Research in environmental sciences in France

With the depletion of the planet's resources, preserving the environment has become one of the major challenges of French research and innovation. Those efforts are aimed at developing sustainable forms of growth and agriculture that will enable societies to meet their needs for food and adapt successfully to climate change. Conserving resources and raw materials, mitigating climate change, and protecting air quality are the subjects of research efforts that bring together disciplines as diverse as ecology and natural milieus, water and biodiversity, green chemistry, ecosystems, the geosciences, land-use planning, and management of natural resources and wastes, as well as ecotechnologies, alternative energy, and clean transportation. The "Climate, Environment, Raw Materials" challenge is one of seven social challenges embraced by the European Union’s Horizon 2020 program of research and innovation.

Research in environmental sciences draws on the life sciences and health, earth and space sciences, marine sciences, and basic disciplines such as agronomy, biology, chemistry, and physics, as well as economics, the social sciences, and management. In other words, environmental science research is characterized by interdisciplinarity.

Research topics in the environmental sciences include observation and monitoring of the earth, protection of the environment and management of environmental assets, and exploitation of the oceans and continental land masses. French research in environmental sciences is also oriented toward the transition of energy policies to “green growth.”

Understanding the environment and climate

Multidisciplinary fields are devoted to the understanding of the physical, chemical, and biological equilibriums of the earth’s environment: study of the climate; the dynamics and thermodynamics of the atmosphere and the oceans; radiative transfer, the functioning of the continental and marine biospheres; the biogeochemical and physico-chemical cycles of pollution in air, water, and soils; experimental and technical developments in remote sensing, environmental engineering, and planetology; among many other topics.

Knowledge of natural systems, the genesis of resources (mineral and energy resources; water; soil; crop production; forests), sustainable use and management of those resources; waste processing and management; food safety; environmental security; and risk management—all appear on the research and development agendas of French academic institutions, organizations, and businesses.

Research in ecology and the functioning of ecosystems (the continental and marine biospheres) relies on biology—the integrative biology of plants, the dynamics and thermodynamics of the atmosphere and oceans, and on sedimentology. The integrative ecology of the systems formed by populations and their environment, the functioning of ecosystems, the dynamics of diversity as affected by human activity, the conservation of biodiversity, the ecology of coastal systems, harvested marine ecosystems (fisheries), and the space available to us for development—these, too, are subjects of environmental sciences research.
Environment and health

Environmental physics and ecotoxicology, as well as biogeochemical cycles and the physical chemistry of air, water, and soil pollution, are among the research topics that underpin fields such as environmental toxicology and pollution control for a variety of purposes—among them adaptation to environments polluted by heavy metals, use planning in coastal zones, green chemistry and the environment, and the treatment of atmospheric pollution.

Adaptation to the climate (particularly in the tropics), cancer and the environment, the epidemiology of tropical parasites, biological methods and algorithms are examples of research conducted to determine the effects of the environment on health and safety. Natural telluric risks (volcanoes, earthquakes, landslides) are also a part of the research to study this impact on populations.

Responsible exploitation of the seas

Water, indispensable for life and for economic development, will be a major strategic challenge for many of the world’s countries in the 21st century. The major water-related sectors of the economy encompass resources, agriculture, aquatic biodiversity, health, urbanism, estuarial and coastal zones, and the treatment of soil and water pollution. Current research on water-related issues is oriented toward environmental protection: management of water, effluents, and waste; soil decontamination; measurement of water, air, and soil quality; and optimization of water treatment plants. Marine biologists concentrate on conserving and protecting marine resources and coastal environments. Water is also a form of renewable energy; geothermia is already used to supply heating systems, triggering innovations in building construction.

Energy

New materials, innovative structures, and research into the many questions pertaining to the effect of energy production on the environment are helping to improve energy efficiency and storage related to fossil fuels, fissile materials, and, particularly, renewable energy: wind, solar (thermal, photovoltaic, and concentrated), geothermal, wave, hydroelectric, and hydrogen fuel cell, as new bioenergies that are the subject of much new research in France.

Alternative energies that assure energy efficiency using clean technologies are analyzed from the point of view of their yield and emissions. Energy efficiency is a particular focus, along with work on solar energy, energy storage, biofuels, and energy derived from the seas.

