

# ign

N° 98

Spring 2020

## MAGAZINE

### 17\_FORESTS

NATIONAL BIODIVERSITY  
OBSERVATORY  
Delivering precise forest data

### 27\_INSIGHT

An observatory  
to closely monitor  
land take

### 30\_PROFILE

Claude Ponti



**Geospatial data  
serving biodiversity**

Note: given the health situation in France as this issue was in preparation, certain events mentioned are likely to be cancelled or rescheduled to a later date.



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**ign**  
MAGAZINE



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**Christophe Aubel**  
 Chief outreach officer  
 French biodiversity office (OFB)

## Urgent action needed to arrest declining biodiversity

**B**iodiversity is declining at an unprecedented rate, with a 60% drop in global numbers of vertebrates between 1970 and 2014, 75% in flying insect biomass in Germany over the last 30 years and a third of the population of French farmland birds, and 75% of Earth's ecosystems, 50% of freshwater ecosystems and 45% of marine environments now considered degraded. The causes of this decline are known and they are due to the pressures exerted by human activities.

These figures pose an ethical question—What right have we to be destroying life in this way?—as well as that of our own survival, as humans are part of and dependent on the interactions of living things, and the quality of our future lives depends on the richness of biodiversity around us.

The good news, as the IPBES<sup>1</sup> reminded us in its report last spring, is that it is not too late to make a difference, provided that we engage 'transformative changes'. That means changing our modes of production and consumption, fostering agro-ecology, establish-

ing sustainable fisheries, changing how we generate energy, developing incentives and funding to support biodiversity, developing and enforcing environmental law, and getting citizens more actively engaged.

It is our collective responsibility to initiate

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"It is not too late to make a difference, provided that we engage 'transformative changes'"

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these changes, and each and every one of us has a role to play, especially in a year in which we must chart and embark on a new course, starting with the IUCN<sup>2</sup> World Conservation Congress in Marseille in June and then at the COP 15 conference in China in October. And we know that for such major events to succeed, all stakeholders and the general

public need to get on board.

OFB, the French biodiversity office, is making a tangible contribution to this effort, working with all concerned. It is providing aid and support, including to territories and firms that are committing to preserve nature through the act4nature France initiative, other partners making the same commitment, the citizen platform showing what we can do to promote biodiversity, and marine and terrestrial outreach areas. These efforts are being pursued by OFB's 2,800 people, covering a broad spectrum from knowledge acquisition to policing of the environment.

Everyone can make a difference. When we take action, the results are visible and nature rewards us. Whether a hedgerow we have planted brings back nesting birds or insects return where municipalities have stopped applying weed killers, examples of nature being successfully restored abound. ●

1. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

2. International Union for Conservation of Nature



LOCATION SCOUTING

# Geoportail goes behind the scenes

**W**henever a film opens with a long sequence-shot of a place of exceptional beauty, you might think an army of helpers had to scout France and the globe to find the exact backdrop the director wanted. But that's not how things are done in the modern world. These days, that swimming pool and dream house can be located simply by a red circle on a map. Working behind the scenes, the French association of location scouts uses the Geoportail online search engine to find that ideal shot. On 10 January, 20 of its members attended a training session at IGN to learn how to get the best out of the platform. "With Geoportail, we can quickly survey rivers and streams, figure out

the lie of the land or locate a glade in the middle of a forest and even find the precise coordinates of a house in an out-of-the-way location," explains Yann Le Borgne, a location scout with 20 years' experience who was already using Geoportail before the training. "We're always working against the clock, so a digital map is an ideal tool to rapidly get a picture of an area, identify land parcels and see whether there's a train station or car park nearby, before actually going there." A meeting of minds that put Geoportail in the spotlight. ●



**Learn more**  
<http://asso-repereurs.fr>

REVIEW

## Geodata to understand our world

The April special issue of general-knowledge review *L'Éléphant* is devoted to mapping and geolocation, two topics that have lately attracted a lot of media attention. In fact, the media have long adopted mapping parlance such as 'disoriented', 'without a compass' or 'losing direction' without even realizing it. Maps tell the story of people's lives, their past and their day-to-day concerns, and offer a window into their future. *L'Éléphant* therefore turned to IGN, whose history is steeped in the traditions of French cartography. The agency is celebrating its 80<sup>th</sup> anniversary this year and the review wanted to retrace its origins over eight decades presented by topic to understand the pioneering work of the men and women who have mapped France and the globe. Through the review's 160 pages, scientists and key figures show us the secrets of maps and how they portray the world. Like the would-be noble in Molière's play *The Bourgeois Gentleman*, we have all become geographers without knowing it and this special issue tells you why. ●



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 **Learn more**  
<https://lelephant-larevue.fr>

BY THE NUMBERS



**300 000**  
sq.km

crop acreage in France for which farm payment claims were filed under the European Union's Common Agricultural Policy (CAP) in 2019.

**32**  
million

addresses in the national database accessible under open licence since 1 January 2020.

**6**  
partners

in the new Gustave-Eiffel University: IFSTTAR, the Paris-Est urban and territorial architecture school, three engineering schools (EIVP, ESIEE Paris and ENSG-Géomatique) and Paris-Est Marne-la-Vallée University.

## IGNrando tourism and hiking maps shop



### Green lanes and cycle routes of France

This map has been a bestseller since it was first released in 2015. The new 2020 edition takes you through France via the Eurovélo trails and safe Green Lanes (*voies vertes*). More than 30,000 kilometres of cycle routes away from road traffic, and for each of the 750 trails a QR code to access detailed descriptions compiled by the af3v association.

**Price: €7.50**  
**Scale: 1:1 000 000 (1 cm = 10 km)**



### TOP 25 maps of the Vosges mountains

Do the excellent TOP 25 walking maps need any introduction? They do when a whole series, here covering the Vosges mountains, has been updated in partnership with the Club Vosgien hikers association. The 24 maps cover the entire range, with six of them in the TOP 25R waterproof and tear-resistant format. TOP 25 maps are GPS-compatible, provide tourist information and free access to a range of Internet services to help you plan your trip.

**TOP 25 price: €13.20**  
**TOP 25R price: €16.95**  
**Scale: 1:25 000 (1 cm = 250 m)**



### Hiking through Corsica

If you're looking to take on Corsica's iconic GR 20 walking trail, this map in the 'discovery trails' series is for you. Its 200 kilometres of paths showing accommodation, *gîtes* and *refuges* (mountain huts), elevations and tricky passages will prove vital in planning your trip. Printed on both sides and laminated.

**Price: €8.95**  
**Scale: 1: 50 000 (1 cm = 500 m)**



# ROUNDUP

\_Our community



@LATELESCOP  
24 January 2020

#AppliSat 1 night-time archive image @cgsatellite2 + 5-m BDORTHO @IGN + IRIS census basemap @INSEE = district-by-district night sky brightness map of #Nantes in November 2018 by @LaTeleScop. Map and district classification at [bit.ly/CGSatNantes](https://bit.ly/CGSatNantes) #pollutionlumineuse #tramenoire



@ESPRITSORCIER  
8 March 2020

How do we draw a #map? And how was it done in the 18<sup>th</sup> century? What impact does technology have on #cartography? How does Google Maps work? A new special report to share from @IGNFrance so you won't get lost!



@VPWPRESS  
17 January 2020

2019 forest inventory: our resources are on the up. While megafires are still burning in Australia and we learn that 30% of Brazil's forests went up in smoke last year, IGN is releasing its 2019 forest inventory. [sigtv.fr/Inventaire-forestier-2019-nos-ressources-augmentent\\_a1137.html](https://sigtv.fr/Inventaire-forestier-2019-nos-ressources-augmentent_a1137.html)



## YOUR SHOUT

You share your thoughts and questions with us on social media. Join the conversation!



@ADRESSEDATAGOUV  
1 January 2020

The #NationalAddressDatabase is now under #OpenLicence! We've updated our website accordingly. More details coming in the days ahead. 📄



@UGUSTAVEEIFFEL  
28 January 2020



#Press conference this morning for the #launch of Gustave Eiffel University with acting chancellor H el ene Jacquot-Guimbal. See the press kit at [bit.ly/UnivGustaveEiffelDossierPresse](https://bit.ly/UnivGustaveEiffelDossierPresse).

### Distinctions for Geoportail and SIEau

(...) The ministry rarely conducts impact assessments on improvements in service delivery. (...) Only four have ever been done before. The ministry oversees 54 government operators. The Cour des comptes [Editor's note: French Court of audit] singles out two for special praise:

- IGN and its Geoportail geodata portal, used "intensively" in the first half of 2019, with 150 million requests a day and 964,000 single visits per month.

