Panorama of strategies and action plans for invasive alien species

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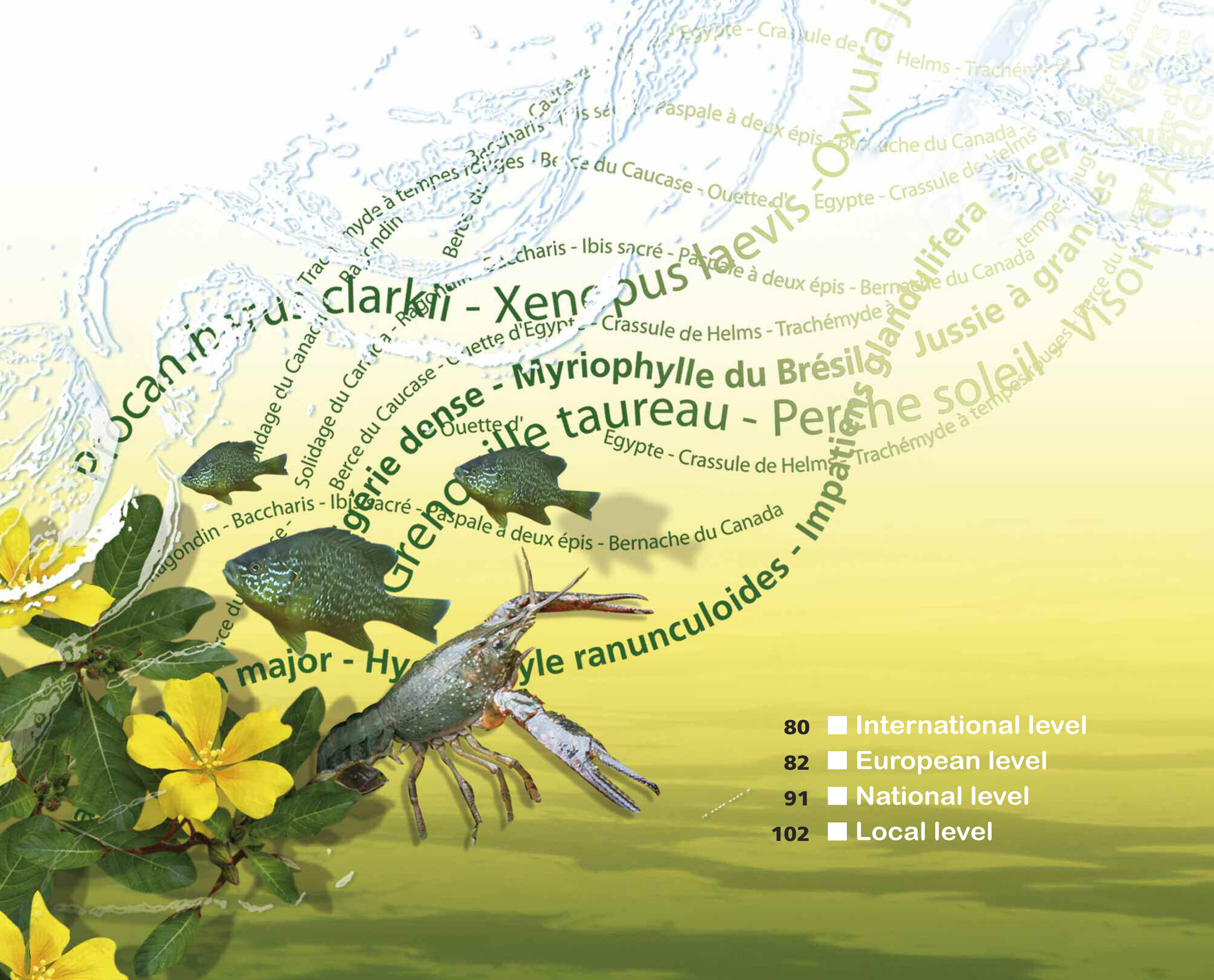


International level

Global Invasive Species Programme (GISP)

The Global invasive species programme (GISP) was launched in 1997. GISP is coordinated by the Scientific committee on problems of the environment (SCOPE), in conjunction with the International union for the conservation of nature (IUCN) and the Centre for agricultural bioscience international (CABI). It is one branch of the international programme of biodiversity science (DIVERSITAS).

Its mission is to contribute to biodiversity conservation and to maintain the necessary living resources for humans by limiting (or reducing) the propagation and impacts of invasive alien species.

Its specific objectives are to provide political support to international conventions dealing with IASs, notably article 8 (h) in the Convention on biological diversity (CBD), and to raise public awareness concerning the threats arising from IASs in the world.

■ Phase I (1997-2005)

During this initial phase, GISP attempted to:

- improve scientific knowledge on IASs to assist in decision making;
- develop the use of early warning, assessments and rapid responses;
- reinforce management capabilities;
- reduce the economic impacts of IASs;
- improve risk-assessment methods;
- strengthen international conventions.

In 2001, GISP published a global strategy for invasive alien species (McNeely et al., 2001) and a guide on enhanced prevention and best management practices for these species (Wittenberg and Cock, 2001). The GISP secretariat was established in 2003 in Cape Town (South Africa) to facilitate and coordinate implementation of the global strategy.

■ Phase II (2006-2010)

During this second phase, GISP activities dealt with:

- assessing the IAS situation and preventing their propagation worldwide by enhancing scientific knowledge to assist in decision making and improve management;
- studying how IASs affect the main economic sectors in order to reduce their impacts on natural ecosystems and on human food sources;

■ managing and providing a political response by creating an environment conducive to improvements in IAS management.

(http://www.diversitas-international.org/activities/past-projects/global-invasive-species-programme-gisp)

Due to a lack of funding, the GISP secretariat ceased its activities in March 2011.
(http://www.bgci.org/resources/news/0794/).

Global Invasive Species Information Network (GISIN)

The Global invasive species information network was created in 2008 as a platform to exchange information on invasive species worldwide via the internet and other digital means. The network, developed by a group of participants under the direction of the United States Geological Survey (USGS6), provides access to data and information of use for detection, rapid response and the regulation of invasive species. An IAS database is available with data on each species and country.
(http://www.gisin.org/DH.php?WC=/WS/GISIN/GISINDirectory/home_new.html&WebSiteID=4)

Invasive Species Specialist Group (ISSG)

Created in 1994 and coordinated by the Species survival commission (SSC) of the International union for the conservation of nature (IUCN), ISSG is the IUCN expert group on invasive alien species. It comprises 196 experts in 40 countries plus an informal network of 2 000 other experts and go-to persons. The objectives are to raise awareness concerning IASs and to improve the methods employed to prevent, control and eradicate them.

(http://www.issg.org/about.htm)

ISSG is active in two main fields, namely providing technical and political advice, and facilitating information exchange using on-line tools and by creating networks. Activities include:

■ providing scientific and technical advice to IUCN members for the drafting of management strategies and for their participation in international organisations (CBD, Ramsar, etc.);

■ publishing a biannual bulletin Aliens (http://www.issg.org/publications.htm);

■ managing the worldwide database GISD on invasive species
(http://www.issg.org/database/welcome/) ;

■ managing the mailing list Aliens-L, that enables users to locate and share information on invasive species and their impacts
(https://list.auckland.ac.nz/sympa/info/aliens-l) ;

■ providing an information service Aliens-referral, to facilitate contacts between the experts and other stakeholders.

6. USGS is a scientific organisation that produces information on the health of ecosystems and the environment, see: http://www.usgs.gov/aboutusgs/

European level

European strategy for invasive alien species (Council of Europe - Bern convention)

Acknowledgement of the problems caused by invasive alien species on the international level, notably in the framework of the Convention on biological diversity (CBD) in 1992, led to the establishment of a European strategy for IASs (see Figure 37). During its 21st meeting in November 2001, the CBD Standing committee requested that a European strategy for invasive alien species be established.

An initial, draft strategy was presented during the 4th meeting of the expert group held in Hora (Azores, Portugal) in October 2002 and during the 5th meeting of the group in Strasbourg in June 2003.

Finally, the 23rd meeting of the Bern convention Standing committee approved the European strategy on invasive alien species and adopted recommendation no. 99 (2003) on the European strategy and recommending that the Contracting parties:

- *"draw up and implement national strategies on invasive alien species taking into account the European Strategy on Invasive Alien Species mentioned above"*;
- *"co-operate, as appropriate, with other Contracting Parties and Observer States in the prevention of introduction of invasive alien species, the mitigation of their impacts on native flora and fauna and natural habitats, and their eradication or containment where feasible and practical, inter alia by exchanging information, collaborating in European projects and paying particular attention to invasive alien species in trade and transboundary areas"*;
- *"keep the Standing Committee informed of the measures taken to implement this recommendation"*.

