain about "soft sand" when their scorecards record extra strokes from digging out of such lies.

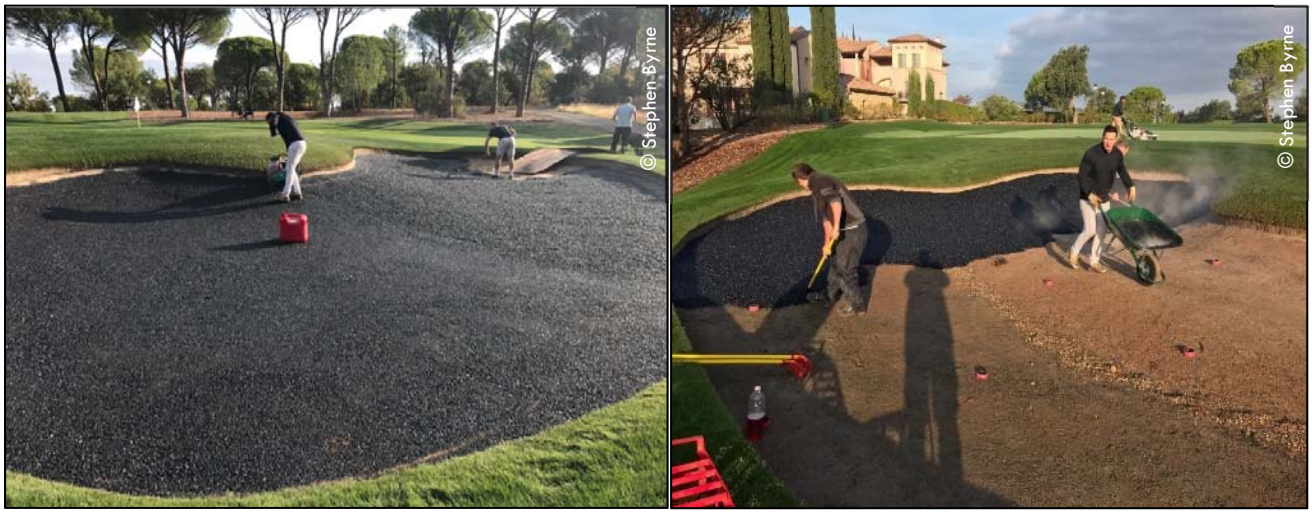
A test can reveal the potential for sands to form fried-egg lies (1). A standard quantity of air-dried bunker sand is placed in the test vessel and stirred. The force required to press a golf ball halfway into the sand is measured and compared with a table of values allowing the sand to be rated as having a very low, slight, medium or high potential for burying golf balls. Ideal bunker sands give a reading of 2.4 kilograms per square centimeter or above on a pocket penetrometer, indicating a very low tendency to bury golf balls landing in bunkers.

USGA recommendations

© USGA

Recommended particle-size distributions for root-zone mixtures and bunker sands.

Fraction	Size (mm)	USGA root zone mixture	Bunker sand
Gravel	2-4	≤3%	≤3%
Very-coarse sand	1-2	≤10% total gravel plus very coarse sand	≤7%
Coarse sand	0.5-1.0		
Medium sand	0.25-0.5	≥60%	≥65%
Fine sand	0.15-0.25	≤20%	
Very-fine sand	0.05-0.15	≤5%	≤25%
Silt	0.002-0.05	≤5%	
Clay	<0.002	≤3%	≤3%
Total very-fine sand, silt, clay	<0.10	≤10%	



Bunker renovation with an asphalted coating – Vidauban golf club

Experiment results

- The maintenance time-saving can be dispatched to other tasks on the golf course,
- Less sand lost by contamination,
- Potentially wider range of sands used as compared to before,
- Longer lifespan of the component on the course,
- Reduction of the quarry sand resource.

Discussions

Today, some golf architects are returning back to the traditional bunkers' definition: real obstacles which are playable but difficult to pass through (for example, « The big Bertha » in Ireland, as shown above).