- The Cour des comptes sees an example to be followed for API usage, at a scale "not seen in other ministerial areas". [silicon.fr/transformation-numerique-etat-avertissements-cour-comptes-ministeres-334974.html](https://silicon.fr/transformation-numerique-etat-avertissements-cour-comptes-ministeres-334974.html)

"DIGITAL TRANSFORMATION OF GOVERNMENT: COUR DES COMPTES CALLS OUT MINISTRIES" SILICON.FR



SATELLITE EARTH IMAGERY

## SPOT keeping French territory in its sights

The world's first civil Earth-observation satellite, SPOT-1, was launched from the Guiana Space Centre in Kourou by an Ariane vehicle during the night of 22 February 1986, marking the start of a fantastic success story. Since that day, seven SPOT satellites in total have been sent into orbit. The latest in the series are SPOT-6 and SPOT-7, which last year supplied colour images of metropolitan France at a pixel resolution of 1.5 metres. This satellite coverage, refreshed every year for the last six years, is vital to keep track of changes and observe land take and ecological impacts. In 2019, SPOT imagery revealed exceptional drought conditions affecting France's soils. The nationwide picture of metropolitan France is available free from Geoportail. ●

 **Learn more**  
[www.geoportail.gouv.fr](http://www.geoportail.gouv.fr)

ENSG

## Students in the footsteps of Vauban

Sébastien Le Prestre, Marquis de Vauban, the famed military engineer and architect, would have shown a keen interest in the work of the students pursuing a PPMD master's degree in photogrammetry, positioning and deformation measurement at ENSG, the French national geographic sciences school, especially when they took possession of his Mont-Dauphin fortress to create a 3D model of it. To be precise, they focused their attention on the Rochambeau barracks and the Lunette d'Arçon. Here, we are talking about the kind of extreme precision required to establish a local topometric grid tied by GNSS to the RGF93 reference system and to build a 3D model of the lunette by photogrammetry from 1,500 or so ground and aerial photos, and by lasergrammetry using a little more than 120 lidar scans. This two-week practical course for the PPMD master's degree is receiving



support from the French national monuments centre. The data will serve research and training purposes as well as forming the basis for virtual tours of places closed to the public. The remarkable results have been welcomed enthusiastically by the French military archives service (SHD), confirming the PPMD master's degree's digital heritage archiving capacity for military, industrial, religious and royal holiday residence sites built up over the last five years. ●

 **Learn more**  
<http://www.ensg.eu/Masteres-Specialises-R>



EXHIBITION

## 300 years of French hydrography at Géoroom

How do we measure the depth of the ocean today and how did we measure it in the last century? Would you recognize the sound of a sperm whale, submarine or trawler? SHOM, the French naval hydrographic and oceanographic office, has the answers to all these questions and more in an anniversary exhibition charting its 300-year history dating back to the world's first official hydrographic service with a range of sensory and interactive features. Visitors will discover the marine world through six themes, from navigation safety and submersion hazard mitigation to exploration of the oceans and the 'blue' economy. For Héléne Lecornu, who is leading the '300 years of French hydrography' project, understanding the oceans is vital: "France has the world's second largest maritime domain, which covers 10.8 million sq.km. SHOM's mission as the heir of the naval maps and charts service created in 1720 is to know and describe this domain, from the ocean depths to coastal waters." IGN and SHOM are also working together to build a continuous land-sea digital elevation model called Litto 3D, designed for hazard mitigation. The exhibition is temporarily closed in accordance with government health guidance, but as soon as restrictions have been lifted it will be open Monday to Friday from 1.30 to 5.30 p.m. until 12 June at Géoroom, 8, avenue Pasteur, Saint-Mandé. Entrance is free. ●

 **Learn more**  
[https://www.shom.fr/fr/300\\_ans](https://www.shom.fr/fr/300_ans)

# Geospatial data serving biodiversity



**Providing peerless information through forest inventories and generating new geospatial databases to document the world's richest ecosystems, IGN plays a pivotal role through its scientific expertise and informing public policies to preserve biodiversity.**



Fontainebleau forest

# “IGN is one of the primary producers of data on biodiversity in France's forests.”



Since the early 1990s, their job has changed completely. In addition to tree species, heights and circumference, they now record the presence of other plant species, detail terrain exposure and topography and examine soil conditions. They follow a study protocol comprising 160 variables, and since 2011, they have learned to identify different types of natural habitat. They are the 60 field officers who compile the national forest inventory, visiting or revisiting 14,000 plots every year according to a precise statistical sampling method. In nearly 30 years and a little over 213,000 surveys, they have built up a unique and freely accessible database on sites covered by the National Inventory of Natural Heritage and Forestry Inventories.

## IGN generating forest data

“The 2012 merger of IGN and IFN, the national forest inventory, made our agency one of the primary producers of data on forest biodiversity in metropolitan France,” explains Sophie Reynard, head of IGN corporate and partner relations at the biodiversity and land-use public policy support directorate. “These data are used by major public institutions working to safeguard biodiversity such as the French biodiversity office (OFB) and the PatriNat<sup>2</sup> joint service unit, which provides expertise and manages scientific knowledge. They are also used by the national biodiversity observatory (ONB) to inform and educate citizens.”

This mission generating environmental data, which is new to IGN, is especially important to assure compliance with the European Union's 1992 Habitats Directive, which requires EU member states to monitor certain natural habitats of special interest and produce a report every six years documenting their conservation status. Of the 132 habitats catalogued in France, 30 are in forest areas (see opposite).



An IGN field officer takes measurements for a forest inventory.

### GLOSSARY

#### **Natural habitat**

The set of environmental elements that characterize a territory, providing the natural resources required for the species it normally supports.

#### **Green and blue corridors**

A network of land and water corridors providing ecological linkages identified in national and local government planning documents.

#### **Land-sea interface**

The boundary where the land meets the sea on the highest spring tide in normal weather conditions.

## Mapping heritage forests

“Being able to obtain ecological and dendrometric<sup>3</sup> data for the same plots is another key advantage when assessing habitat conservation status,” says Fabienne Benest, head of IGN’s forest ecosystems department, the agency’s national hub for forest ecology. “This opens up new avenues for preserving biodiversity, which is encouraged, for example, by the presence of old trees or dead wood.” IGN has also begun mapping heritage forests, working from sometimes very old maps to locate areas that have been wooded for at least 150 years and cross-referencing them with available data—field surveys, topography, forest access and so on—to look for those that have not been logged for at least 50 years. This project dovetails with plans for the new national strategy to extend protected areas that President Emmanuel Macron is expected to announce at the IUCN World Conservation Congress in Marseille this June. IGN’s special expertise in forest environments has also won it a place on the forest biodiversity platform, a consultative body set up in 2012 by the Ministry of Agriculture and Food on which a range of stakeholders, from commercial operators to environmental conservation associations, are represented. This platform has been tasked with crafting proposals to improve observation of forest biodiversity, particularly wild fauna.

## Restoring ecological linkages

Unsurprisingly, mapping of France’s metropolitan and overseas territories is also central to IGN’s biodiversity preservation efforts. Since the Grenelle review of environmental policy, restoring linkages between ‘green’ (land) and ‘blue’ (aquatic) ecological corridors has become the cornerstone of government policy in this domain. IGN is working on several projects to refine conservation statuses. On the land side, the most ambitious are the CarHAB natural habitats map, monitoring of bocage mixed woodland and pasture landscapes and tracking of land take. On the aquatic side, BD Topage, France’s new hydrographic reference database, was recently released for the benefit of all water stakeholders on the website of SANDRE, the French national agency in charge of water data and reference databases. Co-produced with OFB, it is more precise than its predecessor (BD Carthage) and is above all a comprehensive information system that will be continuously updated by an extensive network of contributors. Work has also begun on designing a wetlands portal and many more projects to map specific habitats are set to play a vital role in the years ahead. For example, IGN has joined forces with SHOM, the French naval hydrographic and oceanographic office, and has been working for several months on a new high-resolution plot of the land-sea interface. The coastal strip is one of the richest environments in terms of biodiversity, but it is also among the most fragile. ●



### VIEWPOINT

**Julien Touroult,**  
co-director of the PatriNat  
joint service unit

“France’s forest inventory is one of the few national-scale protocols closely matching the concept of a natural habitat as defined in the 1992 EU directive. Thanks to the quantity and statistical quality of the data we collect, with a revisit interval of five years, we are increasingly able to meet our obligation to monitor the surface area and structure of the 30 forest habitats covered. This shows with hindsight that building on an existing system—the IFN was first established in 1959—was the right way to go rather than starting from scratch, which might have led us to a system better adapted to its goal but would perhaps have been too costly for it to actually see the light of day. Indeed, we have no equivalent for other types of habitat. As a scientist, I obviously would like to see it improved and all source data shared on a continuous basis, in addition to the report compiled for the EU every six years.”

1. Since 1 January 2020, the French biodiversity office encompasses AFB, the French biodiversity agency, and ONCFS, the national hunting and wildlife commission.
2. Jointly overseen by OFB, the national scientific research centre CNRS and the national natural history museum (MNHN).
3. Describing the physical characteristics of trees.

# Preserving bocage landscapes

For three years now, IGN and OFB have been working together to keep track of the nation’s bocage landscapes, a habitat especially conducive to biodiversity.

“**B**ocage mixed woodland and pasture landscapes are among the best for biodiversity, where mixed crop-livestock farming and related practices encourage a wide range of semi-natural ecosystems, from thick or thin hedgerows—sometimes atop earth banks—and thickets, permanent pasture and fields of crop to ponds and wetlands. Species with very different needs may co-habit there, and yet there were no recent maps of this type of landscape that is constantly in retreat,” says engineer Sophie Morin, team leader at the bocage unit of OFB, the French biodiversity office. For the last three years, she has been working with IGN teams to deploy the first national bocage monitoring system. “This project aims to serve the public policies of our overseeing ministries,” notes Barbara Freidman, in charge of partnerships and institutional relations at IGN. “It ties in with the biodiversity plan of the Ministry for the Ecological and Inclusive Transition, notably thread 3 on continuity of green and blue corridors, and with the agro-forestry development plan of the Ministry of Agriculture and Food. France is a pioneer in Europe in this domain, which is vital for sustainable stewardship of agro-ecological resources.” Led chiefly by IGN, the first phase of the project covers development of a nation-



Bocage landscape in Normandy

© Laurent Mignaux / Terra

al hedgerow basemap layer with a high-resolution one-square-kilometre grid to identify different habitats in each municipality and a range of indicators such as length, density and connectivity. The basemap layer will be available free from this spring on the website of the National Inventory of Natural Heritage and on Geoportail.