(https://wcd.coe.int/ViewDoc.jsp?Ref=Rec(2003)099&Language=lanFrench&Ver=original&Site=DG4-Nature&BackColorInternet=a3b811&BackColorIntranet=a3b811&BackColorLogged=EDF4B3)

The European strategy on invasive alien species encourages the implementation of coordinated measures in all European countries in order to prevent or minimise the impacts of these species on biodiversity, the economy and human health.

The strategy is intended primarily for the governments of the Contracting parties to the Bern convention and for other European states. The detailed document provides guidelines for environmental-protection groups and managers of activities linked to IAS prevention and management.

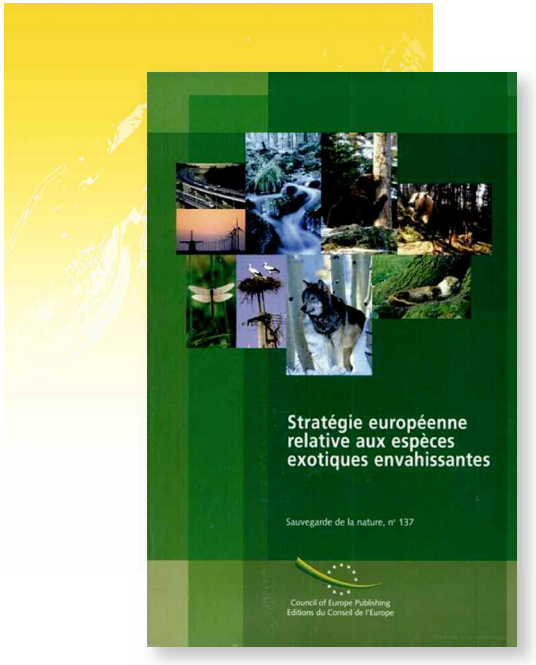
The guidelines propose the following points, among others:

- "*rapidly increase awareness and the available information on the problems caused by invasive alien species and the means to solve those problems*";

- "*reinforce national and regional capabilities and cooperation in confronting the problems caused by invasive alien species*";
- "*prevent the introduction of new invasive alien species in Europe or between regions in Europe, and promote rapid responses to any observed arrivals*";
- "*reduce the impact of the invasive alien species already established*";
- "*provide for the re-establishment of species and restoration of ecosystems and natural habitats that were harmed by biological invasions, where feasible and desirable*";
- "*identify the key measures that must be implemented on the national and regional levels and prioritise them*" (Genovesi and Shine, 2011).

In conjunction with these recommendations, European codes of conduct have been drafted (see Box 11 on the next page).

Figure 37



European strategy for invasive alien species.

European codes of conduct

In the framework of the European strategy on invasive alien species (Genovesi and Shine, 2011), a number of codes of conduct have been drafted for the Member States. These codes are proactive instruments for strategy implementation and are intended for public organisations, economic players, the public and NGOs. The objective is to propose a consistent, responsible and proactive policy for invasive alien species that is applied uniformly across the European Union.

Code of conduct on horticulture and invasive alien plants

In 2008, the Council of Europe and the European plant protection organisation (EPPO) jointly drafted the Code of conduct on horticulture and invasive alien plants (see Figure 38).

The code was adopted by the Standing commission of the Bern convention during its 28th meeting in Strasbourg in November 2008, at the same time as recommendation no. 134 (2008) pertaining to the code and recommending that the Contracting parties:

- "*draw up national codes of conduct on horticulture and invasive alien plants taking into account the European Code of Conduct mentioned above*";
- "*collaborate as appropriate with the horticultural industry and in particular with managers of public spaces (such as municipalities) in implementing and helping disseminate good practices and codes of conducts aimed at preventing release and proliferation of invasive alien plants*";
- "*keep the Standing Committee informed of the measures taken to implement this recommendation*".

(https://wcd.coe.int/ViewDoc.jsp?Ref=Rec(2008)134&Language=lanFrench&Ver=original&Site=DG4-Nature&BackColorInternet=DBDCF2&BackColorIntranet=FDC864&BackColorLogged=FDC864#)

The code, republished in 2011 (Heywood and Brunel, 2011), does not contain any mandatory measures, but proposes various methods to raise awareness among professionals and prevent the introduction of new invasive alien species in Europe:

- "*Be aware of which species are invasive in your area*";
- "*Know exactly what you are growing, ensure that material introduced into cultivation is correctly identified*";
- "*Be aware of regulations concerning invasive alien plants*";
- "*Work in cooperation with other stakeholders, both in the trade and the conservation and plant-protection sectors*";
- "*Agree which plant species are a threat and cease to stock them or make them available*";
- "*Avoid using invasive or potentially alien plants in large scale public plantings*";
- "*Adopt good labelling practices*";
- "*Make substitutes for invasives available*";
- "*Be careful how you get rid of plant waste and dispose of unwanted stock of plants and plant-containing waste*";
- "*Adopt good production practices to avoid unintentional introduction and spread*";
- "*Engage in publicity and outreach activities*";
- "*Take into account the increased risks of alien plant invasions due to global change*".

European code of conduct for botanic gardens on invasive alien species (Heywood, 2013)

In 2013, a European code of conduct for botanic gardens was drafted (see Figure 38). The code explains the specific role played by botanic gardens in biological invasions and proposes guidelines to raise awareness, share information and implement preventive and control measures.
(https://wcd.coe.int/com.instranet.InstraServlet?command=com.instranet.CmdBlobGet&InstranetImage=2300032&SecMode=1&DocId=1943644&Usage=2)

European code of conduct for zoos and aquariums (Scalera *et al.*, 2012)

This code of conduct, intended for all zoos and aquariums in the Member States of the Council of Europe, proposes guidelines on voluntary measures that can be set up to mitigate the problems caused by the dissemination of invasive alien species. Five recommendations are provided to:

- set up preventive measures to avoid intentional introductions of IASs and their dissemination in the natural environment;
- integrate IAS risks in management plans for wildlife;
- launch projects to raise awareness of IASs and their impacts;
- adopt good practices in conjunction with an early-detection and warning system for IASs;
- learn about the applicable regulations for zoos/aquariums and IASs.

(https://wcd.coe.int/com.instranet.InstraServlet?command=com.instranet.CmdBlobGet&InstranetImage=2176840&SecMode=1&DocId=1943806&Usage=2)

Figure 38

European codes of conduct for horticulture and botanic gardens.

LIFE and LIFE+ projects

Though a financial instrument specifically intended for IASs does not exist, the European commission has nonetheless contributed to the funding of over 300 projects on the topic since 1992, representing a total budget of over 132 million euros (Scalera, 2010).

LIFE, the EU financial instrument for the environment, is the most frequently used instrument in setting up IAS management programmes. Launched in 1992, the objective of LIFE is to contribute to implementing, updating and developing EU environmental policy and legislation by co-funding innovative or instructive projects generating value for Europe as a whole.

(http://ec.europa.eu/environment/life/about/)

From 1992 to 2006, a total of 187 IAS-related projects were funded by LIFE programmes, representing 44 million euros (Scalera, 2010).

Some 30 projects directly addressed the topic and over 160 included at least one element dealing with IASs. A majority (52%) of projects were run in Spain, the U.K., France and Italy (see Box 12). On average, 12 LIFE projects dealing with IASs were funded each year by the European commission, representing 3 million euros per year.

The LIFE+ programme covered the period 2007 to 2013 with a total budget of 2.143 billion euros.

Regulation (EC) 614/2007 of the Parliament and the Council of 23 May 2007 created the legal basis for the Life+ programme.
(http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:149:0001:0016:FR:PDF)

According to the regulation, funded projects must meet the following criteria:

- contribute to the implementation, updating and development of Community environmental policy and legislation;
- be technically and financially coherent and feasible and providing value for money;
- ensure European added value by satisfying at least one of the following criteria:

- be best-practice or demonstration projects, for the implementation of the Conservation of wild birds or the Habitats directives,
- be innovative or demonstration projects, relating to Community environmental objectives,
- be awareness-raising campaigns and special training for agents involved in forest fire prevention,
- be projects for the development and implementation of Community objectives relating to the monitoring of forests and environmental interactions.

Each year, the EU commission issues a call for proposals and decides which projects will benefit from LIFE+ funding. The list of selected projects is regularly published.

Examples of LIFE+ projects concerning biological invasions AlterIAS

AlterIAS (*ALTERnatives to Invasive Alien Species*) is a communication project, aiming to raise awareness in the horticultural sector of the problems caused by invasive alien plants. The overall objective is to reduce intentional introductions of invasive alien plants in gardens, parks, ornamental pools, green spaces and along roads, which are the main starting points for invasions in natural areas. AlterIAS is a national project that served to draft the first code of conduct for invasive plants in Belgium.