Originally, the maintenance of that type of bunker is a purely mechanical process. As a matter of fact, on the links, the bunkers are at the forefront and the sand tends to fly away through the Venturi effect. In order to be preserved links' bunkers need to show very steep edges.

Alternatively, in other old golf courses located in diverse environments, the bunkers have rounded up with smoother shapes and turf back on the mounds (for example at the century-old Golf de Chantilly located in the plain).
These types of bunkers are now easier to maintain and there is no will to go backwards to a more complex design, increasing the maintenance routine constraints.

Green bunker's mound – Golf de Chantilly

Nowadays, golf architects tend to design more simple bunkers no longer meant to be obstacles.
In public confidence, getting the ball out of a bunker is always possible.
During an American competition a specific rake dragging operation was tested and long ridges implemented to make the bunkers shots a bit more complex. Because of this practice a prestigious golf player failed.
The disappointment of his fans shows that the public is not ready yet to accept the defeat of their champions because of a tricky bunker obstacle.
That is one of the reasons why golf courses' design cannot introduce too complex playing difficulty anymore.

The butterfly greenside bunker – Dunk Island golf course / Australia

Flora conversion management on a golf course

Discussion with Rémy Dorbeau - General Manager - Golf de Chantilly.

The flora conversion is a relevant necessity for the environment, biodiversity, water saving and the golf course itself.

The flora conversion benefits are numerous and different depending on the golf course zones:

- **Greens**: intrants reduction, less diseases, improvement of golf playing zones uniformity, maintenance costs decrease.
- **Tees**: limited conversion as the Ray-grass seeds are predominant. Yet a mix of grass species is always useful in order to limit the diseases and the mowing frequency.
- **Fairways**: intrants reduction, weeds control, resilience to hot and dry seasons.
- **Roughs** :
    - Native species reintegration to reduce the maintenance costs and restore an environmental consistency.
    - Reduction of the plant cover density to facilitate the game and reduce the balls seekers impact.
    - Bunkers mounds conversion (see hydroseeding below).

- Roughs playability when the balls do not stop in the steep slopes (for safety purpose).
- Maintenance costs reduction.

Bunker's mound reseeding using hydroseeding process

Postulate: Le golf de Chantilly in 2001

Board's and golf Members concerns:

- Desire to anticipate the new regulations regarding intrants reduction.
- Vulnerable watershed,
- Long periods of prefectoral orders forbidding waterings,
- Golf course in good condition only 3 months a year,
- Low budget for a 36 holes golf course,
- Desire for Chantilly golf club to keep its well-known reputation.

Greenkeeper's prior work:

- Due diligence works, technical studies for a better understanding of the site,
- Determination and assessment of the restricting factors,
- Cultural method analysis,
- Observation of non-maintained natural areas in the perspective of further researches.
- Flora conversion from 2001.

Key actions in 2001 (n+0) :

- Greens areas flora conversion.
-

Key actions in 2002-2003 (n+1-n+2).

- Implementation of a tree cutting and root slicing program to boost the low grass light exposure and limit the species competition.
- Cultural method modification :
    - water saving-cycles spacing / easy access to water reserves,
    - cessation of fertilizers use on settled turf grass areas,
    - decompacting and regular sanding preliminary works, maintenance equipment adjustment programme (mower, aerator, sand machine…).

Key actions between 2004 and 2006 (N+3 to N+5).

- Tests implementation- varietal seeds collection

Varietal seeds collection – observation of the different grass seeds adaptability.

- Initial programme enhancement and fairways irrigation stoppage,
- Modification of the trees cutting plan to create ventilation corridors, minimizing at the maximum the humidity process on the playing areas,
- Test of the direct seeding tools,
- Rehabilitation preliminary works of the watering system (concept of a water tower).

Key actions between 2007 and 2010 (N+6 to N+9).