Applications for the production of low-carbon technologies have an impact on agricultural technologies and practices, transportation, and regional land planning. Within the framework of environmental initiatives for the design and construction of buildings of high environmental quality, the concept the “positive energy building” (achieved partly through advanced insulation) is a primary challenge. In the area of air transportation, aeronautical research is aimed at lowering fuel consumption, CO₂ emissions, and atmospheric pollution.

Advanced scientific instrumentation

Basic multidisciplinary research of the highest quality creates the conditions for technological breakthroughs and success in achieving the energy transition through 2050.

That research depends on the use of the advanced scientific instruments available to scientists in France, such as spectrometers, nuclear devices (radioactive materials, accelerators, reactors), sensors, and large instruments. Research platforms are equipped for cellular imaging, in vivo imaging, and proteomics applied to the environment.

Our ecological footprint

The ecological footprint measures the impact of human activity on ecosystems and the planet as a whole by assessing the biologically productive area of land required to accommodate a population’s consumption of space and resources (food, heat, clothing, building materials, goods and services, housing, roads, clean air, potable water, and so on) and to absorb its waste products. At the planetary scale, humanity’s ecological footprint is an estimation of the biologically productive area of land and ocean needed to meet the needs of the human race. The ecological footprint and biological capacity are two of the most critical indicators of the state of the planet’s environmental capital.

The major disciplines and sectors engaged in research in environmental sciences

- Agronomy, agriculture, food processing, agroecology, fisheries, forestry, horticulture
- Architecture, urbanism, regional and rural planning and land management
- Biology (populations, organisms, ecosystems, marine environments), biodiversity, biotechnologies, genetics, genomics
- Chemistry, geochemistry (isotopic, marine)
- Ecology (functional, behavioral, industrial), ecotechnologies
- Economics and management, environmental law, water resource management
- Energy (efficiency, storage, alternatives, renewables)
- Geography, geomatics
- Environmental engineering, civil engineering, sanitary engineering, water management techniques
- Physics, astrophysics, geophysics
- Atmospherics, meteorology, climatology, paleoclimatology
- Sea sciences, oceanography
- Earth and space sciences, geosciences, geotechnics, planetology, astronomy, geology, glaciology, hydrology
- Life and health sciences, public health, epidemiology, toxicology
- Transportation, tourism
In the 1990s, France began several air-quality and waste-treatment initiatives. Environmental protection became a national priority with the creation of the *Agence de l’environnement et de la maîtrise de l’énergie* (ADEME, environment and energy security agency) and the adoption of *a national environmental plan*. Under the Kyoto Protocol, France made a commitment to stabilize, over the period 2008–12, greenhouse gas emissions at 1990 levels. In 2000, the *Programme de Lutte contre le Changement Climatique* (PNLCC, program to combat climate change) made it possible for France to meet its commitment.

By 2004, France had made a plan, which was followed in 2007 by a *national environmental task force*. Programs that included renewable forms of energy were incorporated into a master carbon assessment, which gave rise to *regional climate plans* that by 2012 enabled France to reduce its emissions by 12%.

Within the framework of the new national environmental plan, research and innovation play a major part in France’s energy transition. The goals of the plan are energy security, prudent management of resources, the protection of human and environmental health, limitation of climate risks, and social and geographic cohesion. Energy research therefore takes into account the low-carbon strategy and climate change, with a priority for programs at the European level.

*Alliance nationale de recherche pour l’environnement* (AllEnvi, national environmental research alliance)—food, climate, water, land use - [http://www.allenvi.fr](http://www.allenvi.fr)

AllEnvi brings together public research efforts to program and coordinate France’s environmental science strategy. Food and feed, animal life, biodiversity, climate, water, ecotechnologies, environmental assessment, the seas, plant life, risk, land use, cities, and mobility are current thematic priorities. On land, the consolidation of networks for the observation of flows of carbon, water, and energy between the atmosphere, the biosphere, and soils has emphasized the importance of biodiversity. Research into how opinions are formed and into the modification of behaviors involving environmental risk is making it possible to implement targeted regulations and incentives.

*Agence de l’environnement et de la maîtrise de l’énergie* (ADEME, environment and energy security agency) - [http://www.ademe.fr](http://www.ademe.fr)

ADEME participates in the implementation of the national sustainable development strategy and of environmental public policies. Five areas are emphasized: (i) wastes, (ii) contaminated ground and wastelands, (iii) energy and climate, (iv) air and noise pollution, and (v) cross-cutting actions (sustainable production and consumption, sustainable cities and regions). ADEME supports research and development into vehicles, buildings, new energy technologies, and ways to use alternative and renewable energy to reduce greenhouse gas emissions.