(http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFile&rep=file&fil=ALTERIAS_Code_conduite_FR.pdf ; http://www.alterias.be/fr/)

CAISIE (*Control of Aquatic Invasive Species and Restoration of Natural Communities in Ireland*) contributes to enhancing comprehension and the control of invasive alien species in Ireland. The overall objective of the project is to halt and reverse biodiversity loss in freshwater ecosystems in Ireland by limiting the impacts of invasive aquatic species through the development of effective management methods, a programme to engage and raise the awareness of stakeholders, and drafting of legislative and political documents. One of the more specific objectives of the project is to eliminate curly waterweed (*Lagarosiphon major*) in Corrib Lake (see the management project in volume 2, page 27).

(http://caisie.ie/)

- **Visón La Rioja** (*Conservación del visón europeo en La Rioja*) is part of a coordinated action plan to save the European mink from extinction in the EU. One of the objectives is to prohibit the installation of the American mink (*Neovison vison*) in the Rioja region. Annual trapping campaigns have been carried out in the neighbouring provinces of Alava and Burgos to prevent the American mink from reaching Rioja rivers where the European mink currently lives.

(http://www.larioja.org/npRioja/default/defaultpage.jsp?idtab=439621&IdDoc=439491)

- **MIRDINEC** (*Management of the invasive Raccoon Dog (Nyctereutes procyonoides) in the north-European countries*) aims to halt and reverse biodiversity loss caused by the raccoon dog (*Nyctereutes procyonoides*), particularly in EU wetlands. An early-warning system has been established to monitor populations of raccoon dogs and innovative elimination and management techniques have been used to control the species.

(http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=3784)

- **Mink control** (*Mink control to protect important birds in SPAs in the Western Isles*) had as its overriding objective the eradication of the American mink (*Neovison vison*) to avoid major disturbances and population losses of internationally important bird species (see Annex 1 in the Birds directive) nesting on the ground.

(http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=1713)

- **Vertebrados invasores** (*Control de vertebrados invasores en islas de Portugal y de España*) is an organisation that works to disseminate the know-how and the feedback acquired in managing invasive alien vertebrate species in the Portuguese and Spanish archipelagos. It also aims to establish a network between agencies to ensure monitoring of and the exchange of technical information on invasive alien species and to inform the concerned sectors on the seriousness of the problem, on the need to set up preventive measures to limit the introduction and establishment of alien species, and on the importance of habitats and native species.

(http://www.gobcan.es/cmayot//medioambiente/medionatural/biodiversidad/conservacion/lineas_actuacion/life14.jsp)

Estuarios del Pais Vasco (*Restauración de hábitats de interés comunitario en estuarios del País Vasco*) attempts to counter the problems caused by the Groundsel tree (*Baccharis halimifolia*), a plant originally from North America, in the main estuaries of the Basque country, by focussing on the most heavily invaded areas. Work deals with habitat conservation by eliminating the Groundsel tree and replanting the affected areas, raising awareness and improving communication with the general public and stakeholders, as well as managing and monitoring the overall project (see the management project in volume 2, page 106).

LAG'Nature a programme to create a network of demonstration sites in lagoons and dunes along the Mediterranean coast in Languedoc-Roussillon, was developed in the framework of the Mediterranean lagoons centre in order to promote innovative operations and demonstrations on pilot sites in Languedoc-Roussillon. Measures to counter invasive plant and animal species are part of the "pilot" projects serving as examples for actual, operational measures. Work is carried out to manage invasive flora and the red-eared slider turtle (*Trachemys scripta elegans*) on the various project sites (see the management project in volume 2, page 175).

(http://www.lifelagnature.fr/)

Many other LIFE projects address invasive alien plant and animal species. Information on past and present projects is available on the internet site of the EU commission.
(http://ec.europa.eu/environment/life/project/Projects/index.cfm)

The European commission will budget 3.2 billion euros for the period 2014-2020 for the new LIFE programme focussing on the environment and climate projects (COM(2011) 874 final).
(http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2013.347.01.0185.01.ENG)

The draft for the new LIFE regulation will draw on the success of the current LIFE+ programme, but will be better structured and more strategic, simple and flexible. Greater importance will be placed on better governance and on the role played by projects in implementing EU policies. New aspects of the future LIFE programme include:

- creation of a new sub-programme for "Climate action";
- clearer definition of priorities, with multi-annual work programmes adopted in conjunction with the Member States;
- new possibilities to implement wider-ranging programmes via "integrated projects" that can call on other EU, national or private funds for environmental and climate objectives.

(http://ec.europa.eu/environment/life/about/beyond2013.htm#proposal)

Projects addressing invasive alien species are clearly eligible in the nature and biodiversity categories. They should target the implementation of measures for invasive alien species via work to experiment and develop approaches to:

- a) prevent the introduction of invasive alien species, notably by addressing the problem of unintentional introduction paths;
- b) establish an early-warning and rapid-response system;
- c) eliminate or reduce invasive alien species established over sufficiently large areas.

These projects must include the three phases (prevention, early warning and rapid response, eradication/reduction) in a complete approach or, if one phase has already been implemented, at least clearly position

the work in a more general framework combining the three phases. They must be designed to improve the existing technical, administrative and legal frameworks (or create new ones) on the relevant level to ensure that invasive alien species do not gain any more ground in the EU.
(http://eur-lex.europa.eu/legal-content/FR/TXT/PDF/?uri=CELEX:32014D0203&from=FR)

European Alien Species Information Network (EASIN)

The European alien species information network was created by the EC joint research centre and works to improve access to data and information on alien species in Europe. EASIN makes it easier to explore existing on-line databases for policy makers and scientists in their management of these species.

The network works to harmonise the data from an array of sources, thus enabling users to run requests through several databases and organise the results according to their specific needs (e.g. maps, species classification) (Katsanevakis et al., 2012).
(http://easin.jrc.ec.europa.eu/)

Delivering Alien Invasive Species Inventories for Europe (DAISIE)

DAISIE is a research project developed for the EU FP6 programme (6th Framework programme for research and technological development).
The project has set up a large database on introduced species in Europe. Experts in a vast network throughout Europe participate in:

- creating an inventory of the invasive alien species that threaten freshwater, marine and terrestrial environments in Europe;
- structuring the inventory to provide a database for the prevention and control of biological invasions, thanks to better understanding of the environmental, social, economic and other factors involved;
- assessing and summarising the ecological, economic and health risks as well as the impacts of the most common invasive species and/or those causing the greatest impacts;
- using the species-distribution data and feedback from Member States in identifying indicators for early warning.

The database and main programme results may be accessed via the internet site (http://www.europe-aliens.org/).

DAISIE is an important tool in developing a European strategy for the management of invasive species. Reliable and detailed information on species introduced on the European geographic scale represents an essential means of preventing the dissemination of IASs, reducing their impact and applying relevant and effective management strategies. The assembled data deals with vertebrates, invertebrates and plants from both terrestrial and aquatic (freshwater and marine) environments. Over 248 data sets have been assembled and checked by experts, thus constituting the largest database to date on invasive species in the world.

Among the tools created, DAISIE drafted a list of the “100 worst invasive alien species in Europe”, selected for their impacts on biodiversity, the economy and human health. Species data sheets present information on their biology and ecology, their habitats and their distribution range (maps), as well as on introduction paths, invasion trends, impacts and management techniques, including prevention.
(http://www.europe-aliens.org/speciesTheWorst.do).

Framework programmes for research and technological development (FP)

These funding programmes were created by the EU to support and encourage European research.

FP6 served as the general framework for EU activities in the fields of science, research and innovation from 2002 to 2006. The main objective of the sixth FP was to contribute to creating a true European research area (ERA) by improving the integration and coordination of what had been, until then, a relatively fragmented research sector in Europe.
(http://europa.eu/legislation_summaries/research_innovation/general_framework/i23012_fr.htm)

A number of research projects on invasive alien species were developed in this framework, for example:

- ALARM (*Assessing LArge scale Risks for biodiversity with tested Methods),* where the objective was to develop and test assessment methods and protocols for large-scale environmental risks in order to reduce their direct and indirect impacts on humans. The potential risks of biological invasions were also taken into account;
(http://www.alarmproject.net/alarm/)

- IMPASSE (*Environmental impacts of invasive alien species in aquaculture),* where the objective was to supply guidelines on ecologically rational practices concerning the introduction and transport of species in aquaculture (quarantine procedures and protocols to assess the potential impacts of invasive alien species).
(http://www2.hull.ac.uk/science/biology/research/hifi/impasse.aspx)

The objectives of **FP7**, spanning the period 2007 to 2013, were to consolidate the European research area and to fulfil the needs of industry and European policies in terms of research and new knowledge. The programme was divided into four categories, namely Cooperation, Ideas, People, Capacities.
(http://europa.eu/legislation_summaries/research_innovation/general_framework/i23022_fr.htm)
(http://cordis.europa.eu/fp7/understand_fr.html)

Further projects on invasive species were carried out in FP7, notably those listed below.