- Fairways over seeding program, greens and tees collars,
- Damage and diseases management,
- Implementation of regular devoting on all the playing areas.

Key actions between 2010 and 2014 (N+9 to N+13).

- Regular over-seeding cultural practice,
- First assessment of the programme and site resilience monitoring according to the weather data over the years following the drought in 2011,
- Introduction of the fescue seeds on the greens,
- First measures in managing the deficiencies,
- Beginning of the flora conversion on the bunkers mounds implementing hydroseeding process.

Key actions between 2015 and 2017 (N+14 to N+16).

- 2015 - Green test construction,
- 2016-2017 Greens rehabilitation works and development of a green model copied on the existing greens substrates,
- Tests of new selective treatments thresholds,
- Members' involvement in divoting (divots bags).

Divots Mix bags available for Members at the Chantilly golf

Some grass species seeded on the golf course: *Agrostis tenuis, Festuca rubrea, Festuca ovina*.

Flora conversion on the fairways – 27th of August 2015

Fairways 7th of September 2015

Fairways 20th of September and 15th of October 2015

Learnings from this experience

A lesson of modesty and humility, due to:

Very fluctuating results (particularly on the fairways) depending on:

- Soil specificities,
- Seasonal period and connections between seasons (rainfall, heat).
- Felt material thickness.

Very positive results regarding :

- Intrants reduction,
- Regular implementation of two new cultural practices,
- Great responsiveness to hazards,
- The greenkeepers team trained to new practices.

The non-modified playing areas approaches still need to be studied.

Yet, this programme remains difficult to implement without a strong will of the Club and its managers.

The super-intendant's expertise is also essential as each site must be approached according to its own features and with a lot of patience.

In the golfing world, climate change is not the unique reason for motivating a flora conversion process. The reduction of water consumption, intrants and maintenance costs are obviously among the first priorities of the clubs committed into sustainability. Nevertheless, the golf players' expectations have also changed for the last 30 years: facing the summer is no longer their main concern. They now expect to play on nice turfed areas even at the summer time and are not willing to accept long turf recovery periods after the dry season. As a matter of fact, the golf industry needs to develop new technologies in order to improve the golf courses resilience.

Sustainable landscaping and management.

Discussion with Didier Novelli - Vidauban Golf Club

The selection of plants species adapted to the local conditions (climate, soil, water…) engraves the sustainable landscaping over the years. The plants are chosen in accordance with their resilience to the heat and the summer drought. Some plants stems are rooted from the local species present in the natural habitats and local cork-mulch is used to cover the beds. The non-surviving plants in the decorative areas (natural selection) are not replanted afterwards. The species adapted to the local conditions are more resistant and require less management.

All the landscaping developments on the golf course are inspired from the local landscape setting, namely La plaine et le Massif des Maures, a permanent source of inspiration for the greenkeeper-landscaper.

The species adapted to the local conditions are more resistant and require less management.

Pistachio tree edge – local species of the Plaine des Maures.

La plaine des Maures – an inspirational mosaïc of natural landscape for a gardener-landscaper.

Enhancement of the most beautiful items around the village.

Landscaping developments on the golf course, inspired from the local landscape setting.

Along the course - A typical plaine des Maures local species edge to welcome small fauna.

Revegetation of a pond banks to partially retain the intrants streaming from the close playing area.

Bunkers managed manually, without any pesticide.

Preservation of natural zones on the golf course.

A three-year sylvopasture program with donkeys to maintain the natural areas on the golf course.

Workshop 5. Innovation & perspectives

Reminder, on the definition of the scientific approach and the requirements of a thesis curriculum.

Aurélie Lacoeuilhe (UMS PatriNat)

Following the « Management workshop", attendees have discussed the different topics which could be eligible, within the process of a scientific approach, both from a theoretical and practical point of view.