*Agence nationale de la sécurité sanitaire de l’alimentation, de l’environnement et du travail* (ANSES, national agency for food, environmental, and workplace safety) - [https://www.anses.fr](https://www.anses.fr)

ANSES assesses the impacts of the environment on health and identifies safety risks linked to ambient environments (air, water, soil) or physical forces (fields and waves). It also tests pesticides and germicides before they are introduced into the market, as well as chemical products covered by the REACH program of the European Chemical Products Agency.

*CIRAD, agronomic research for development* - [http://www.cirad.fr](http://www.cirad.fr)

CIRAD uses research as a tool for development in its areas of priority: ecologically intensive agriculture, commercial uses of biomass, sustainable food production, plant and animal health, and public action for development, societies, and natural environments. CIRAD’s research themes include climate change and agriculture, biodiversity and development, the future of tropical forests, food security, subsistence agriculture and livestock tending.

*GIS Climat-Environnement-Société* (scientific interest group on climate, environment, and society) - [http://www.gisclimat.fr](http://www.gisclimat.fr)

GIS supports and coordinates interdisciplinary research on climate change and its environmental and social effects, relying on the expertise of the research laboratories of the Île-de-France in the fields of climatology, hydrology, ecology, health, and the humanities and social sciences.

*Commissariat à l’énergie atomique et aux énergies alternatives* (CEA, commission on atomic and alternative energy) - [http://www.cea.fr](http://www.cea.fr)

CEA works in four major areas: low-carbon forms of energy (nuclear and renewable), defense and security, information technologies, and health technologies.
IFP Énergies nouvelles (IFPEN, new energies)  
http://www.ifpenergiesnouvelles.fr

In its research and training activities, IFPEN covers the fields of energy, transportation, and the environment. It concentrates its research efforts on finding solutions for society’s energy and climate challenges, emphasizing the development of sustainable energy. Projects are clustered into five different themes: renewable energy, eco-responsible production, innovative transportation, eco-efficient processes, and sustainable resources.

Institut français de recherche pour l’exploitation de la mer (IFREMER, French Research Institute for Exploitation of the Sea) -  
http://www.ifremer.fr

IFREMER is a marine research institution whose research fields include undersea technologies, biodiversity, fisheries and aquaculture, coastal environments, mineral resources, biotechnologies, and operational oceanography, among others. IFREMER is organized into several scientific departments (biological and environmental resources; physical resources and undersea ecosystems; oceanography and ecosystem dynamics; digital and marine infrastructure) that operate in five multi-site centers: Atlantic, Brittany, North Sea–Channel, Mediterranean, and Pacific.

Institut national de recherche en sciences et technologies pour l’environnement et l’agriculture (IRSTEA, national institute of environmental and agricultural sciences and technology)  
http://www.irstea.fr

Having earned the Institut Carnot label, IRSTEA cooperates with other research organizations (CIRAD, CNRS, INRIA) and academic research clusters in pursuit of public policy goals. IRSTEA is also involved in European environmental research networks (EurAqua, PEER), as well as numerous exchanges and cooperative agreements with research institutions around the world (Australia, Brazil, Canada). With nine regional centers, IRSTEA is organized into three scientific departments: (i) Water, (ii) Ecotechnology, and (iii) Regions. About 30 percent of its research effort is related to global issues, including climate change; 70 percent relates to surface-water issues.

The European “Climate Action, Environment, Resource Efficiency, and Raw Materials” challenge

For the period 2014–2020, the European Union’s program of financing for research and innovation (€79 billion) has three priorities: scientific excellence, manufacturability, and social challenges.

Challenge number 5 of Horizon 2020, the European research and innovation program, is “Climate Action, Environment, Resource Efficiency, and Raw Materials.” The goal of the challenge is to reconcile global population growth with the planet’s limits in terms of natural resources and ecosystem balance. The challenge program supports the production of new knowledge and the development of tools, methods, policies, and eco-innovations. Activities related to climate, environment, and resources figure in requests for proposals for the Blue Growth program: exploiting the potential of the oceans (bioeconomy challenge), energy efficiency (energy challenge), and "disaster resilience: protecting and safeguarding society," including in its adaptation to climate change (security challenge).