- FRESIS (*Freshwater invasive species in Europe: control, prevention and eradication*), proposed an integrated, multi-disciplinary approach in implementing the three main thrusts (control, prevention and eradication) of the project intended to improve European competitiveness in managing biological invasions.
(http://cordis.europa.eu/projects/index.cfm?fuseaction=app.details&TXT=fresis&FRM=1&STP=10&SIC=&PGA=&CCY=&PCY=&SRC=&LNG=en&REF=94723)

- INSPECTED.NET (*INvasive SPecies Evaluation, ConTrol & EDucation.NETwork*), put together a group of international experts on biological invasions to support and enhance existing programmes such as DAISIE and GISP.
(http://cordis.europa.eu/projects/rcn/101539_en.html)

- PRATIQUE (*Enhancements of pest risk analysis techniques),* where the objective was to improve pest risk analysis (PRA) techniques, which meant gathering the data required to produce valid PRA results for all of Europe, devising multi-disciplinary research programmes to improve PRA techniques and developing an effective and simple decision-making system.
(https://secure.fera.defra.gov.uk/pratique/index.cfm)

The Community research and development information service (CORDIS) provides information on European R&D work and on technology transfers. Ample information is available on the various European projects dealing with invasive alien species.
(http://cordis.europa.eu/home_fr.html).

National level

Strategy and programmes of the Ecology ministry

■ National strategy against invasive alien species

In 2009, the Water and biodiversity directorate of the Ecology ministry drafted the framework for what was to become the National strategy against invasive alien species having an adverse impact on biodiversity. The central elements of the strategy were based on the commitments undertaken during the Grenelle environmental meetings and the Convention on biological diversity (see Chapter 2).

In implementing the strategy, the directorate called on the National agency for water and aquatic environments (Onema), the National agency for hunting and wildlife (ONCFS), the IUCN French committee and two scientific coordinators, for fauna, the Natural heritage department (SPN) of the National museum of natural history (MNHN), and for flora, the Federation of national botanical conservatories (FCBN). All the above organisations assist the Ecology ministry in implementing regulations and in various projects concerning invasive alien species.

The strategy included several parts:

- prevention of introductions of invasive alien species into the natural environment;
- creation of a monitoring network;
- design and implementation of national action plans;
- reinforcement of the nature police;
- increased communication, training and research;
- support in establishing regulations.

The publication of Regulation (EU) 1143/2014 of the European parliament and the Council of 22 October 2014 made necessary a complete rethinking of the national strategy. The Water and biodiversity directorate launched a project to revamp the national strategy taking into account the European regulation. The project consists of a steering committee and work groups bringing together stakeholders and experts working in the field of invasive alien species.

■ Biological invasions programme (Invabio)

This programme was established in 1999 by the Ecology ministry. The main objective was to provide the information required for a coherent approach based on improved knowledge (theoretical and practical) on biological invasions and to propose management tools designed to prevent, minimise or eradicate invasive alien species (Barbault and Atramentowicz (coord.), 2010).
(http://www.ecolab.ups-tlse.fr/invabio/accueil.html)

Three topics were set for the research carried out in the Invabio programme:

- the mechanisms underlying invasive phenomena, taking into account the evolution of invasive populations and the characterisation of the invasive phenomenon, to develop the capacity to predict the invasive potential of a population in a given area;
- the socio-anthropological perception of invasive phenomena and an economic assessment of biological invasions with cost-benefit analysis of introductions and cost analysis of the management of invasions;
- the control and management of invasive phenomena, comprising first of all the development of a risk-assessment method, then proposals on techniques, experiments and assessments of one or more control methods that must be adapted to the specific conditions of the invasions and, finally, an assessment of the inherent or secondary risks of the control techniques used for these populations (Mazaubert, 2008).

Between 2000 and 2006, Invabio financed approximately 30 research projects on a vast range of organisms and processes. The main results of these projects were presented during a feedback symposium at Miolets et Maa (Landes department) on 17-19 October 2006. A further objective of the symposium was to propose recommendations for research and management to assist in decision making for public policies. (http://centrederessourcesloirenature.com/mediatheque/especes_inva/telechargements/evenementiel/publication_invabio.pdf)

Finally, the symposium produced a book reviewing the current situation of IASs in France on the basis of the results of the funded projects.

Strategy of the Agriculture ministry

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ET DE LA FORÊT

The Agriculture ministry is also active in managing IAS issues. The plant-protection services are, among other tasks, in charge of monitoring health and plant-protection issues throughout the country (Dutartre et al., 2010). The National laboratory for plant protection (LNPV) previously reported to the General food directorate of the ministry, but on 1 January 2011, it became the Laboratory for plant health (LSV) and a part of ANSES (Agency for food, environmental and occupational health & safety). (http://agriculture.gouv.fr/laboratoire-national-de-la)

LSV is now the go-to lab for scientific and technical support for all issues concerning risks to plant health. Its activities within the agency contribute to an overall approach to risk assessment (see Box 13). The Entomological and invasive plants unit in Montpellier deals in particular with regulated insects and acari, and with invasive alien plants. This unit will play a major role in detecting the new species introduced in France and Europe and running the pest risk assessments. (http://www.anses.fr/fr/content/laboratoire-de-la-sant%C3%A9-des-v%C3%A9g%C3%A9taux#onglet3-tab)

In addition, a professional agricultural group, the National federation against pests (FNLON) coordinates the work of the regional federations (FREDON) and departmental federations (FDGDON), and works closely with the plant-protection services through an agreement with the ministry (Dutartre et al., 2010). These groups working against pests are required to manage the IASs that have been declared as such by the Rural code (e.g. nutria and muskrats).

In the framework of the Ecophyto 2018 plan, an epidemic-surveillance network for plants has been established. The network covers all sectors, in particular non-agricultural areas. A manager was appointed to coordinate projects and to draft a "Guide on observing and monitoring pests in non-agricultural areas". (http://www.ecophytozna-pro.fr/n/guide-d-observation-et-de-suivi-des-organismes-nuisibles/n:185).

This technical guide discusses observation and monitoring methods for pests, including invasive alien plants having an adverse impact on other plants (Dutartre et al., 2010).

Pest risk analysis (PRA)

A double regulatory framework exists for PRA because both the **International plant protection convention** (IPPC) and the **Convention on biological diversity** (CBD) recommend that a collaborative effort be made to address invasive alien species. The latest version of the PRA standard (international standard for phytosanitary measures, ISPM no. 11) includes the risks for the environment, in particular for ecosystems and habitats, and is a regulatory instrument to raise awareness among the public and authorities concerning biological invasions.

For over 60 years, the European plant protection organisation (EPPO), which corresponds to the regional plant-protection organisation for Europe within the IPPC framework, has attempted to prevent the introduction and spread of pests that damage crops in the European and Mediterranean region. However, in step with the regulatory context and starting in the beginning of the last decade, EPPO also launched to work on invasive alien plants capable of severely disturbing or destroying natural plant communities. EPPO, in conjunction with LSV in France, assumed responsibility for PRA to determine the risks involved with certain invasive alien plant species and to make recommendations on how to prevent their introduction and spread via international trade.

Strategy of the Health ministry

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The purpose of the first National plan for health and the environment (PNSE) 2004-2008 was to improve the health of the French people as it relates to environmental quality, in view of sustainable development. One of the eight priority issues according to the PNSE-1 guidelines committee for environmental health was to “prevent respiratory allergies caused by environmental exposure” and one of the corresponding projects dealt with pollen. (http://www.sante.gouv.fr/plan-national-sante-environnement-pnse,3480)

PNSE-2 (http://www.sante.gouv.fr/deuxieme-plan-national-sante-environnement-pnse-2-2009-2013.html) contained the environmental-health commitments undertaken in the Grenelle environmental agreement. The objective was to provide an overview of the main issues, as well as describe and prioritise projects for the 2009-2013 period. However, in a effort to reduce environmental inequalities, PNSE-2 also dealt with the prevention of allergies.

It was in this context that the various ministries, including the Health ministry, launched the project against common ragweed (Ambrosia artemisiifolia), an invasive alien plant from North America. Its widespread establishment in France is a major concern for public health because its pollen can cause severe allergies in humans.

To determine the sectors currently infested, not infested and those in the process of becoming infested by ragweed, the Health ministry assigned to the Federation of national botanical conservatories (FCBN) the task of drawing up a map indicating the presence of the plant.

In addition, in view of reinforcing coordination of the measures against the annual, highly allergenic plant, the Health ministry and the National institute for agricultural research (INRA) established in 2011 the Ragweed observatory. The primary objective of the observatory is to encourage coordination of the measures against ragweed on the national, European and international levels.
(http://www.ambroisie.info/index.php)

National museum of natural history and Federation of national botanical conservatories

During the formulation of the national strategy against invasive alien species, MNHN and FCBN were appointed in 2009 as the coordinators of scientific networks to assist the Water and biodiversity directorate of the Ecology ministry. Management of a network of experts on invasive, introduced plant and animal species is a means to enhance knowledge on a number of taxonomic groups.