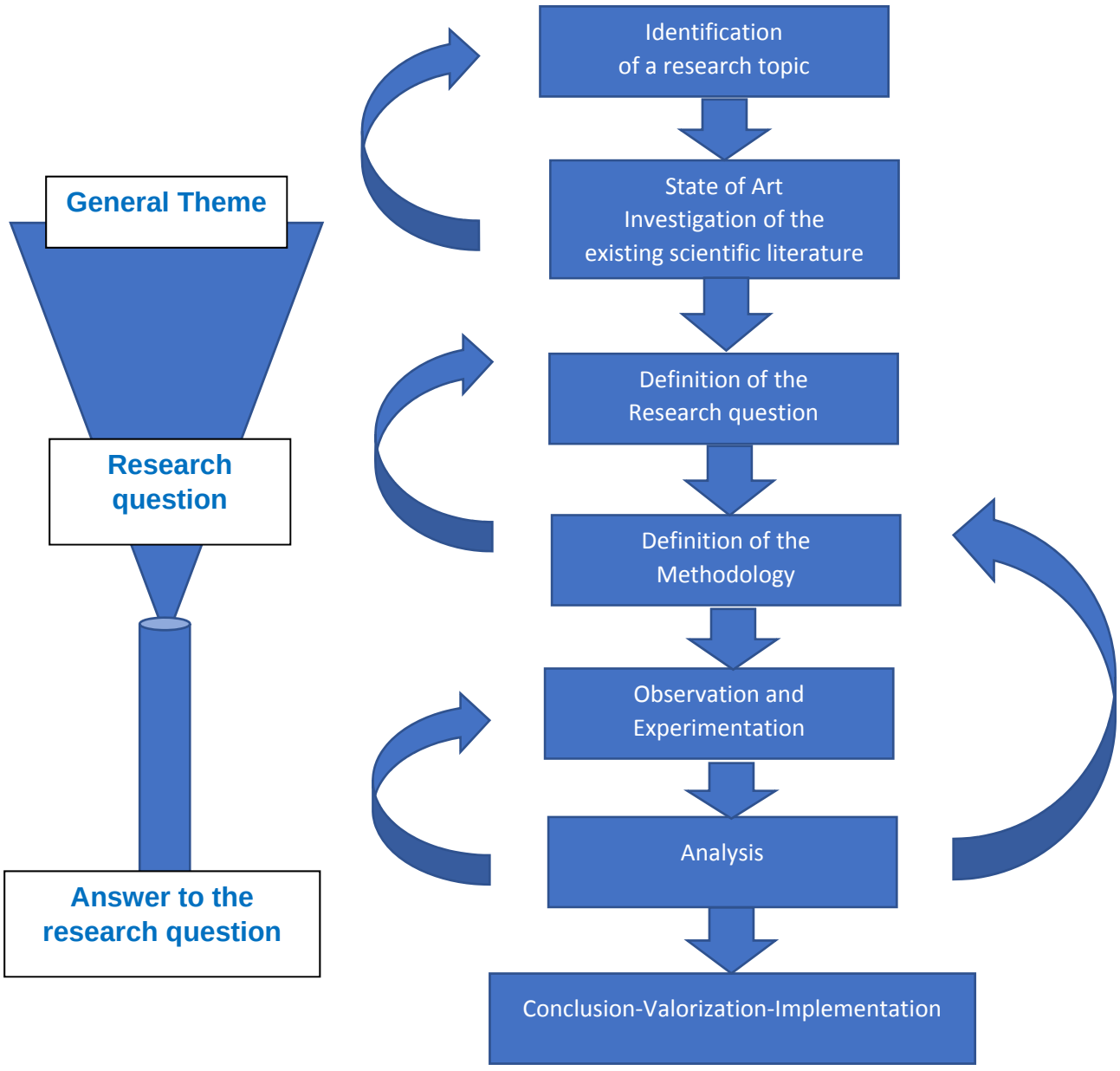
As reminded below, a scientific approach goes through different steps.

From an idea or an interest for a specific subject will emerge a research topic.

This topic must have:

- a scientific focus,
- a social pertinence and
- a feasibility in terms of time, human, technical and financial resources.