Environmental sciences

- École Doctorale du Pacifique - (ED 469, doctoral department of the Pacific)
  http://www.univ-nc.nc/recherche/ecole-doctorale
  Affiliated with the University of New Caledonia and the University of French Polynesia, the doctoral department of the Pacific performs research in New Caledonia through its laboratory on life sciences and the environment (EA 4243), the multidisciplinary cluster on matter and the environment (EA 3325), and a joint research unit on oceanic island environments in French Polynesia (UMR 241).

- Environment and society - ED 377
  http://ecole-doctorale.univ-corse.fr
  Doctoral department 377 of Université Pascal Paoli in Corte (Corsica) conducts research through a joint research unit in environmental sciences (UMR 6134) and, as a coordinating unit for research scholars, the CNRS research federation for environment and society (FRES).

- Environmental sciences - ED 251
  https://www.cerege.fr/spip.php?rubrique156
  Affiliated with Aix-Marseille Université, doctoral department 251 provides a home for researchers in chemistry, life sciences and medicine, engineering, and the humanities. Its major research themes are environmental geosciences, oceanography, ecology, environmental chemistry, process engineering, anthropology, and the links between environment and health.

- Gay Lussac environmental sciences
  The Gay Lussac environmental sciences department consists of ten research units, including the joint unit on coasts, environment, and society (UMR 7266); the department of genetic improvement; IFREMER’s animal health and environment program; the water, soil, and environment research group; and the institute of paleoprimatology and human paleontology (evolution and paleoenvironments).

- MIPEGE (modeling and instrumentation in physics, energy, geosciences, and the environment) - ED 534
  MIPEGE at Université de Paris Sud combines energy and environment, from mining research on uranium and other fissile materials to storing or reprocessing radioactive wastes with a long half-life; and from renewable energy (hydrothermal sources, solar energy, new energy sources) to the effects of energy production on the environment, especially the climate, which involves understanding past climates (paleoclimates, paleoenvironments) as well as the climatic and geological evolution of planets.

- Sciences and environments - ED 304
  http://www.u-bordeaux1.fr/edse/
  Doctoral department 304 at Université de Bordeaux supports research on five themes: biogeochemistry and ecosystems; evolutionary, functional, and community ecology; geochemistry and ecotoxicology; environmental physics; and marine sedimentology and paleoclimates.

- SEIF (Île-de-France environmental sciences)
  Doctoral department 129 of Université Pierre et Marie Curie-Paris 6 is devoted to multidisciplinary fields related to the understanding of the physical, chemical, and biological balance of the earth’s environment. Research work conducted by some 20 host laboratories includes the following themes: the climate and its variations at all scales of time and space; atmospheric and oceanic dynamics and thermodynamics; the functioning of the continental and marine biosphere; biogeochemical cycles; the physical chemistry of air, water, and soil pollution; and experimental and technical developments in observation and remote detection.

- SMRE (sciences of matter, radiation, and environment),
  The multidisciplinary SMRE doctoral department of the Lille Nord de France academic community conducts research in areas as varied as physics, chemistry, biotechnologies, the earth and life sciences, and agri-food sciences. Fifteen research directions are related to the environment—among them adaptation to environments polluted by heavy metals, management of coastal zones, and green chemistry.

Life sciences and health

- ABIES (agriculture, biology, environment, health),
  ED 435 http://www.agroparistech.fr/abies/
  Affiliated with Agroparistech and its institute for environmental and life sciences and industry, ABIES devotes a quarter of its research effort to environmental sciences, as well as agronomy, ecology, and land-use planning. Other areas of effort include environmental engineering, the social sciences, economics, and management, all applied to agricultural and environmental problems.

- BIOSE (biology, health, environment) - ED 266
  Attached to Université de Lorraine, doctoral department 266 works at the intersection of environment and health, carrying out laboratory research on environmental chemistry, physics, and microbiology and on genetic–environmental interactions in cardiovascular physiopathology.

  Among the research themes of doctoral department 216 at Université Joseph Fourier Grenoble 1 are biotechnologies, instrumentation, signals and imaging in biology, and medicine and the environment, as well as models, methods, and algorithms in biology, health, and the environment.