- The ministry ordered a report from the two organisations on setting up a network to monitor the natural environment. The report was drafted in 2011 and published in 2014 (Thévenot and Leblay, 2014). The report will be used in preparing the national strategy.
(http://spn.mnhn.fr/servicepatrimoinenaturel/rapports.html)

A framework document containing definitions for biological invasions (Thévenot *et al.* 2013), available via the same link shown above, comprises an array of information drawn from the bibliography and papers submitted by experts.
MNHN and FCBN are also working on devising an IAS prioritisation method:

- concerning fauna, the national list of introduced vertebrates (Thévenot, 2014), the first step, is available on line (see the link above). Step 2 will be a study on their invasive nature;
- concerning flora, an initial proposal listing species requiring regulation, drawn up according to a published method, was submitted to the ministry in 2010. Since then, the federation has worked on improving a semi-automatic risk-analysis technique, integrating field data and bibliographical information from the FCBN network.

The step consisting of proposing measures concerning these species will be handled by an expanded work group in the framework of the activities undertaken by the ministry.

Natural heritage department (SPN) at the MNHN

MUSÉUM
NATIONAL D'HISTOIRE NATURELLE

Currently, MNHN takes part in the national plans against the Pallas' squirrel (*Callosciurus erythraeus*) (see Box 14) and the Asian hornet (*Vespa velutina nigrithorax*), and assists the National agency for hunting and wildlife with the European plan for the ruddy duck (*Oxyura jamaicensis*).

SPN also provides technical and organisational support by making available the tools used to acquire and manage species monitoring and surveillance data in the framework of citizen-science programmes for IASs and for standard inventories (species occurrence observations).

The department draws up departmental maps (Biodiversity atlas for departments and marine sectors (ABDSM) and updates the TAXREF reference dataset on newly detected introduced species and the species status conditions on the national level.

National programme against the Pallas' squirrel

The Pallas' squirrel (*Callosciurus erythraeus*), originally from Eastern Asia, entered France via Cap d'Antibes at the end of the 1960s. Initially sold as a pet and released to the environment, the species has become an ecological and economic pest (damage to tree bark, impact on local fauna, damage to fruit, telephone cables, wooden structures in buildings, etc.) requiring control measures.

At first limited to Cap d'Antibes, the species overcame the obstacle represented by buildings in the town of Antibes - Juan-les-Pins toward the end of the 1990s. As of today, the species is also present in the town of Vallauris and has started to colonise neighbouring towns. However, its extension northward is limited by the A8 highway that is currently seen as a very difficult barrier to overcome.

The increase in damage, notably in orchards, has pushed individuals to take action by trapping, shooting and, worse yet, poisoning the animals. These non-selective methods, poorly implemented, may have significant, indirect consequences on wildlife as well as on household animals.

Given this situation and the currently limited range of the species, control measures for this alien squirrel were considered in 2010 by the Ecology ministry. Following an initial phase used to analyse the situation, gather data, obtain the necessary authorisations and organise the intervention, the programme was launched in June 2012 under the responsibility of the National museum of natural history, the Museum of natural history in Nice and the National agency for hunting and wildlife.
(http://ecureuils.mnhn.fr/sites/default/files/documents/plan-national-lutte-ecureuil-ventre-rouge.pdf)

■ Federation of national botanical conservatories

FCBN represents the network of botanical conservatories working to enhance the knowledge, preservation, management and use of plants (Thévenot and Leblay, 2014). As a joint organisation for all the national botanical conservatories, it encourages the convergence of policies and the tools used within the network. It organises and coordinates the knowledge base of the conservatories available via the network.

It interacts with the public authorities that it assists in preparing and implementing policies concerning the natural heritage, particularly for wild plants and natural habitats. The network of conservatories has a database comprising over 20 million data points on the current and past distribution ranges of plants. This data in map form serves to provide a scientific basis for policies targeting the conservation of nature, to maintain watch over changes in natural environments and to support the implementation of any necessary conservation plans and measures. (http://www.fcbn.fr/)

National agency for hunting and wildlife (ONCFS)

The National agency for hunting and wildlife was founded in 1972 as a public agency under the supervision of both the Ecology and Agriculture ministries.

ONCFS was assigned five main missions listed in article L421-1 of the Environmental code and included among the Grenelle objectives of the French government, namely:

- general surveillance of rural areas and policing activities for the environment and hunting;
- research and studies on wildlife and its habitats;

- technical support and advice for administrations, local governments, territorial managers and planners;
- orient hunting practices toward forms of sustainable development and develop environmentally friendly management techniques for rural areas;
- organise and run examinations for hunting permits.

(http://www.oncfs.gouv.fr/)

In the framework of its strategic objective no. 1 (Contribute to preserving biodiversity), listed in the Statement of objectives for 2012-2014, ONCFS uses its police powers to enforce environmental law and in particular the European Habitat and Birds directives.

Point 3 in the strategic objective no. 1 (Contribute to controlling invasive alien animal species and those interfering with ecosystem balances or human activities) consists of two specific objectives:

- Objective 9, participate in monitoring, studying and managing invasive alien species and protected native animal species interfering with ecosystem balances or human activities;
- Objective 10, assist prefectoral authorities in taking action against wildlife constituting risks for public safety.

Invasive alien species are one of the research topics addressed by ONCFS. IAS management is divided along three lines:

- prevention of introductions in conjunction with informing and raising the awareness of stakeholders;
- surveillance for early detection of new species, monitoring of their development and regular assessments of the situation;
- curative action (up to and including eradication of a species), including national action plans (PNL) or control programmes at the request of the State.

In the field, the agency contributes to numerous IAS management projects for birds and mammals (ruddy duck, sacred ibis, Canada goose and small invasive alien carnivores). These projects are coordinated nationally by the Studies and research directorate, with technical support from experts, in close cooperation with the Police directorate concerning regulatory issues, and are carried out via partnerships when necessary.
(http://www.oncfs.gouv.fr/Recherches-sur-les-especes-exotiques-envahissantes-ru509).

Projects are executed on the regional level and the departmental services ensure that the entire country is covered in terms of police work and for IAS detection, monitoring and management. The results are published, notably in the Faune Sauvage journal.
(http://www.oncfs.gouv.fr/Recherches-sur-les-especes-exotiques-envahissantes-ru509).

ONCFS is also present in the overseas territories where science-advice missions are carried out, in conjunction with local partners, notably the IUCN French committee which has launched a project on IASs in the overseas territories, including territorial diagnoses and control strategies, legal and regulatory support for State services, early-detection studies, monitoring and projects, management and eradication (Cugnasse, Sarat, personal pub., 2013, for the IBMA (biological invasions in aquatic environments) site).
http://www.gt-ibma.eu/oncfs/).

National agency for water and aquatic environments (Onema)

ONEMA
Office national de l'eau et des milieux aquatiques

The main objective of Onema, a national, essentially administrative agency, is to contribute to overall and sustainable management of water resources and aquatic ecosystems. Its missions are listed in article L.213-2 of the Environmental code and consist of attaining good ecological status, the objective set by the European water framework directive (WFD).

Objective no. 8 in the first Onema Statement of objectives (2009-2012) was to Produce data on aquatic environments in order to characterise their biodiversity, among other aims. To achieve that objective, Onema studied the structure of communities and their changes, targeting in particular migratory species, as well as flag and alien species. Territorial units monitor invasive species (water primrose, duckweed, waterweed, ragweed, Pseudorasbora parva, garden balsam, etc.), notably in the framework of local projects. These units are also in

charge of monitoring various crayfish species (native and alien) as per the Natura 2000 regulations. (http://www.onema.fr/Contrat-d-objectifs-2009-2012)

The new Onema Statement of objectives covers the period 2013 to 2018. Objective 12 in the new Statement is to Upgrade data production. To meet that objective, Onema participates in water-status monitoring programmes, in characterising pressures and impacts on aquatic environments and in acquiring knowledge on biodiversity. In addition to the data acquired via the monitoring programmes, other observations of aquatic environments are carried out in the framework of the National biodiversity strategy for invasive and important native species, spawning grounds and ecosystem services. The data produced is fed into the nature and landscapes information system, in compliance with the reference dataset for the national list of natural heritage. (http://www.onema.fr/L-Onema-vient-de-signer-son-contrat-d-objectifs)

In addition, Onema provides scientific and technical support to the Ecology ministry and the decentralised services. With Irstea (formerly Cemagref), Onema founded the Biological invasions in aquatic environments work group (see page 98). Onema has also funded research projects dealing with biological invasions, for example:

- Genetic structure of alien crayfish populations and pathogenic effects. Invasion mechanisms and impact on native fauna (Symbiose UMR CNRS - Univ. Poitiers 2010-2012);
- Predicting the establishment of alien species in aquatic environments. Progress toward anticipating biological invasions (MNHN, 2010);
- Impact of alien species on food webs in lakes (Ecolab UMR CNRS - Univ. Toulouse III 2010-2011);
- Potential impact of Wels catfish (Silurus glanis L.) on fish. Multi-scalar approach using modelling, isotopic and genetic tools, and in situ observations (Ecolab UMR CNRS - Univ. Toulouse III 2012-2014);
- Preserving biodiversity against invasions of Louisiana crayfish (*Procambarus clarkii*) (INRA and Brière regional nature park 2010-2012, with joint organisation of the first French symposium on invasive alien crayfish in June 2013).