THE DIFFERENT STEPS OF THE SCIENTIFIC APPROACH



A thesis subject has to:

- be validated by a PhD school,
- be co-managed by a Director of Research,
- be innovative in order to push forward the scientific community's knowledge,
- allow the transmission of the information to a wider public.

Not all subjects are eligible for a thesis.
A prior investigation of the existing scientific literature on the chosen topic is compulsory, mainly to point out the research question and to identify the limits of the existing knowledge.

The CIFRE process – Industrial Agreement for Training through Research

The French Ministry for Research supports the CIFRE programs to foster research collaboration between the academic and the business sectors.

"A CIFRE thesis is a scientifically relevant thesis, devoted to:

- a concrete action,
- the definition of targets and action tools.

The scientific quality must not yield this practical target".
(Comment from a researcher appraising a CIFRE thesis).

More information available on the ANRT site (National Association Research and Technology).http://www.asso.fr/fr/espace cifre/accueil.jsp

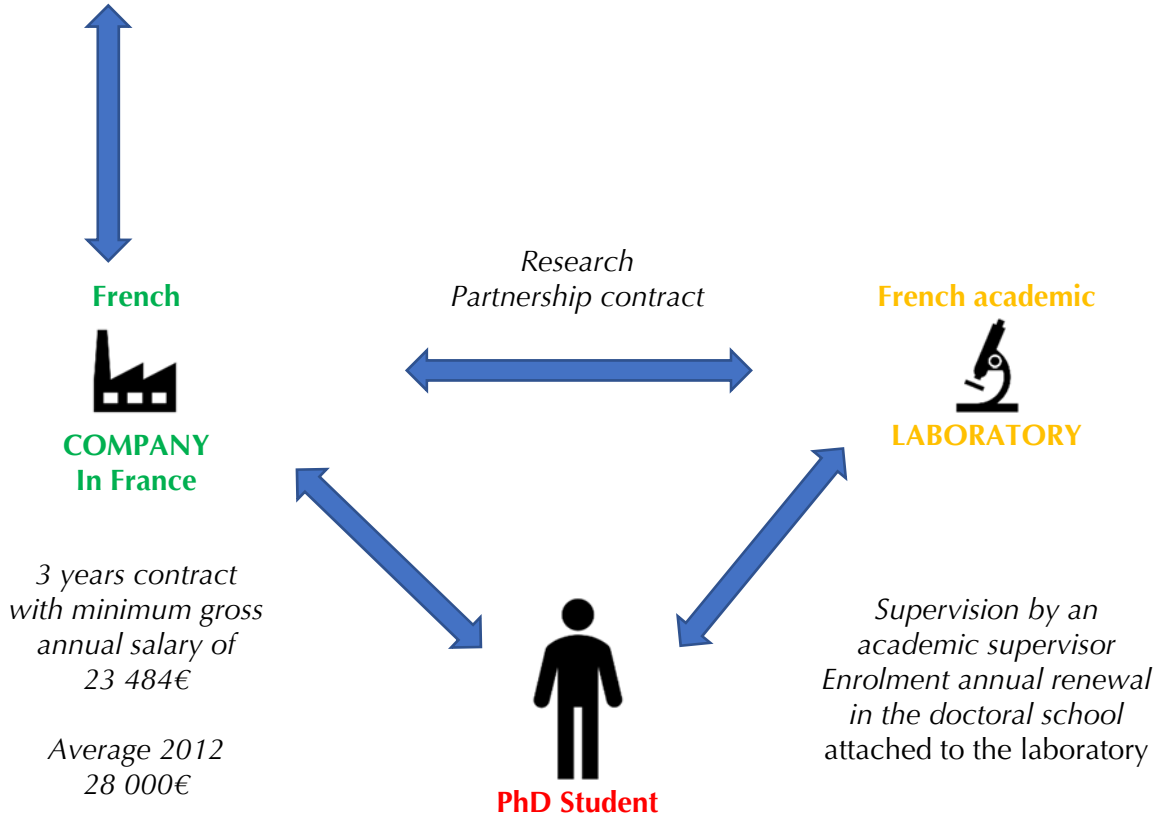
AND
http://www.web1.anrt.typhonnet/sites/default/files/plaquette cifre 2016 0.pdf