## Highly automated processing

“There were previously two databases: BD Topo® and the RPG graphic land parcel register,” explains research engineer Loïc Commagnac, who is leading the project for IGN. “BD Topo® covers all of France but only records fairly large hedgerows. The RPG is more exhaustive and more recent, but it doesn’t cover farmland claiming European subsidies. And in both cases, hedgerows are represented as polygons, which aren’t suited to density or connectivity calculations required to study their ecological functions. So the two databases have been merged and linearized using an automated process.” Compared to manual data recording for the Gers and Pays de la Loire regions, the goodness-of-fit rate is close to 85%, enough to now move on to phase 2, which will involve surveying bocage landscapes and identifying their types on the basis of additional data such as farm size, presence of ponds and soil characteristics. This will be followed around 2021 by phase 3 to monitor the quality of these landscapes in the field with the aid of scientists, forest rangers, farmers and associations. “Focusing on habitats instead of a particular species or practice brings communities closer together in the end, which makes our efforts more effective,” concludes Sophie Morin. ●

## BY THE NUMBERS



70%

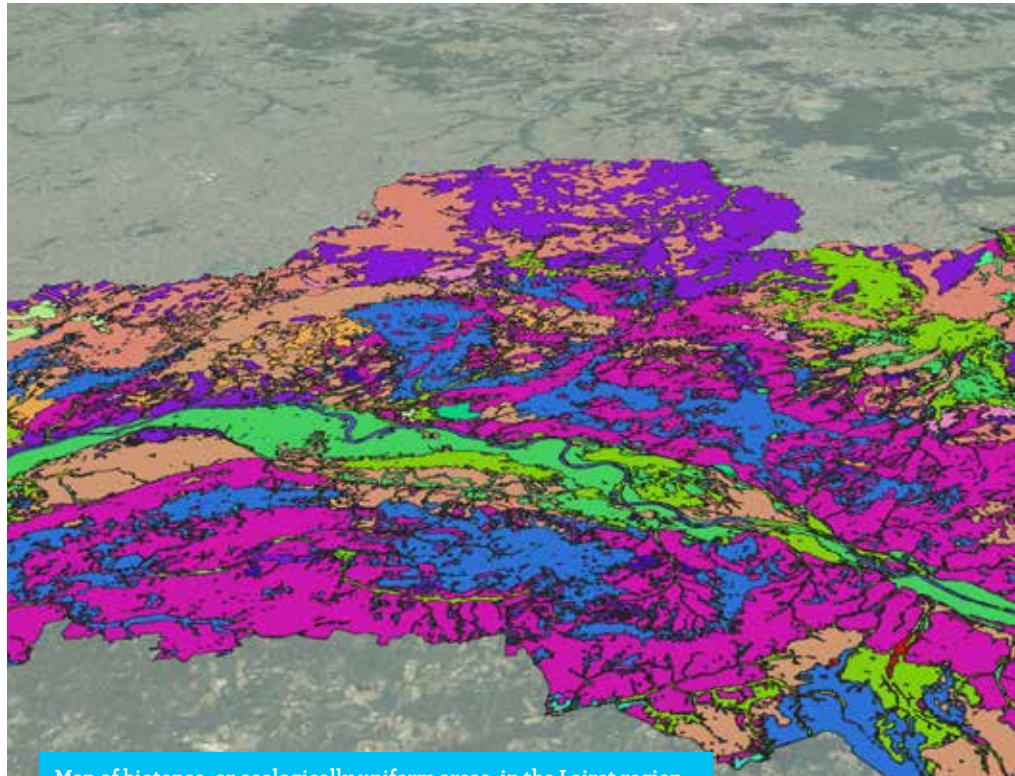
**of hedgerows are thought to have disappeared since the start of the 20<sup>th</sup> century.** Between 2006 and 2014, France is estimated to have lost 58,482 hectares of hedgerows and tree lines all told, a drop of 6%.

Sources: Agreste and Solagro

# Mapping natural habitats to improve conservation

For the CarHAB programme to compile the first nationwide map of natural and semi-natural habitats, IGN, the PatriNat<sup>1</sup> joint service unit and the French biodiversity office OFB are set to deploy a predictive method that relies on artificial intelligence.

**I**f you don't succeed first time round, don't give up... In 2011, the Ministry of Ecology oversaw a project that asked a group of operators and universities to compile a nationwide map of natural habitats. This new tool was to inform policymaking in various domains likely to impact biodiversity, such as the creation of protected areas, the network of green and blue corridors and major urban and land planning projects. These data were to be part of the national natural heritage inventory (INPN). A Herculean endeavour. Many experts—biostatisticians and modelers, botanists and remote-sensing and geographic information system specialists—were brought on board and the task of matching field surveys to aerial and satellite imagery was huge. The financial, scientific and operational obstacles proved too hard to overcome, and the programme was dropped in 2017. In response to ever-growing needs, the Ministry for the Ecological and Inclusive Transition decided to bring it back to life and a new methodology relying more on automation was conceived, making extensive use of supervised learning techniques. In a nutshell, it involves matching two major types of information that characterize habitats: biotope, as defined by seven parameters (like, for example, climate and soil), and vegetation physiognomy (pasture, forest, etc.). The model uses imagery to predict physiognomy, and climate, topography and geology data to predict the biotope. Initial parameters are set based on available



Map of biotopes, or ecologically uniform areas, in the Loiret region.

knowledge and then refined through field surveys conducted by specialists from botanical conservancies around the country.

## First nationwide map in 2025

“The learning data are ground truth used to generate department-scale predictions, which are standardized at national level,” explains Yorick Reyjol, who heads the ecosystems and networks team at PatriNat. “Each uniform zone identified on the habitat map will be assigned a confidence level to guide botanists checking the model’s predictions and to improve data quality and the machine’s intelligence.” Among the pilots underway for the project, PatriNat is supervising identification of biotopes in close collaboration with a research unit at the University of Saint-Étienne<sup>2</sup>. At the same time, IGN is working on the vegetation physiognomy map using a methodology

developed with numerous partners<sup>3</sup>. The data will be geometrically stitched together by IGN, while PatriNat is tasked with predicting habitats present on the basis of the physiognomy and biotope information, working closely with botanical conservancy experts. The resulting nationwide habitat map is planned to be ready by 2025, with 20 departments covered each year. ●

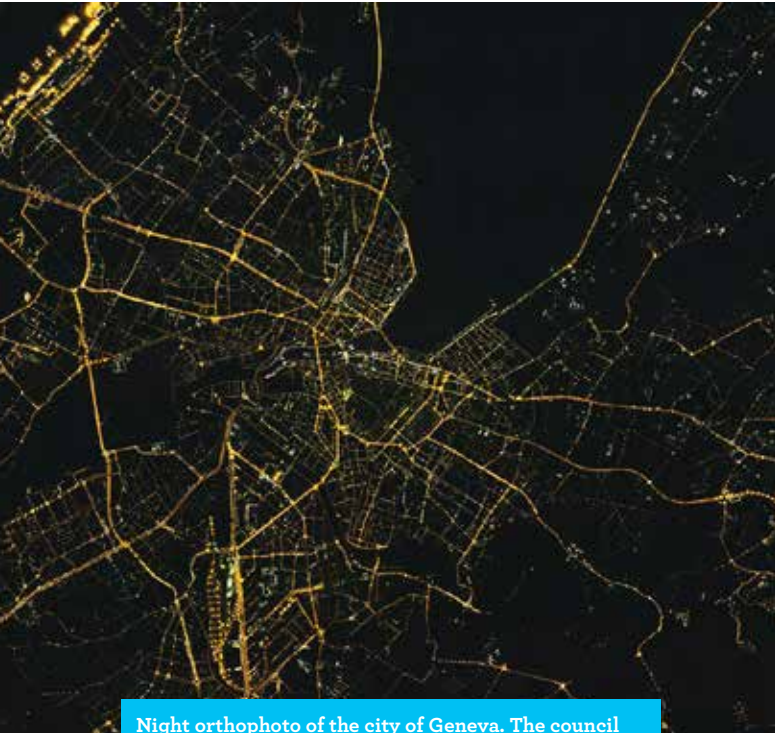
1. Natural heritage unit overseen by OFB, the national scientific research centre CNRS and the national natural history museum (MNHN).

2. CNRS 5600 EVS-Isthme joint research unit (Isthme for Image société territoire homme mémoire environnement).

3. Notably the CESBIO biosphere space research centre, Rennes II University, INRAE, the national research institute for agriculture, food and the environment, and CEREMA, the hazards, environment, mobility and land planning research centre.

# When night calls

IGN is producing aerial night images for local authorities with a view to creating networks of ‘dark corridors’ protected from light pollution for nocturnal species, reaching as far as urban areas.



Night orthophoto of the city of Geneva. The council is studying ways to reduce nocturnal light pollution to restore linkages in response to the alarming decline in bat populations.

To help local authorities grasp the impact of artificial lighting, IGN produces maps from night orthophotos. “We began the first trials in 2008 for street lighting planners looking to optimize power consumption,” explains Sylvain Airault, head of IGN’s imagery and aeronautics department. “Then we were caught up by the concept of dark corridors as it increasingly became a focus of public debate.”