IUCN French committee

The French committee consists of the network of French organisations and experts working for the IUCN. This novel partnership comprises two ministries, 13 public organisations, 41 NGOs and over 250 experts grouped in commissions addressing specific topics and in thematic work groups. Thanks to this highly diverse composition, it serves as a knowledge base and platform for discussion on biodiversity issues.

To meet the challenges of conserving biodiversity in France, the IUCN French committee draws up status reports, issues practical recommendations and manages projects in order to produce better policies, knowledge and measures. Of particular importance is support for conservation stakeholders, including the managers of natural areas, and guidelines for public policies. Concerning invasive alien species, the French committee has two main projects in its Species programme:

- invasive alien species in the overseas territories, a project in conjunction with all the overseas local governments and a wide array of stakeholders (see Box 15);
- since 2014, joint management of the Biological invasions in aquatic environments work group with Onema.

The IUCN French committee and its partners organised the first national IAS symposium, titled “Invasive alien species, reinforced strategies for action”, in September 2014 in Orléans. During the three-day meeting, 200 stakeholders and experts from continental France and the overseas territories traded opinions and discussed project feedback in an effort to address the issues raised by biological invasions, taking into account the new European directive and the future national strategy for IASs.

Finally, the committee also acts as a liaison with the IUCN on the international level and is in close contact with its Invasive species specialist group (ISSG). It participates as well in supplying and updating the world database on invasive alien species (GISD).

IUCN French committee project for IASs in the overseas territories

Invasive alien species are one of the main threats to biodiversity in the French overseas territories. Since 2005, the IUCN French committee has run an initial project specifically targeting IASs in the overseas territories in order to assist the local stakeholders.

Thanks to the involvement of numerous partners and precise targets in each of the overseas territories, a network has been established comprising over 100 experts and go-to persons from an array of organisations active in the overseas territories and in continental France.

The main results of this project include:

- publication of a scientific and legal review of the situation in the overseas territories, with numerous recommendations on how to improve the response to the phenomenon;
- drafting of several technical guides and documents to raise awareness, in support of local projects;
- organisation of workshops in the Caribbean, the Pacific and the Indian Ocean to share information and develop solutions;
- creation of an internet site on IASs in the overseas territories (see Figure 39) that serves as a resource centre for all overseas stakeholders;
- dissemination of a quarterly information bulletin.

(http://www.especes-envahissantes-outremer.fr/)

Figure 39

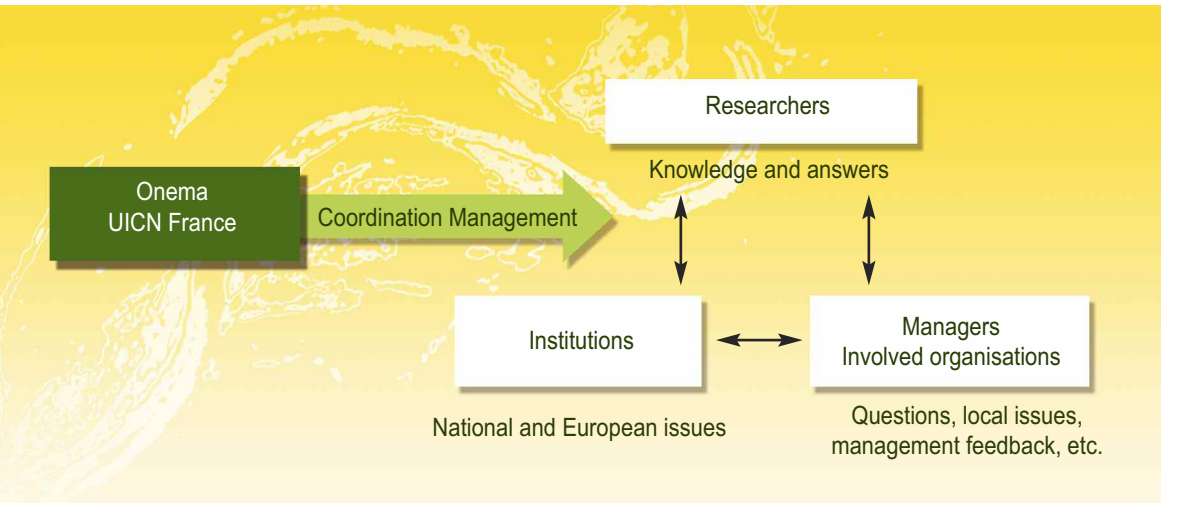
Biological invasions in aquatic environments work group (IBMA)

The group was created in 2009 and serves as an interface for communication and discussion on how to manage IASs in freshwater aquatic environments. The purpose of the group is to enhance coordination among the various stakeholders working on these problems on the national level (see Figure 40).

In order to cover the full range of issues involved in IAS management, the group has co-opted approximately 50 representatives of the various stakeholders, from the "producers of scientific knowledge" to "people active in the field", i.e.:

- managers of river boards, regional nature parks, conservatories for natural areas, etc.;
- other "involved organisations", e.g. the French national angling federation or Voies navigables de France (French waterways);
- State services and local governments, e.g. the Water and biodiversity directorate of the Ecology ministry, departmental councils, etc.;
- researchers (Irstea, National institute for agronomic research, National scientific-research centre, National museum of natural history, Laboratory for plant health, Agency for food, environmental and occupational health & safety, etc.) working in the life sciences (biology, ecology) and in the human and social sciences (ethnology, sociology, economics) (Dutartre et al., 2012).

Figure 40



Organisation of the Biological invasions in aquatic environments work group (IBMA)

By bringing together these different types of stakeholders, the group serves as an innovative platform where the main objective is to assist managers by digesting and making available the knowledge acquired on IAS management.

The assistance, targeting exclusively those alien plant and animal species seen as invasive in aquatic environments, deals with:

- the development of operational tools to improve knowledge and management of invasive alien species;
- support in implementing management operations for certain species;
- identification of scientific issues and proposals for programmes of applied research;
- the formulation of strategies and public policies for the management of invasive alien species;
- scientific and technical support for the Ecology ministry.

Group activities fall into three categories:

- internal discussions, i.e. current studies, information exchange, meetings, research proposals;
- production and dissemination of knowledge for managers (see Figures 41, 42 and Box 16), including surveys, the knowledge base on species and their management, codes of conduct, management feedback, bulletin and case studies;
- interface and go-between for stakeholders with a listing of managers, monitoring of local committees, organisation of symposia, participation in training sessions.

The group also takes part in the national strategy on invasive species set up by the Ecology ministry. Contacts also exist with a number of organisations supervised by the Agriculture ministry.

Figure 41

Examples of the work by the IBMA work group:
- publication in 2012 of an issue of Sciences Eaux & Territoires dedicated to biological invasions in aquatic environments (http://www.set-revue.fr/les-invasions-biologiques-en-milieux-aquatiques);
- publication in 2015 of two volumes in the Knowledge for action series dealing with invasive alien species.

The group was created through an agreement between Onema and Irstea. It was originally planned to last three years (2008 to 2010), but its activities have been pursued.

Given the importance of the issues involved in biological invasions, its continued existence may be attributed to the quality of the network established, the positive results obtained and the great need for knowledge, communication and coordination in this field on the national level. The recent adoption of the European directive on IASs and the issues involved in its implementation on the national level are a further reason for the group to continue its activities. That explains why, since 2014, group management and coordination is now ensured by a new partnership between Onema and the IUCN French committee.

Box 16

Internet site for Biological invasions in aquatic environments - www.gt-ibma.eu

This site, focussing on biological invasions in aquatic environments, presents the IBMA work group, its activities and provides access to the operational tools:

Figure 42

- management feedback;
- document library;
- regulations;
- existing strategies;
- news;
- bulletin and reports;
- species requiring monitoring;
- events and training;
- case study on management of water primrose in the Brière regional nature park;
- activities and success stories of members.

A large number of initiatives have been taken on the international, European and national levels to develop management tools for invasive alien species. Figure 43 recapitulates the documents and tools available for IASs in aquatic environments, on the international, European and national levels.

Figure 43

Review of the documents and tools available for invasive alien species (IAS) in aquatic environments, on the international, European and national levels.

Local level

Regional environmental directorates (DREAL)

In parallel with the establishment of the national strategy against IASs having an impact on biodiversity, the Ecology ministry, in its 2009-2010 road map for local State services in the fields of water and biodiversity, requested that all DREALs:

- "*raise the awareness of the concerned population groups concerning the hazards involved with invasive alien species*";
- "*list the measures that can be taken by local governments and managers of natural areas against IASs*";
- "*list the scientific and technical organisations already addressing the detection and establishment of biological invasions*";
- "*reinforce their relations with departmental and regional public entities, with local governments in view of coordinating measures to protect natural biodiversity*";
- "*increase inspections on compliance with applicable regulations*".