- EdNBISE (Normandy Doctoral Department of integrative biology, health, and environment) - ED 497
  http://www.unicaen.fr/ednbise/
  More than 30 research units operate within EdNBISE at Université de Rouen. The department is equipped with research platforms in cellular imaging and proteomics, which are also used by Normandy’s SCALE federation for research in applied environmental sciences.
Earth and space sciences, geosciences

- **Earth and environmental sciences** - ED 413
  [Ed413.unistra.fr](http://ed413.unistra.fr)

Several disciplines are at work in doctoral department 413 at Université de Strasbourg—geophysics, geochemistry, geology, the environmental sciences, and geography. Three research units operate within the department: the Strasbourg institute of global physics (UMR 7516), the Strasbourg laboratory of hydrology and geochemistry (UMR 7517), and the laboratory of imaging, cities, and the environment (UMR 7362).

- **Earth, universe, environment** - ED 105

Affiliated with Université Joseph Fourier—Grenoble 1, doctoral department 105 conducts research in eight laboratories. Joint research units operate in the fields of earth sciences (geophysics, geology, natural risks), the universe (planetology), and the environment. Oceans, atmosphere, hydrology, and glaciology are areas of special emphasis.

- **Energy, materials, earth and space sciences** - ED 552
  [Ed552.univ-orleans.fr](http://ed413.unistra.fr)

Affiliated with Université d’Orléans, the department includes some 15 laboratories, including the following:
- The institute of aerothermic combustion, reactivity, and environment (UPR 302), [Upr302.cnrs-orleans.fr](http://www.univ-angers.fr/ed/emstu/)
- Orléans institute of earth sciences (UMR 6113), [Umr6113.cnrs-orleans.fr](http://www.univ-angers.fr/ed/emstu/)
- Laboratory for environmental and space physics and chemistry (UM 6115), [Lpce.cnrs-orleans.fr](http://www.univ-angers.fr/ed/emstu/)
- **GRN (geosciences, natural resources, and environment)**
  - ED 398 - [Ed398.upmc.fr](http://www.univ-orleans.fr/ed/emstu/)

With seven laboratories, doctoral department 398 at Université Pierre et Marie Curie–Paris 6 performs research on the exploitation and conservation of natural resources: hydrosciences, environment, and water resources; sedimentary basins and energy resources; geophysics; and more.

- **SDU2E (sciences of the universe, environment, and space)**
  - ED 173 - [Sdu2e.obs-mip.fr](http://sdu2e.obs-mip.fr)

SDU2E at Université de Toulouse consists of 13 laboratories affiliated with the Institut des Sciences de l’Univers (INSU, institute of space sciences) and CNRS, the French national research agency.

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**Environment-Health**

- ED 554 - [www.ecoledoctoralee2s.com](http://www.ecoledoctoralee2s.com)

A part of the Bourgogne–Franche-Comté academic cluster, this doctoral department houses more than 20 research units focusing on the environment (ecology, evolution, geology, climatology, behavioral sciences, agro-ecology, and food science) as related to human health and nutrition.

- **Multidisciplinary doctoral department of Université Antilles-Guyane**
  - ED 260

The laboratories affiliated with doctoral department 260 conduct environmental research related to health, ecology, and applied geosciences in the region.

- **Natural and human sciences** - ED 227
  - [http://www.mnhn.fr>Enseignement & formation>Enseignement supérieur>Ecole Doctorale](http://www.mnhn.fr>Enseignement & formation>Enseignement supérieur>Ecole Doctorale)

Housed in Paris’s Museum of Natural History, doctoral department 227 conducts advanced environmental research on topics such as functional and environmental genomics, as well as transdisciplinary research that integrates several approaches (molecular, morphological, environmental).

- **SIBAGHE (integrated systems in biology, agronomy, and bioengineering sciences)**
  - ED 458
  - [http://www.sseag.univ-tlse.fr](http://www.sseag.univ-tlse.fr)

Located at Université Paul Sabatier Toulouse 3, SIBAGHE has six research directions, including ecology, biodiversity and evolution; plant development; and agrosystems, ecosystem, and the environment.

- **SVSAE (life sciences, health, agronomy, environment)**
  - ED 65 - [Edsvs.univ-bpclermont.fr](http://www.sseag.univ-tlse.fr)

Coaccredited by and associated with Université Blaise Pascal in Clermont-Ferrand, Université d’Auvergne, and four external research bodies (CNRS, INRA, INSERM, and VetAgro Sup), SVSAE houses 26 laboratories for doctoral candidates. It provides a structure for all research efforts in the Clermont region in the fields of agronomy, cancer research, ecology, genetics, microbiology, the neurosciences, human nutrition, physiology, and food science.