## Towards a new science of lighting?

To reduce the risk of images being blurred by longer exposure times than those used during daytime, IGN developed cameras capable of correcting automatically for aircraft movements. Photos are then assembled using geolocation data. The first maps compiled cover the regions of Ile-de-France, Metz, Geneva and Nantes. For Nantes, a reprocessing technique was devised by CEREMA<sup>1</sup>, the hazards, environment, mobility and land planning research centre, to highlight in black sectors where brightness is less than 3 on a scale of 10 on a yellow background map. The maps are thus easily overlaid on natural species inventories and urban zoning plans. “Dark corridors are at the centre of debate about our lighting development plan,” admits Dany Joly, in charge of street lighting at the Nantes Métropole borough council. “The key is to find the right balance between safety and the environment. Nineteen of our 24 boroughs are already switching lights off in the middle of the night and the impact is visible in aerial photos. The gradual roll-out of dimmable lighting will give us more scope for action.” All that will then remain will be for biologists to verify whether this still nascent ‘science’ of lighting actually works. ●

1. Centre d’études et d’expertise sur les risques, l’environnement, la mobilité et l’aménagement. CEREMA is a government agency.

## 3 QUESTIONS



Romain Sordello

Green and blue corridor and light pollution expert at PatriNat (OFB-CNRS-MNHN)

### How is light pollution impacting nocturnal biodiversity?

Just like physical barriers, light is an obstacle for many species of land animals. Light pollution leads to fragmentation of habitats, reduced pollination and numerous biological and demographic disruptions.

### What exactly are dark corridors?

Just like their green and blue counterparts, dark corridors aim to preserve linkages in the natural environment so that animals can move about freely. And these ecological linkages factor in the nocturnal dimension of the environment from the outset.

### What measures and solutions can local authorities apply?

Limiting light pollution in new urban areas by switching off or dimming street lighting at certain times of the night are just some of the solutions currently being trialled. Measures will depend on the specific context and challenges in each area.



© R. Emeyriat

# “Heritage forests are great potential reserve for nature”

**Fabienne Benest**, head of the forest ecosystems department at IGN’s Southwest division. Since 2017, she is also vice-chair of the protected areas committee of CNPN, the national nature conservation council.

## What is the national nature conservation council, or CNPN?

**Fabienne Benest:** The CNPN is one of the two national governing biodiversity bodies. It gives scientific advice informing the Minister for the Ecological and Inclusive Transition’s decisions concerning nature conservation. The council has 30 sitting members on two committees, one for species and one for natural areas. I’m on the protected areas committee, which examines projects seeking to create or modify nature reserves and national or regional parks. We’re currently looking at extending such areas to cover 30% of French territory, with strong protection for 10%, whereas at the moment they only cover 1.5%.

## How are the council’s members chosen?

**F. B.:** It’s always the result of someone’s career

experience putting them in a position to contribute independent and objective technical or scientific insight to complement the other members. Personally, I was approached because of my expertise in forest ecology and nature conservation in France. I’m leading a small national team of engineers tasked by IGN with exploring new avenues for characterization and monitoring of biodiversity in forest environments.

## Can you give a tangible example of how you are contributing?

**F. B.:** Our project to map ancient and old-growth forests, which are both great potential reserve for nature, in partnership with the Sud Atlantique national botanical conservancy, supported by the Regional Council and the Nouvelle-Aquitaine office of DREAL,

**KEY DATES**

**1991–1996**  
**Division head** at ONF, the French National Forestry Office.

**1997–2000**  
**Officer** overseeing national botanical conservancies at the Ministry of the Environment.

**2001–2004**  
**Land ecosystems unit in Réunion** created Étang de Saint-Paul nature reserve.

**2005–2008**  
**Knowledge and species manager** at Aquitaine regional environment directorate (DIREN), led European mink conservation plan.

**End 2008**  
**Joined national forest inventory (IFN)** and set up its ecology unit. Currently head of IGN’s forest ecosystems department.

the French agency responsible for the environment, urban planning and housing. It’s attracting a lot of interest and its results will be broadly applied.

## What lessons have you learned from this experience?

**F. B.:** I’m glad to see that forests are getting more attention, with a view to studying them more closely and cultivating them better while preserving biodiversity. That said, you have to develop a feel for the forest environment before mapping or measuring it. I live next to a national beech forest unlike anywhere else that is the largest reserve of its kind in France and has been evolving untouched for 10 years now. I go there whenever I get the opportunity. To understand forests, you have to live with them. ●

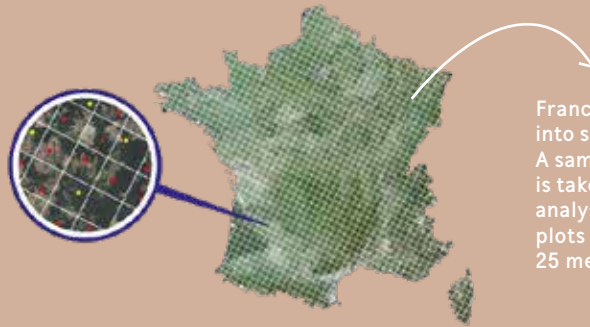
# Forest inventory

## A photofit picture of France's forests

Every year, IGN analyses a representative sample to obtain a statistical picture of forests. The goal is to get a precise idea of the status, evolution and potential of France's forests.

### Statistical method

Every year, a representative sample of metropolitan France is analysed using a statistical method. Data from five years of field surveys are aggregated to obtain precise national and regional results.



France is divided up into squares of 1 sq.km. A sample of these squares is taken each year to analyse about 100,000 plots with a radius of 25 metres.

### The inventory is a three-step process

1



The 100,000 plots are analysed by IGN's photo-interpreters using aerial orthophotos to infer information on land cover and the size of woody plant stands.

2



15,000 of these 100,000 plots are also inventoried in the field by IGN officers to describe stands, record plants, measure trees and detail soil characteristics. In total, more than 200 data points are collected for each plot, recorded on a smartphone and stored in a central database.

3



IGN's forest engineers qualify and aggregate these data to make them readily usable, using complex processing of the information obtained from the first two steps coupled with other sources like for example geospatial data. Checks are also performed throughout the process to verify the data and ensure they are uniform over all of the national territory.



### Results for different applications

Inventory results are available at regional and national administrative levels or at major ecological or forest ecological region level for private and/or public forests. These results are a key tool informing policies for forests and the wood industry. Raw field data can also be viewed and downloaded free from the forest inventory website at <https://inventaire-forestier.ign.fr>.







ECOSYSTEMS

## NATIONAL BIODIVERSITY OBSERVATORY

### Delivering precise forest data

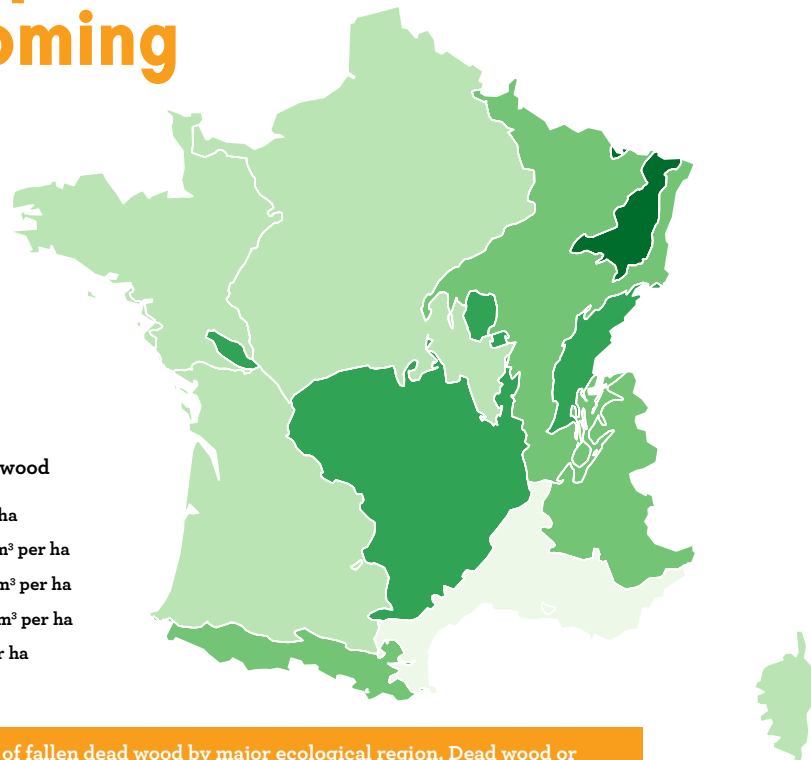
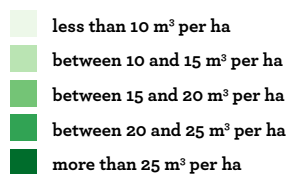


ONB, the national biodiversity observatory—overseen by OFB, the French biodiversity office—taps into the expertise of a broad range of partners to conceive and disseminate indicators. IGN is one of these partners, providing vital information about France's forests from its forest inventory and map.

# “Broadly speaking, forests in metropolitan France are becoming a haven for biodiversity.”



Volume of fallen dead wood



Volume per hectare of fallen dead wood by major ecological region. Dead wood or coarse woody debris is a piece of wood that has fallen to the floor or been cut more than a year ago.

**L**and take, depletion of resources, pollution, climate change and invasive exotic species are all threatening biodiversity around the world. Faced with the seriousness of the situation, France decided in 2012 to set up ONB, its national biodiversity observatory. “ONB disseminates indicators and maps to provide anyone who needs it with reliable information on the status of biodiversity, the pressures being exerted on it and the strategies being applied to counter them,” says Ingrid Bonhême, a research engineer in the forest ecosystems department at IGN’s Southwest division. These indicators—currently numbering 100—cover major areas of focus and are categorized by type of environment.