(http://dise.seine-maritime.agriculture.gouv.fr/IMG/pdf/annexe_feuille_route_2009-2010_cle0da8c3-1.pdf)

Given the specific context of overseas territories due to the fragility of island biodiversities, in 2008 the administrative authorities in each territory received guidelines enabling them to develop a strategy tailored to their territory (Ménigaux and Dutartre, 2012).

Then for the period 2013-2014, the instruction dated 11 February 2013 concerning the road map for local State services in the fields of water, biodiversity and landscapes, stipulated that each *"DREAL encourage its institutional partners to develop monitoring of invasive alien species in view of establishing a monitoring network throughout continental France". It was also requested that the DREALs "finish drafting the national action plans (Pallas' squirrel and Pampa grass) [...] for which they are cognizant and ensure implementation of the plans in their region"*.

(http://circulaire.legifrance.gouv.fr/pdf/2013/02/cir_36545.pdf)

Even prior to the requests of the Ecology ministry, many DREALs were involved in listing, organising studies on and managing IASs in their region. For example, projects have been set up or reinforced throughout the country:

- in the Pays-de-la-Loire region, the DREAL established in 2001 a management committee for invasive alien plants that was expanded to include fauna in 2013;
- in the Midi-Pyrénées region, the DREAL works with the Pyrénées-Midi-Pyrénées botanical conservatory to set up a regional action plan for invasive alien plants;
- in the Centre region, an Invasive plants group has been created, notably at the instigation of the DREAL. Plans are now being made for an Invasive fauna group;

■ in the Basse-Normandie region, a project to organise efforts against invasive species in the region was launched in 2007 with support from the DREAL;

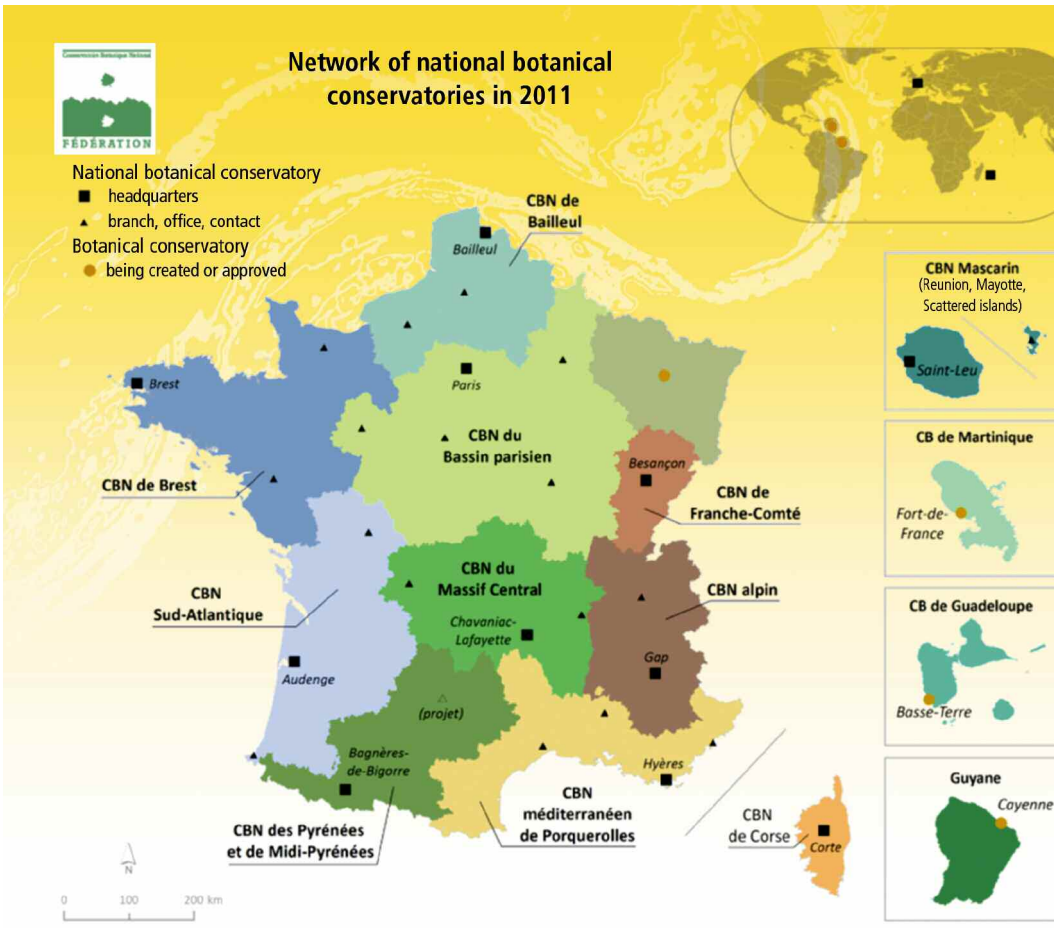
■ in the Auvergne region, the DREAL and the Auvergne conservatory for natural areas are drafting a characterisation report on invasive alien fauna in conjunction with the ONCFS Loire plan and local partners;

■ in the Nord-Pas-de-Calais and Bourgogne regions, studies are under way for regional characterisation reports on invasive alien species.

National botanical conservatories

The network of national botanical conservatories currently groups 11 organisations approved by the Ecology ministry (ten in continental France and one overseas, see Figure 44). They operate in 91 departments and their mission is defined by article D.416-1 in the Environmental code. The missions of the national botanical conservatories (CBN) include gaining knowledge on the status and evolution of wild plants and natural/semi-natural habitats, identifying and conserving plants and rare or threatened habitats, providing scientific and technical support to public authorities (State, local governments) and raising the awareness of the public. They also participate in developing and managing the National list of natural heritage (INPN).

Figure 44



Map of the botanical conservatories in 2011. According to Thévenot and Leblay, 2014.

© Fédération des conservatoires botaniques nationaux

The national botanical conservatories have extensive experience with biological invasions. They are indispensable scientific partners in terms of acquiring new knowledge and managing invasive plants, and they actively support the State, public agencies, local governments and local work groups.
In carrying out their missions, they (Thévenot and Leblay, 2014):

- collect field data on the biology of invasive plants and draw up maps on species distribution ranges, using scientific methods;
- support and organise regional strategies for invasive alien plants and experiments on their management;
- disseminate information by preparing data sheets to assist in recognising and alerting to invasive alien plants, issuing warnings and drafting species-identification guides;
- propose substitute species that may be used as alternatives to alien species;
- train and raise awareness through regular training courses on invasive alien plants, information targeting the general public and various communication tools.

The above list is far from complete, yet demonstrates that the national botanical conservatories are a highly structured network active in monitoring invasive alien plants and in supporting management work.

Work groups

In the past, requests to control invasive plants have originated from organisations in the field directly confronted with the problems arising in their use of the environment, in some cases following failures to eradicate the species. These requests by managers are transmitted to the entities in a position to provide technical and/or financial assistance, such as the local State services, the Water agencies, etc.

Initially, the response to these requests was handled individually on the local level, but when the number of requests grew, the need became apparent for a more broad-based organisation and form of cooperation capable of collecting information (species biology and ecology, mapping of colonisations, control methods, etc.), organising the information and producing opinions, which led to the creation of ad hoc work groups (see page 217).

A work group comprises a manager (designated in some cases due to his/her organisational capabilities, long-standing activity and/or dynamism) and a number of motivated partners. Its activity takes place within clearly defined territorial limits (department, region, river basin, etc.). Its work consists of organising meetings and projects, disseminating information and, in some cases, collaborating with other groups.

Since 2000, a number of work groups addressing biological invasions have been created. Their organisational and functional characteristics are highly diverse. However, though they did not necessarily have a precisely defined range of activities at the time of their founding, their work has systematically addressed the issues and needs of the stakeholders in the field. These groups have generally demonstrated great dynamism and responsiveness in providing pragmatic answers compensating the impression, at that time, of a lack of national structure and organisation for IAS issues.

The work done by these groups made it possible to improve the coordination of projects concerning various species in many parts of continental France (Dutartre et al., 2010).

The list of territorial groups on the following pages is not complete. The objective here is to present the main committees and to illustrate the diversity of stakeholders and geographic scales. This list is regularly updated on the IBMA internet site (www.gt-ibma.eu).

■ Pays-de-la-Loire committee for the management of invasive alien species

This committee, created by the Pays-de-la-Loire DREAL in 2001, brings together representatives from the scientific community and environmental associations, as well as from State services, public agencies and local governments.