- **SIBAGHE (integrated systems in biology, agronomy, geosciences, hydrosciences, and environment)**
  - ED 477
  - [Http://www.sibaghe.univ-montp2.fr](http://www.sibaghe.univ-montp2.fr)

SIBAGHE is attached to Université Montpellier 2 for life and earth sciences and coaccredited with Montpellier SupAgro and AgroParisTech for agronomy and environmental sciences, and with Université de Montpellier 1 for plant genomics and development, microbiology, and parasitology. Six fields of doctoral specialization are emphasized: integrative plant biology; continental water bodies and societies; ecology, evolution, genetic resources, paleontology; ecosystems and agronomy; geosciences; and microbiology and parasitology.

- **VENAN (plants, environment, nutrition, agriculture, sea)**

Situated at Université d’Angers, VENAN has 22 host laboratories distributed over five sites in the Loire region (the universities of Angers, Nantes, and Maine; AgroCampus Ouest; and the École nationale de Nantes Oniris (for human and animal health)).
Marine sciences

- Sea and sciences - ED 548
  http://www.univ-tln.fr>Investigación>Estudios doctorales
  This multidisciplinary doctoral department houses eight scientific and technical laboratories of Université de Toulon (UTLN), including:
  - The Mediterranean institute of oceanography, UMR 7294
  - The laboratory on polymers, interfaces, and marine environments, EA 4323
  - The laboratory on exchange and transfer processes in the environment, EA 3819

  Doctoral department 156 at Université de Bretagne Occidentale provides a home for the disciplines involved in the broad study of marine environments. It trains specialists in space sciences, engineering, the life sciences, and the humanities.

Engineering, energy

- Doctoral department of chemistry - ED 206
  Doctoral department 206 at Université de Lyon is composed of 14 research units, several of which pursue research related to the environment:
  - IRCELYON, the Lyon institute for research on catalysis and the environment: www.irceylon.univ-lyon1.fr
  - Energy and environment - ED 305
    http://www.univ-perp.fr>Recherche>Écoles Doctorales
    Affiliated with Université de Perpignan, doctoral department 305 focuses its research efforts on the links between the environment, solar energy, and the sea. Its five areas of scientific emphasis include solar energy, the marine environment, and interactions and evolution in living things. Work is done in nine laboratories, including CIRAD's biomass laboratory, participating in the DERBI competitiveness cluster on development of renewable energy for construction and industry.
    I-MEP2 houses some 15 research units (UMR, UPR), among them:
    - LGGE, laboratory of environmental glaciology and geophysics (UMR 5183), which conducts research on climate and the composition of the atmosphere: http://lgge.osug.fr
    - LTHE, laboratory for the study of transfers in hydrology and environment (UMR 5564), devoted to research on the water cycle and its links with climate and the environment: www.lthe.fr/LTHE/
    Doctoral department 468 of the national polytechnic institute of Toulouse is coaccredited with the national institute of applied sciences of Toulouse, the higher institute of aeronautics and space, and Université de Toulouse. A dozen laboratories and institutes are affiliated with the department—among them LAPLACE (plasma and energy conversion laboratory, UMR 5213, www.laplace.univ-tlse.fr), LMDC (laboratory of materials and construction durability, EA 3027, www-lmdc.insa-toulouse.fr), and PHASE (the human body in its environment, http://phase.ups-tlse.fr).
    RP2E encompasses 18 laboratories and research teams at Université de Lorraine that cover the life cycle of mineral and biological matter and energy with respect to the environment. Research is focused on knowledge of natural systems: the origin of resources (mineral and energy raw materials, water, soils, agricultural production, forests); sustainable exploitation of resources; waste management and processing; health, food, and environmental safety; and risk management.
  - SIE (sciences, engineering, and environment) - ED 531
    http://www.univ-paris-est.fr>Études doctorales>Les Écoles Doctorales
    SIE, a multidisciplinary doctoral department at Université Paris-Est, concentrates on physics, mechanics, chemistry, geosciences, environmental sciences, and life sciences. Some 15 host units and teams carry out research related to the environment—among them CEREA (center for teaching and research in atmospheric environments), LEESU (laboratory on water, environment, and urban systems), LGGE (laboratory on geomaterials and the environment), and LISA (interuniversity laboratory of atmospheric systems).
  - SISEO (sciences and engineering of systems, environments, and organizations) - ED 489
    Affiliated with Université de Savoie, SISEO consists of six research units—among them the alpine research center on trophic networks of limnic ecosystems (UMR 42); mountainous environments, dynamics, and regions (UMR 5204); laboratory of molecular and environmental chemistry (EA 1651), laboratory of the optimization of environmental design and engineering (UMR 5271).
  - SPIGA (engineering, geosciences, architecture) - ED 498
    http://www.ec-nantes.fr>Recherche>Ecole Doctorale
    SPIGA at the École Centrale de Nantes houses ten laboratories, among them:
    - Laboratory of process engineering, environment, and food processing (UMR 6144): www.gepea.fr
    Research is performed in about 15 different disciplines and areas: astronomy and astrophysics, solid earth (deep deposits and layers, superficial envelopes, and fluids), geography (physical, human, economic, and regional), land and city management and urbanism, civil engineering, and others.
Useful links