## Detailing French forests

IGN provides ten forest indicators for ONB. For example, it supplies data on afforestation rate and timber extraction from forests, which show that surface area and growing stock are on the rise in recent decades. However, 56% of resources derived from trees are extracted every year. IGN also provides an indicator on very large trees with a diameter of more than 67.5 centimetres and dead wood, both key parameters. “Very

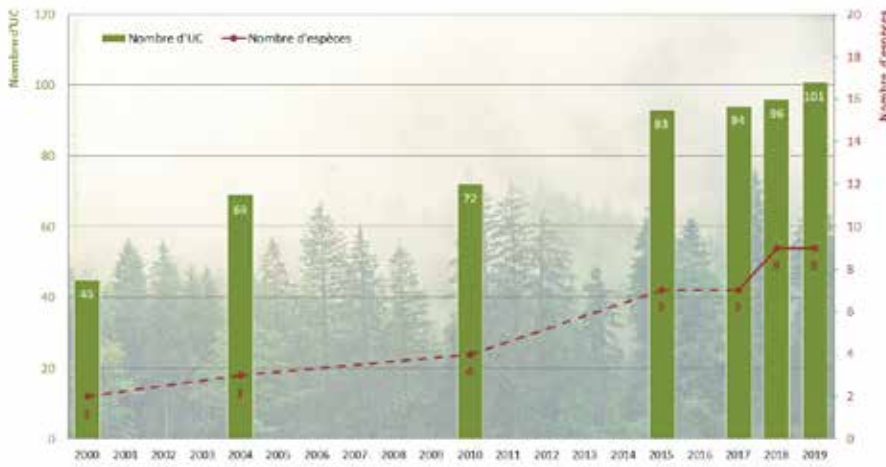
large trees and dead wood encourage all kinds of forest biodiversity,” says Bonhême. “Some animals will only dig their burrows at the foot of old trees and certain birds will only nest inside old trunks. Dead wood is vital to the survival of saproxyllic insects. Graphs show a strong increase in very large living trees that is good for biodiversity. That’s quite logical, since forest cover has been expanding in France for more than a century and they’ve recolonized lands that are no longer farmed.”

The indicators, which afford several levels of analysis—from simple summary information to comprehensive science data—are regularly refreshed and added to. Late last year, IGN and INRAE, the national research institute for agriculture, food and the environment, submitted a new indicator to ONB concerning abundance of common tree species. “The abundance of trees has been increasing overall in France since 2010, to varying degrees according to species. Pioneering trees are exhibiting strong growth,” notes Bonhême.

## 18% of forest habitats preserved

With this wealth of information, ONB compiles a yearly report. This shows biodiversity is less affected in the forests of met-

**EVOLUTION OF NUMBER OF TREE SPECIES AND CONSERVATION UNITS IN CRGF\* DYNAMIC IN-SITU CONSERVATION NETWORKS (\*FOREST GENETIC RESOURCES BOARD)**



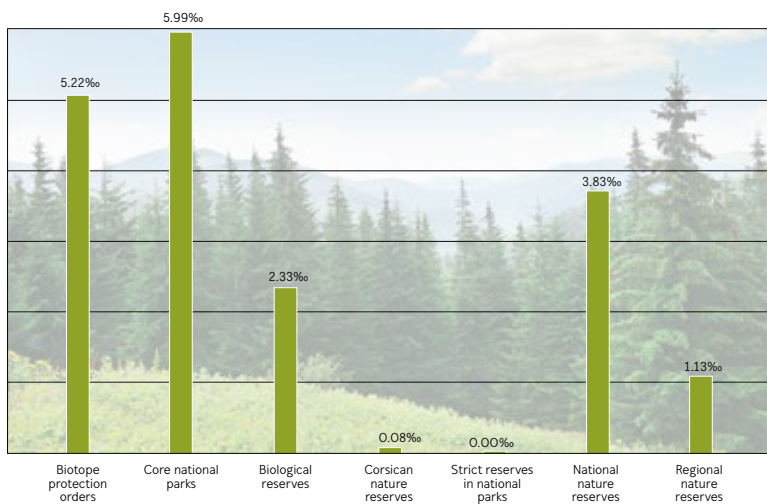
**VIEWPOINT**

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**Ingrid Bonhême**

Research engineer in the forest ecosystems department at IGN's Southwest division

**NUMBER PER THOUSAND OF PROTECTED AREAS IN FRENCH FORESTS**



“Very large trees and dead wood encourage all kinds of forest biodiversity. Some animals will only dig their burrows at the foot of old trees and certain birds will only nest inside old trunks. Dead wood is vital to the survival of saproxylic insects. The strong increase in very large living trees is good for biodiversity.”

ropolitan France than in other habitats. “Only 18% of forest habitats of community value have good conservation status, but that’s more than marine habitats (6%) or aquatic habitats (7%),” points out Julien Massetti, head of OFB’s reporting and observatories unit. “For example, common bird populations in forests were stable between 1989 and 2018 (down 1%), whereas they declined by 38% in farmland environments. Broadly speaking, forests in metropolitan France are relatively less prone to anthropogenic threats and are tending to become a haven for biodiversity, even if they are having to cope with fragmentation by transport infrastructures and urban spread.” All in all, ONB still has plenty of work to do as the nation’s biodiversity lookout... ●

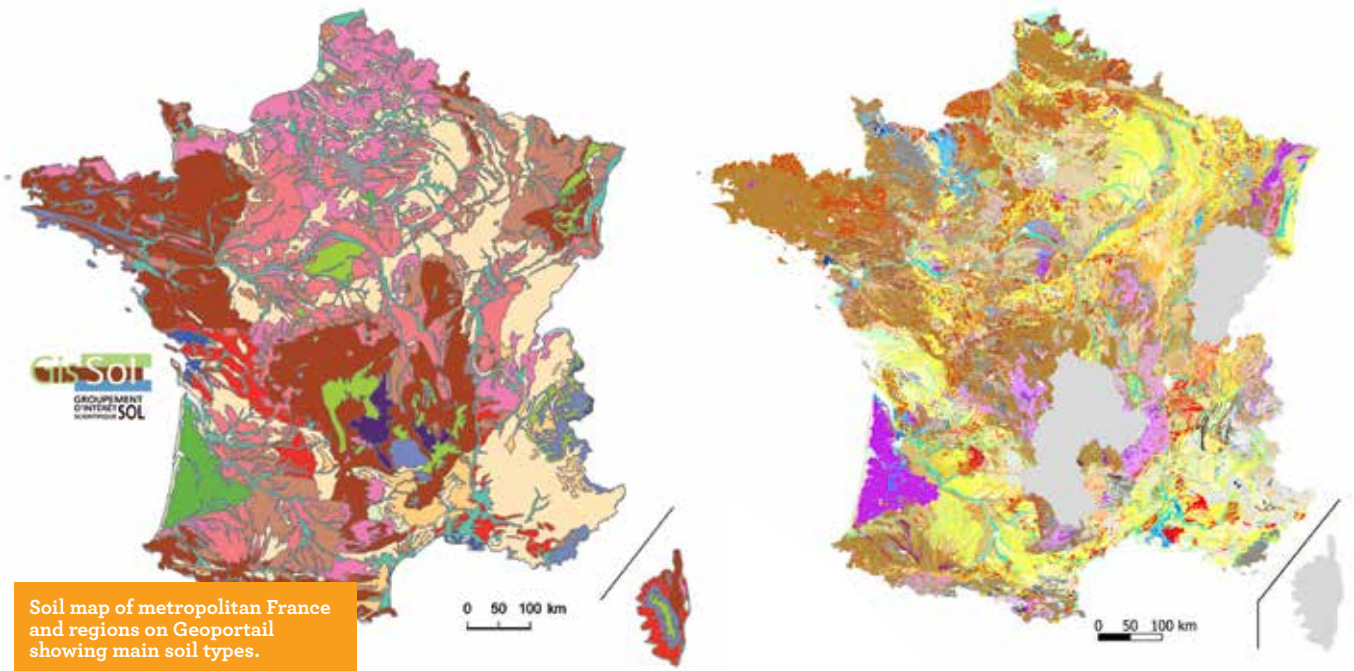
**GLOSSARY**

**Saproxylic**

Term applied to insects—mostly beetles, flies, wasps and bees — that only feed on dead wood, whether it is still standing or lying on the floor, and therefore play a role in the decay of wood by fungi. A quarter of forest biodiversity is saproxylic.

**Pioneering**

This term indicates the first trees that colonize non-forest areas after brush. Birch, willow and ash are pioneering trees.



Soil map of metropolitan France and regions on Geoportail showing main soil types.

S O I L C O N S O R T I U M

# France's soils in sharper focus

Since the end of February, a detailed nationwide soil map is consultable on Geoportail. Using data collected over nearly 20 years through the GIS Sol science consortium, this initiative now puts information about the properties and quality of soil in France at your fingertips.

**A**t the interface between the biosphere, geosphere and atmosphere, soil both sustains and is generated by living matter. But despite its crucial role in many ecosystems, this surface layer of Earth's crust has not always received the level of attention it deserves. The GIS Sol science consortium was formed in 2001 with the aim of gaining a deeper understanding of the different types of soil in France. Federating the key national stakeholders' in this field of study, this structure is supervising a range of large-scale scientific programmes like that to inventory, manage and conserve soils (IGCS), the soil quality survey network (RMQS) and the land analysis database (BDAT). "GIS Sol is improving understanding and

monitoring of soils in France by building on already available information while producing new databases in this domain," says Loïc Commagnac, a research engineer in IGN's forest ecosystems department working with the consortium.