To apply to a CIFRE Program: http://cifre.anrt.asso.fr

THE CIFRE PROCESS

ANRT – accredited by the French Ministry of Higher Education and Research

- **Assesses the doctoral research project**
- **Assesses the involvement of the company and sign and industrial training convention trough research with the Cie**
- **Grants to the company for an amount of 14 000€ per year**



- **Advantage for French companies**: train future employees for their French or foreign offices.
- **Advantage for the French academic laboratory**: train doctoral students as per industrial needs.
- **Advantage for PhD student**: gain valuable academic and industrial research abilities in France.

Research topics and perspectives

Two research subjects have been identified at Vidauban golf course:

- Recycling of grass clippings and cores,
- Nematodes and ants proliferation on the golf course.

As the 2nd subject appeared to be more significant, a study on this topic is then launched as a first step and in the framework of the partnership between the National Museum of Natural history and the Vidauban corporate Foundation for the environment, co-managed with Dr Colin Fleming, a nematodes expert from the Agri-Food and Biosciences Institute of the Queen's University of Belfast.

The second step will consist of defining a Master 2 internship subject (to investigate the scientific existing literature and define the research question), before planning the recruitment of a thesis student.

Furthermore, to answer the question "What would be the next step to foster biodiversity into the golfing world?", the attendees have suggested to rely on the environment psychology technic to reach the golf players.

In the same tariff conditions, a golf course promoting its commitment in favour of sustainability will provide its club with a competitive advantage on other clubs. The analogy with the agri-food sector is easy: nowadays people pay more to get the eco-friendly and healthy organic food.

We are guessing then that a golf player will prefer to practice his favourite sport in a responsible club.

In that context, one question has raised inducing a project of an enquiry on the topic.

"How do golf players perceive the biodiversity?"

The enquiry results could give us the opportunity to better understand the biodiversity influence on golf players and the bond they have got with it, when practicing their sport or more widely, in their daily life.

Overview on the 1ST working session about

"Golf and Biodiversity"

A common objective: the preservation of biodiversity

The partnerships FEGVE-MNHN and FFG-MNHN are both targeted to two main objectives: improve the knowledge about biodiversity to be able to better preserve it.

Taking into account the different sites activities, the management of the courses and their remarkable, or ordinary, existing biodiversity all attendees have positively contributed to the debate aiming at integrating biodiversity into golfing activities.

A golf course is a "living area". Each golf course is then different and each zone on each course is different too. Therefore, there is no management standardized miracle formula adapted.

We need then to reinvent constantly, to innovate and adapt in order to reconcile agronomic, sport and ecological challenges.

Not only a working session but a great time of sharing views and experiences

Thanks to the workshops, share visions and productive discussions germinated.

Always conciliating theory and practice new working paths have been explored, with the objective of progressing towards a better functioning to understand the reasons of the improvement!

In reference to the Albert Einstein's quote:

" The theory is when we know everything but nothing functions. The practice is when everything operates but nobody knows why.

Here we have reconciled theory and practice. Nothing works and nobody knows why……."

During this working session everybody has enjoyed a great time of shared experiences and got back a lot from a human, scientific and technical point of view. And last but not least, all participants want to pursue the discussions and resound the developed ideas beyond our newly created think-tank.

Considering the enthusiasm and the success of this first edition, it is agreed that a second seminary « Golf and Biodiversity » will be held in 2018.

Thanks

The fruitful collaboration between golf professionals and naturalist experts drove us to a successful working session.

Thank you to the 16 attendees for this 1st friendly and hard-working seminary.

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