- Airparif, air pollution in Île-de-France: http://www.airparif.asso.fr
- ANCRE, the national coordinating alliance for energy research: http://www.allianceenergie.fr
- ANR, national research agency: http://www.agence-nationale-recherche.fr
- CDC climate research: http://www.cdcclimat.com/CDC-Climat-Recherche.html
- CEREGE, European center for research and teaching in geosciences and environment: https://www.cerege.fr
- CERFACS, European center for research and advanced training in scientific computation: http://www.cerfacs.fr
- CESE, economic, social, and environmental council: http://www.lecese.fr
- Climate-KIC, a European project at the FCS Campus-Saclay: http://www.climate-kic.org
- CNRM, national center for meteorological research: http://www.cnrm.meteo.fr
- Energy and climate research challenges: http://www.cea.fr/Energies/Impact sur le climat
- EU Environment: http://ec.europa.eu/environment/
- EurAqua, European network of freshwater research organizations: http://www.euraqua.org
- European geosciences climate: http://www.egu.eu
- European Institute of Innovation and Technology, KIC-Climate: http://eit.europe.eu/eit-community/climate-kic
- Evolution of the climate and the oceans, articles by Édouard Bard of the Collège de France: http://www.college-de-france.fr/site/edouard-bard/travaux__1.htm
- FIRE, IDF federation for environmental research: http://www.upmc.fr>Recherche>Terre vivante et environnement>Structures fédératives
- France’s water authorities: http://www.lesagentsdesdeau.fr
- History of the environment, a multidisciplinary thematic network (CNRS–Institute of Humanities and Social Sciences: http://www.cnrs.fr/inshs/>La recherche en sciences humaines et sociales>RTP Histoire de l’environnement
- INSU, national institute of space sciences: http://www.insu.cnrs.fr
- IPCC, Intergovernmental Panel on Climate Change: http://www.ipcc.ch
- Key climate figures for France and the world 2014: http://www.cdcclimat.com/Publications
- La Recherche, climatology archives: http://www.larecherche.fr/savoirs/climatologie
- MAEDI, Ministry of Foreign Affairs and International Development: http://www.diplomatie.gouv.fr>Politique étrangère de la France>Environnement et développement durable
- ONEMA, national office on water and aquatic milieus: http://www.onema.fr
- ONF, national forestry service: http://www.onf.fr
- PEER, Partnership for European environmental research: http://www.peer.eu
- RAC-FR, network for climate action, France: http://www.rac-f.org
- REACH, registration, assessment, authorization, and restriction of chemical products: http://ec.europa.eu/enterprise/sectors/chemicals/
- Research newsletter of the scientific interest group on climate, the environment, and society: http://www.gisclimat.fr>Nos activités>Diffusion scientifique
- SAFIRE, research aircraft: http://www.safire.fr
- Sagascience, a collection of multimedia files from CNRS on climate issues and topics: http://www.cnrs.fr/cw/dossiers/saga.htm
- UNFCCC, United Nations Framework Convention on Climate Change: https://unfccc.int
- Volatils, earth, atmosphere, and interactions from the Voltaire laboratory of excellence: http://www.univ-orleans.fr/Investissements-avenir/voltaire
- WCRP, World Climate Research Programme: http://www.wcrp-climate.org