## Comprehensive national coverage

Samples collected for the first RMQS survey campaign between 2000 and 2009 under the supervision of INRAE, the national research institute for agriculture, food and the environment, served as the basis for a first national map of soil contamination by trace metals like lead, arsenic and mercury, as well as persistent organic pollutants like dioxins. In addition, the RMQS effort helped to reassess carbon stored in each major

3 QUESTIONS



**Bertrand Laroche**

— ○ ○ ○ —  
**Research engineer at INRAE's InfoSol unit and leader of the national soil mapping programme supervised by GIS Sol.**

**What is INRAE's role in the GIS Sol consortium?**

Through its InfoSol unit, INRAE is coordinating all soil mapping programmes in metropolitan France and overseas territories. This inventory effort draws on the expertise of a network of partners from the public and private spheres, local government and agronomy schools.

**How was the soil map of France consultable since February on IGN's Geoportail designed?**

It is based chiefly on data collected since the 1960s through the IGCS programme. The 1:250 000-scale map was compiled from department-level and regional data collected and then fed into DoneSol, the national soil data repository.

**What kind of soil information is consultable on Geoportail?**

IGN's on-line portal identifies major soil types with respect to regional soil reference systems established for the IGCS programme. It also provides contact information for structures holding data and offering their expertise.

soil type while also mapping biomass. Thanks to the advances achieved by the IGCS programme, France now has comprehensive 1:250 000-scale coverage of its soils. This map is freely consultable on IGN's Geoportail on-line portal, providing a key tool to inform decisions for sectors like agriculture and land planning. It is also useful for assessing risks of soil degradation due to weather events like flooding and drought.

**Taking the pulse of forest soils**

The GIS Sol consortium is paying very close attention to woodland areas. Every year, IGN conducts surveys of thousands of inventory plots that reflect the diversity of this environment (see graphic p. 16). During these field surveys, the agency's officers record observations and take measurements to document habitats and vegetation. Soils are also analysed in situ by digging a pit at the centre of each plot. While designed above all to gauge the status of trees at each forest site to ensure they are managed and logged sustainably, this dataset can also serve other purposes, as Loïc Commagnac explains: "By matching forest stand characteristics to soil type, we get a closer estimation of fertility at each forest site." ●

1. Since 1 January 2020, GIS Sol federates the Ministry of Agriculture and Food and the Ministry of the Ecological and Inclusive Transition, INRAE, the French environment and energy agency ADEME, IGN, the IRD development research institute and the new French biodiversity office, OFB, formed from the merger of AFB, the French biodiversity agency, and ONCFS, the national hunting and wildlife commission.

— ○ ○ ○ —  
**Soil profile pit**

A pit tens of centimetres to several metres deep, dug to obtain a detailed picture of soil layers and horizons.



The auger is the soil scientist's tool of choice for identifying soil types.

© INRAE



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FARMING STANDARDS AND WATER POLICING

# Harmonizing basemaps for public water policies

Since 2015, IGN has been working closely with the ministries in charge of public water policies to build a common basemap in support of regulatory compliance.

**I**n France, a range of public policy instruments and compliance-checking tools—the water statute, water framework directive, good agricultural and environmental conditions (GAEC), pesticide-free zones and nitrates directive—are converging to protect water resources and aquatic habitats. “Each one is governed by specific regulations and overseeing bodies,” says Didier Moisset, IGN’s deputy director of operations and territories. “And all of them refer to different legal definitions and basemaps.” For water policing purposes, for example, water courses are identified according to three cumulative criteria: sufficient flow most of the year, a source and a natural bed. On the other hand, the defini-

tion of water courses covered by the GAEC standards on which certain European Common Agricultural Policy (CAP) farm payments are conditional refers only to map criteria that vary between regions. In the Doubs department, for instance, GAEC water courses are those shown as a solid or dotted blue line and annotated on IGN 1:25 000-scale maps, whereas in the neighbouring Jura department the baseline category also encompasses non-annotated water courses. Unsurprisingly, farmers might wonder how they are supposed to tend to land alongside water courses running adjacent to their fields. What regulations apply and to which section? What map should they consult when in doubt or in the event of a dispute? And what about when their land overlaps two depart-

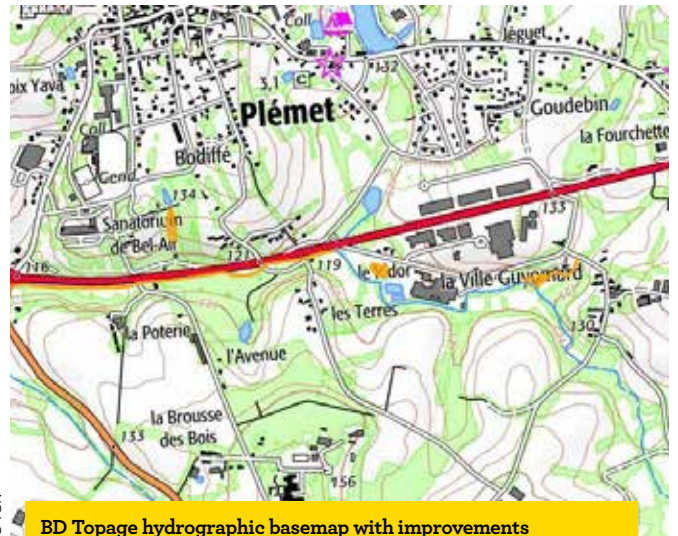
ments? “In the light of this situation, and while there’s no question of enforcing convergence of different water regulations, an effort to harmonize basemaps would appear advisable,” notes Julie Percelay, assistant to the deputy director of territorial outreach and support for ecosystem protection and restoration policies at the Ministry for the Ecological and Inclusive Transition.

## The genesis of BD Topage

Things have in fact started to move in recent years. In 2015, the ministry issued an instruction to government departments and agencies to establish “comprehensive maps of rivers and streams that shall be deemed water courses”. At the same time, “IGN and the French biodiversity office OFB (formerly ONEMA<sup>1</sup>) have been working together to co-produce the BD Topage database derived by matching IGN’s BD Topo database to the BD Carthage database, which was the French national hydrographic basemap since the 90s,” explains François Hissel, in charge of monitoring, assessment and data at OFB. End 2019, the two areas converged with the signing of a new agreement between OFB and IGN. “This agreement provides for incorporating geometric information from inventory work conducted in response to the 2015 instruction in BD Topage, which is set to become the hydrographic component of IGN’s RGE official national basemap,” adds Timothée Royer, IGN project leader. “Trials are already underway in 25 of France’s departments.” The national map of water courses required for water policing generated by government departments will draw on this work.

## GAEC water courses on Geoportail

A similar shift has occurred at the Ministry of Agriculture and Food, which oversees the GAEC standards. “Previously, the prefects heading each department had delegated government authority to establish these kinds of maps,” says Arnaud Dunand, assistant to the deputy director of CAP farm payments management. “But in 2015, a ministerial order superseded this procedure with a view to harmonizing often very different practices. The order defined four types of administrative department, three of which are based on IGN 1:25 000 maps



© IGN

BD Topage hydrographic basemap with improvements on Scan 25 shown in orange.

“water policing and GAEC maps will rely on the same basemap.”



with variants, while the fourth covers a range of formats using other basemaps.” To take the process a step further, the ministry turned to IGN. “It tasked us with establishing a digital basemap from the inventories compiled by territorial divisions (DDTs) following the 2015 order,” adds Didier Moisset. As a result of this effort, a map layer of GAEC water courses currently covering 50 departments was put on Geoportail and will be revised yearly. “Ultimately, the goal is to cover the whole of France by progressively registering the plots supplied by the DDTs with the RGE,” notes Arnaud Dunand. Once these two projects have been completed, water policing and GAEC maps will rely on the same basemap. “This prospect opens up new avenues and will enable all stakeholders to compare territories and systems. That will be a real plus for public water policies,” concludes Julie Percelay. ●

1. Office National de l’Eau et des Milieux Aquatiques, the national water and aquatic environment office

### GLOSSARY

#### GAEC standards

The French code of rural and sea fishing law states that farmers claiming CAP farm payments must leave buffer strips along certain water courses in accordance with good agricultural and environmental conditions (GAEC standard n°1).

#### RGE national basemap

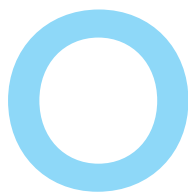
Set of geographic data compiled by IGN charting the national territory. BD Topo is the topographic component of this basemap.



ACCLIMATERRA

# A scientific committee anticipating the impacts of climate change

‘Anticipating climate change for action in Nouvelle-Aquitaine’ is the title of the report released in 2018 by a network of more than 240 research scientists to which IGN contributed. With this approach, the Regional Council is trialling a first-of-its-kind initiative in France to support the ecological transition through scientific knowledge.



Obtaining objective information on climate change and documenting it as accurately as possible was the ambition of the then Aquitaine Regional Council in 2011 when it asked a cross-disciplinary group to conduct an assessment of its impacts in this region of Southwest France. Working under the supervision of climatologist

Hervé Le Treut, after a two-year effort the group produced a status report on which more than 160 experts collaborated.

Following on from this first report, the AcclimaTerra initiative was launched in 2016 with more than 240 scientific experts from the Nouvelle-Aquitaine region, again led by Hervé Le Treut. Titled ‘Anticipating climate change for action in Nouvelle-Aquitaine’, the new report released



## VIEWPOINT

- - -

**Benoît Sautour,**  
Lecturer and research scientist in  
ecology and coastal system  
biogeochemistry in Arcachon

“The two AcclimaTerra reports were drawn up by a broad consortium of research scientists from the Nouvelle-Aquitaine region. We identified new avenues that the AcclimaT research network will now be focusing on to anticipate territorial-scale climate change impacts. The overall idea is to be able to put forward anticipation and mitigation scenarios that will vary according to research themes and territories’ characteristics.”

on 1 June 2018 reviews the quality of natural habitats, availability of water, specific regional climate characteristics, energy consumption and resource exploitation, and the impacts of warming on forests, mountain ranges, farming, urban areas and coasts. “The regional scale lends itself well to measuring the impacts of climate change,” explains Alain Rousset, President of the Nouvelle-Aquitaine Regional Council. “It’s also at local scales that our actions are the most effective.”

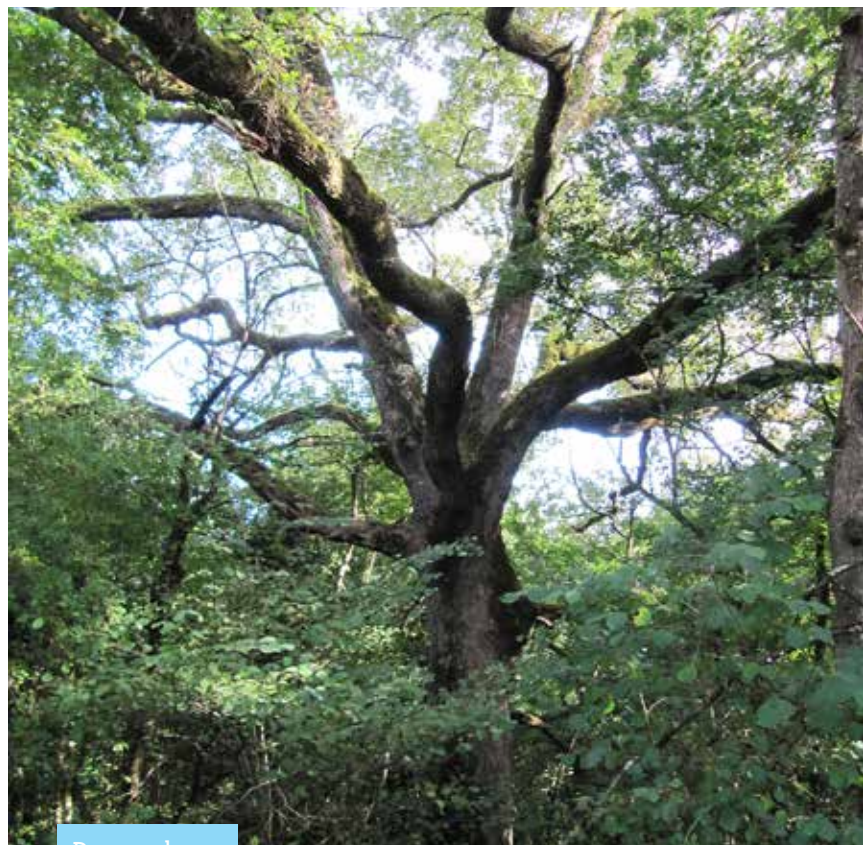
### 360° picture

Besides informing citizens, the purpose of the report is to offer insight to policymakers. For example, the Neo Terra roadmap voted in July 2019 sets 11 ambitions for the Regional Council to support the energy, ecological and agricultural transition effort between now and 2030, through tangible actions and targets. “With AcclimaTerra, the idea is to obtain a 360° picture of what’s fuelling climate change and scale up transition initiatives so that we can shift our mitigation strategies into higher gear,” says Alain Rousset. For with a 1.4°C increase in mean temperature over the course of the 20<sup>th</sup> century, recurring floods, storms and drought epi-

sodes and coastal erosion, this region is one of the hardest hit by global warming. Fabienne Benest, head of the forest ecosystems department at IGN’s Southwest division and one of the experts who contributed to the AcclimaTerra reports, fully concurs with this assessment. Working with research scientists from the Biogeco laboratory at INRAE’s Nouvelle-Aquitaine centre in Bordeaux, her team studied the impact of a changing climate on the composition of forest stands and on the abundance of different species of oak, which are key indicators of climate change in our forests.

### “Downy oak are moving north”

By looking at the national forest inventory and matching data on stem numbers, volume and size, we can track how the abundance of different species of oak has evolved in the region since 1980. “This research shows that downy oak and evergreen oak along the coast are moving further north, while common oak are withering in the northern part of the Nouvelle-Aquitaine region,” notes Fabienne Benest. For this work, “the protocol used for the national forest inventory, which is stable and based on well-defined samples, was a precious aid in interpreting time-series of data and supporting research scientists’ efforts.” After the report’s release, AcclimaTerra morphed into a non-profit association in 2018. “We hit the road to show the public the results of our research,” says Benest, who has given conferences in Dordogne and Charente-Maritime to present her work. ●



Downy oak.

## Ocean Hackathon®4#

# ENSG makes it to final four



The fourth Ocean Hackathon® took place from 11 to 13 October 2019 in Champs-sur-Marne. ENSG, the national geographic sciences school, which co-organized the event, was among the laureates.

**E**xperimenting with an idea related to the sea using digital data was the challenge set by the Campus mondial de la mer in Brest for the fourth edition of Ocean Hackathon®. For last year's event, ENSG, the national geographic sciences school, organized and hosted the Ile-de-France session concurrently with seven other cities: Brest, Dinan, Cherbourg, La Rochelle, Sète, Toulon and Mexico City. In Champs-sur-Marne, 34 competitors from six teams managed by 10 coaches pitted their wits against each other for 48 hours to come up with future solutions to preserve the oceans and biodiversity.

### Automatic detection of sea lettuce

ENSG launched a call for challenges in summer 2019 and received ten responses. "The idea was to transpose land remote-sensing methods to this environment that is only rarely studied at the school and take up an educational challenge together," says Marc Poupée, a lecturer at ENSG who was on the winning team. With young graduates from ENSG and students from the Ecole polytechnique engineering school, Télécom Paris and École 42, they looked at automatic detection of sea lettuce on the Brittany coast using satellite imagery.

"It was interesting to see how the team simplified their analysis methods," notes Poupée. "They focused on biology aspects like types of seaweed and detection indicators, and on techniques (satellite data retrieval, time-series compilation and alert mechanisms) to build an operational on-line demonstrator."

Although the project was not selected at the final in Brest on 12 December, for Pierre-Yves Hardouin, who coordinated the hackathon at ENSG, it was a very positive experience for the school and its students. "It was a great learning experience, as they worked with other schools and succeeded in putting together a viable project in record time." •



**"They worked with other schools and put together a viable project in record time."**



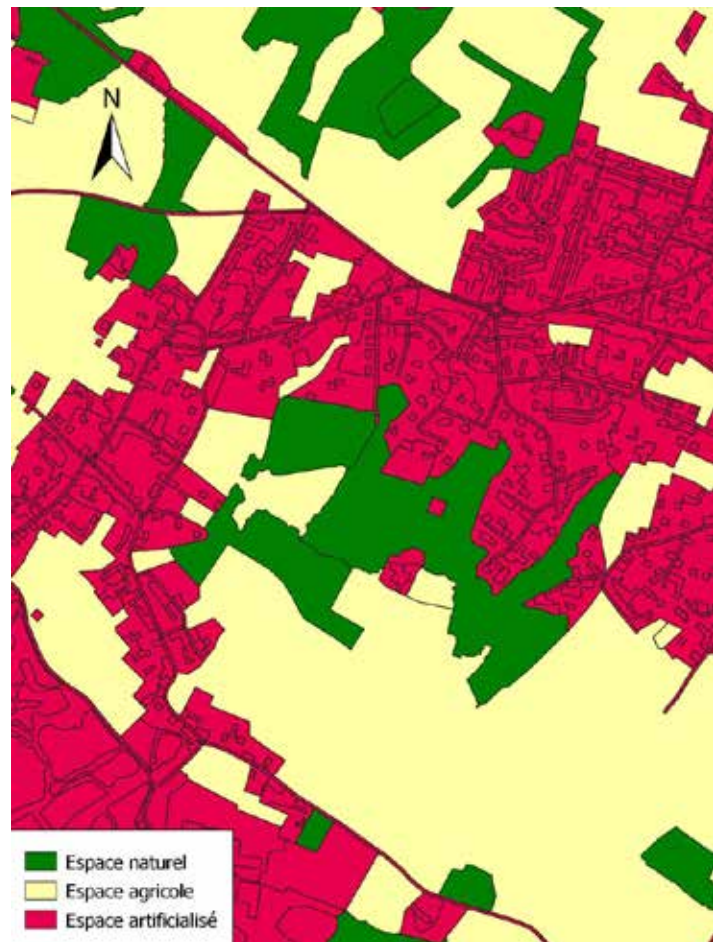
# An observatory to closely monitor land take

**Obtaining a more precise picture of land take and raising awareness of the issues surrounding it is the dual objective of a new observatory overseen by the Ministry for the Ecological and Inclusive Transition to which IGN is contributing.**



**“Local authorities will be able to get up to speed with the data and confirm that they match the objective of monitoring zero net land take.”**

**Véronique Pereira, Head of IGN's Projects and Services department**



Extract from the OCS GE database showing land use around Guérande, on France's west coast.

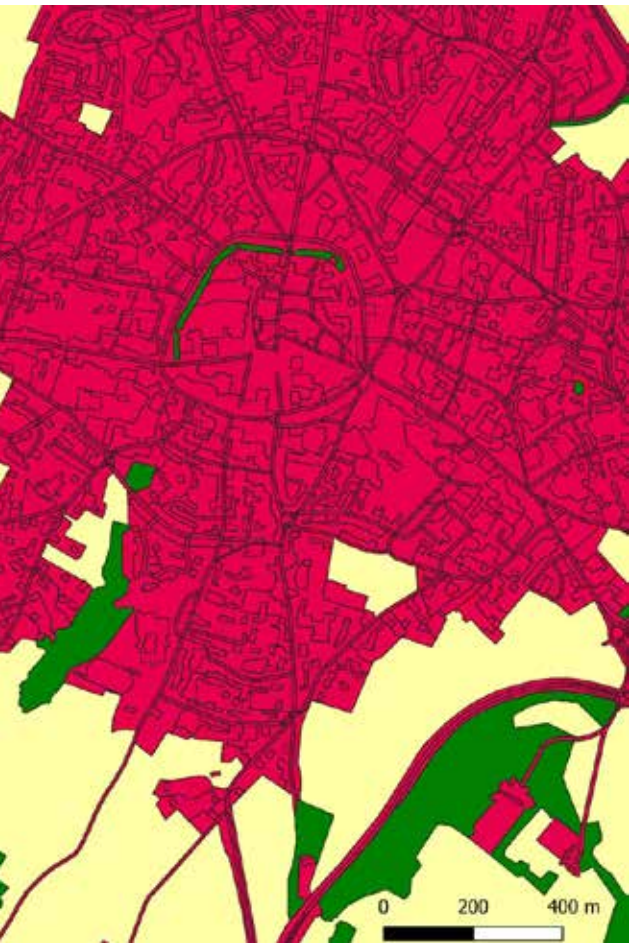
**T**he French government's biodiversity plan released in July 2018 set the unprecedented ambition of publishing a yearly status report on land take and giving local authorities and citizens data that can be compared at all territorial scales (action 7). This measure was supplemented, in action 10 of the plan, by the need to “define the timescale for achieving ‘zero net land take’.” Under the plan, the Ministry for the Ecological and Inclusive Transition launched in July 2019 a national reference structure of which the land take observatory is the visible part. The lead contractors for this initiative are CEREMA, the hazards, environment, mobility and land planning research centre, INRAE, the national research institute for agriculture, food and the environment, and IGN.

“Measuring land take is key to charting a course towards zero net land take,” explains Pascal Lory, special adviser on geospatial information to the Director General of Land Planning, Housing and Nature (DGALN) at the ministry. A shared national definition of what this zero net land take target actually entails is soon set to be established. But besides that, for Pascal Lory the most important thing is to

emphasize the issues underlying the goal: “Every square metre of land lost translates into less biodiversity, increased risk of flooding due to soil sealing, declining food self-sufficiency through loss of farmland and ever greater distances between where people live and work as a result of urban spread.”

### Prototype in Arcachon

The observatory is designed to be a portal to view and disseminate all the data required to measure loss of natural, agricultural and forest land. It has already devised a map tool showing binary changes of artificial and non-artificial surfaces from the land archives of the Directorate General of Public Finances (DGFIP). Large-scale land-use and land-cover data from the OCS GE database will offer better resolution than land-parcel scale and a nomenclature providing more than just binary detail. These data will be downloadable. Further up the chain, IGN is working to devise a methodical production process to make all these data available. The first step consists in building an architecture from existing regularly refreshed data. This is followed by a deep-learning process using orthophotos and satellite



## GLOSSARY

**Land take**

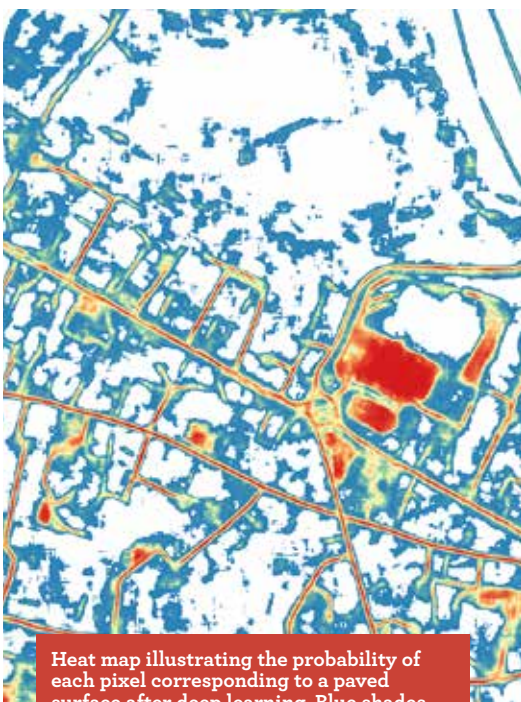
**Transformation of natural landscapes**, farmland or forest land into surfaces that are partly or totally sealed, notably for urban development or transport purposes (housing, shops, infrastructure, public works).

**OCS GE**

**Vector database recording land use** in metropolitan France and French overseas territories.

**Deep learning**

**Type of artificial intelligence** derived from machine learning in which a machine is capable of learning by itself, unlike programming, where it simply executes a set of predetermined rules.



Heat map illustrating the probability of each pixel corresponding to a paved surface after deep learning. Blue shades indicate low probability, redder shades higher probability.

imagery. “We’ll be able to detect a multitude of features through **deep learning**, such as forests, pastures, built-over land, car parks and vineyards,” says Véronique Pereira, who heads IGN’s Projects and Services department. A land-use classification of these features will then be generated by vectorization and aggregation. “The reference dataset thus produced will enable regular monitoring of land take on a nationwide basis, updated every three years, at an affordable cost and through an open-data model,” notes Pereira. A prototype is being tested in Arcachon, Southwest France, to validate whether the data meet users’ expectations, adjust specifications to the land-take definition and generate data in the most automated way possible from aerial and satellite imagery acquired in 2015 and 2018, using deep learning to arrive at a division of land into uniform parcels. “The prototyping phase is scheduled to close out in June 2020, and we’ll then decide on how to roll the system out at national level,” concludes Pascal Lory. ●

**Learn more**

<https://artificialisation.biodiversitetousvivants.fr/>

# Claude Ponti

**The author of hundreds of children's books with wacky titles and thousands of yellow chicks dotted throughout their pages, Claude Ponti is an illustrator who has remained a child at heart.**



# Illustrator and wordsmith

**C**laude Ponti has always drawn and yellow chicks even adorn his school notebooks. He initially wanted to be an

## “Nature is inseparable from humans.”

artist. After three months at the school of fine arts in Aix-en-Provence, he “went up to Paris to be an artist”, found a job to “keep the pot boiling”—as a courier for *L'Express*—and threw himself into painting “with precision and realism things that don’t exist”. He exhibited his work and for a time was a press cartoonist, then artistic director at the Imagerie d’Épinal printworks, all the while continuing to exhibit in art galleries. Painting was his life... until the day in 1985 when his daughter Adèle came into the world and he decided to write a book “just for her”. The result was *L'Album d'Adèle* (Adèle’s Album), a funny and poetic collection of all kinds of drawings. But Geneviève Brisac, at publishing house Gallimard, saw some of the drawings, liked what she saw and resolved to publish the album, much to Claude Ponti’s surprise: “I’d never thought of becoming an illustrator for children’s books. If you’d told me that one day that’s what I’d do for a living, I’d have laughed in your face.” He most certainly admired great children’s cartoonists like Maurice Sendak with his *Maximou* and Winsor McCay with his *Little Nemo*, but hadn’t really given a lot of thought to this kind of literature, “and I still haven’t given much thought to it today,” he quips.

### Childhood landscapes

Claude Ponti creates characters with weird names who speak in funny ways with all kinds of invented words, because he was “a bit dyslexic” and “tended to mishear things”. His characters are depicted against a backdrop of crazy and meticulously drawn landscapes populated by mountains, rivers and valleys, and strangely shaped animals and plants. The source of his inspiration comes from his childhood in the Vosges region of Northeast France where he grew up.

“Our little village was surrounded by forests and mountains,” he recalls. “I was fascinated by the landscapes and they have stayed with me. When I draw, it all comes flooding back: the sound of the river, the wind in the branches, the birdsong and the miniature landscapes formed by tree stumps covered in lichen and fungi.” He also remembers his fascination with the imaginary maps that fuelled his dreams. As a boy scout, he had learned to read ordnance survey maps and liked to see on paper whatever place he found himself at. Even today, he still feels the need to actually “be where it’s happening” to draw properly and

**B I O G R A P H Y**

**1948**

Claude Ponticelli, a.k.a Claude Ponti, is born in Lunéville (Lorraine).

**1969**

Moves to Paris, where he studies drawing, painting and etching on his own.

**1985**

His daughter Adèle is born. He draws *L'Album d'Adèle* for her, which is published the year afterwards, followed by *Adèle s'en mêle* (1987) and *Adèle et la pelle* (1988).

**1990**

Joins publishing house *École des Loisirs*, which publishes *Pétronille et ses 120 petits* and more than 70 other albums.

**2009**

Convinced that children have as much talent as adults and that “shunning, forgetting, neglecting and dismissing children’s works of art is a mistake”, with a group of friends he creates Le Muz<sup>1</sup>, an on-line museum providing access to thousands of children’s works from around the world.

**2013-2014-2015**

Produces unique open-air creations for the *Jardin des Plantes* in Nantes.

“I wanted to relive the garden of my childhood where I saw secrets everywhere, to make a magical garden for all, whether they are just passing through or sitting and contemplating.”

1. Le Muz is marking its 10<sup>th</sup> anniversary with a series of events—workshops, exhibitions and auctions—and a study day at the Orsay Museum in Paris on 6 May 2020. [www.lemuz.org](http://www.lemuz.org).

create a landscape to go with his story and characters. Nature, metamorphosed by his fertile imagination and memories, is very much apparent in his albums. Because, he says, “it’s inseparable from humans and enables me to build a world that speaks more and in a better way to children.” ●

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