Commissions (Species monitoring and mapping, Communication-training-regulations, Science and management, Terrestrial primrose, Hydrocharitaceae) organise the work, where the objective of the committee is to:

- provide up-to-date information on the status of invasions in the Pays-de-la-Loire region;
- enhance knowledge on proliferation phenomena and develop analysis of control and management techniques (their effectiveness and impacts on the environment);
- develop communication and information;
- encourage training.

The committee organises meetings and symposia that are open to the public, including a regional symposium on Invasive plants in the Pays-de-la-Loire region in 2011.

A commission on invasive fauna was created in 2012.

(http://www.pays-de-la-loire.developpement-durable.gouv.fr/plantes-exotiques-envahissantes-r431.html)

■ Loire-Bretagne work group

This group was created in 2002 by the Water agency, which transferred the daily management in 2007 to the Federation of conservatories for natural areas (FCEN) in the framework of the *Loire grandeur nature* plan. Participants include technical and financial partners, managers and various experts who meet once or twice each year.

The objective of the group is to provide scientific and technical answers to stakeholders in the field and to formulate a management strategy for invasions that can be implemented in the framework of public water and environmental policies.

It coordinates a strategy spanning the Loire basin and contributes to setting up regional work groups targeting:

- the development of strategies tailored to the areas covered by stakeholder groups;
- the dissemination of information between the various levels (local, regional, river basin);
- improvements in knowledge on current colonisation by invasive alien plants in the region, in view of enhancing their management.

To those ends, the work group calls on local coordination and development groups:

- in the Auvergne region, the Auvergne regional group for invasive alien plants (GRAPEE);
- in the Centre region, the Centre regional invasive-plants work group;
- in the Poitou-Charentes region, the Regional observatory on invasive alien plants in aquatic ecosystems (ORENVA);
- in the Pays-de-la-Loire region, the Pays-de-la-Loire committee for the management of invasive alien species;
- in the Loire department, the Departmental committee on invasive plants;
- in the Vienne River basin, the Vienne organisation for the coordination of invasive-plant management.

(http://www.centrederessourcesloirenature.com/home.php?num_niv_1=1&num_niv_2=4&num_niv_3=11&num_niv_4=50)

■ Charente observatory on invasive plants (OPE)

OPE launched its activity in 2003, under the supervision of the Charente departmental council (Water and rivers service), following the appearance of water primrose (*Ludwigia* spp.) in rivers.

Stakeholders in this group meet twice each year, once in the spring to select the zones for study and once in the fall to analyse the results of the work undertaken.

OPE is also active in training, raising awareness and informing on the topic.

Primrose is the main concern for OPE, however a number of observers have regularly alerted to the presence of invasive alien plant species such as parrot-feather watermilfoil, Asian knotweed (*Fallopia* spp.) and Himalayan balsam (*Impatiens glandulifera*).
(http://www.gt-ibma.eu/lobservatoire-des-plantes-envahissantes-de-charente/)

■ Poitou-Charentes regional observatory on invasive alien plants in aquatic ecosystems (ORENVA)

The observatory initiated operations in 2009, under the supervision of the Poitou-Charentes regional council. Two organisations are in charge of management. The Regional observatory on the environment (ORE) is in charge of computer systems and the Forum for Atlantic marshes (FMA) manages the network of stakeholders, provides expert advice on species and organises training for stakeholders in the field.

The objective of the observatory is to assist local managers by organising the stakeholder network and providing a common monitoring tool for invasive phenomena.

A steering committee made up of scientific and technical partners meets once each year to promote greater use of the monitoring tool which involves four levels of observation, ranging from local managers to an interregional coordinating committee.
(http://www.orenva.org/)

■ Network for invasive alien vertebrates in the Loire basin

As part of the *Loire grandeur nature* plan, the ONCFS Centre - Île-de-France interregional office has since 2011 managed a network for invasive alien vertebrates in the Loire basin. The prime objective is to produce and share knowledge on these species. The progressive establishment of a monitoring system is facilitated by training and the involvement of various stakeholders in the basin.

The first phase of the project consisted of drawing up an assessment of current knowledge and measures addressing invasive alien vertebrates, in conjunction with the partner organisations directly involved in managing the species. The result was a collective document presenting the species in the Loire basin, their biology, ecology, the impacts caused and the management projects under way in the Loire basin. Training courses for stakeholders, a review of regulations and a set of reference documents have been prepared to facilitate the exchange of information among the various partners (environmental protection associations, managers of natural areas, administrations and local governments).

The second phase of the project will consist of assisting the partners in setting up regional strategies to manage invasive alien vertebrates and in developing innovative decision-aid tools (Sarat, personal pub., 2013).

■ Basse-Normandie regional committee on invasive species

In 2007, the conservatory for natural areas in Basse-Normandie (CEN-BN) and the DREAL created the Regional committee on invasive species (CREI). The committee, composed of numerous regional stakeholders including the local State services, local governments and the organisations managing natural areas, sets strategic guidelines.

The action programme for 2013-2015 is intended as the operational implementation of the management strategy for invasive species in that it sets the objectives and lists the measures required in Basse-Normandie.

The action programme is structured around three interrelated objectives:

- enhance knowledge on invasive species by participating in setting up the Invasive fauna database, organising data collection, drafting informational documents (species-distribution maps, technical data sheets, project feedback, etc.);
- coordinate regional efforts to control the invasive species designated as the priorities, i.e. provide local project groups with technical support for their worksites, supply the necessary documents (technical information, management recommendations, work contracts, technical specifications, etc.), lead and inform on experiments;
- provide information and raise awareness of invasive species by creating informational documents for the general public (internet site, brochures, etc.) and for managers of natural areas (technical data sheets, etc.), participating in training courses and in public events (stands).

Since its creation, CREI has produced an array of informational documents, e.g., lists of invasive fauna and vascular plants in Basse-Normandie, a brochure and an exhibit for the general public.

(http://www.gt-ibma.eu/strategies-ou-en-sont-les-institutions/strategies-infranationales/cen-basse-normandie/)

Other organisations

A number of other organisations, in some cases integrated in the work groups presented above, are regular participants, often over many years, in the management of invasive alien species or, more generally, in efforts addressing biological invasions.

The list in Table 6 on the next pages presents a wide range of organisations and types of projects, however it is far from complete because many other types of organisations, e.g., river boards, specific units of local governments (departmental and regional councils), conservatories for natural areas, environmental groups managing natural areas, protected areas, etc., are also active in management work for invasive species in aquatic environments.

Regular updating of this list and of the information produced by the organisations would contribute significantly to improving information flows on management issues and to improving the management work itself.

Table 6 *Examples of organisations working on invasive alien species.*

Organisation	Projects
Centre for environmental initiatives (CPIE) in the Creuse department	Reinforce the monitoring network and improve knowledge of invasive alien plants on the local level in conjunction with the work group for the Loire-Bretagne basin: ■ enhance knowledge of the distribution of invasive alien plants in the Creuse department and inform local stakeholders; ■ active efforts against the proliferation of the most troublesome species. (Bodin, personal pub., 2013 for the Biological invasions in aquatic environments site: http://www.gt-ibma.eu/cpie-des-pays-creusois/) (http://www.cpiepayscreusois.com/page.php)
Bressuire urban area	Participation in the monitoring and management of invasive alien species in aquatic and terrestrial environments as part of its Environmental protection and improvement policy: ■ manual removal of water primrose (*Ludwigia* spp.) and monitoring of knotweed (*Fallopia* spp.); ■ action plan against the African clawed frog (Xenopus laevis); ■ campaigns with the Deux-Sèvres FDGDON against nutria (*Myocastor coypus*) and muskrats (*Ondatra zibethicus*). (Koch, Audebaud, personal pub., 2013 for the Biological invasions in aquatic environments site: http://www.gt-ibma.eu/cca/)
Var departmental council, Environment directorate, Rivers and aquatic-environments unit	Survey to locate invasive species in sensitive reaches of the Argens River and some of its tributaries. Event in 2012 to raise awareness and remove water primrose (*Ludwigia* spp.) from a lake, monitoring of the site. (Auda, personal pub., 2013 for the Biological invasions in aquatic environments site: http://www.gt-ibma.eu/cg-var/)
Conservatory for natural areas (CEN) in the Centre region	Work group co-managed by the Centre CEN and the National botanical conservatory for the Paris region (CBNBP) to coordinate efforts to control invasive plants on the regional level. Objectives concern knowledge, management and information on these species. (http://www.gt-ibma.eu/strategies-ou-en-sont-les-institutions/strategies-infranationales/groupe-plantes-invasives-en-region-centre/)(http://www.cen-centre.org/index.php)
Vienne public river-basin territorial agency (EPTB Vienne)	Coordination of a management system for invasive alien plants in the Vienne basin: ■ assist stakeholders in the field in monitoring and controlling the species; ■ provide property owners with information on the most troublesome sectors. (Jean, personal pub., 2013 for the Biological invasions in aquatic environments site: http://www.gt-ibma.eu/eptb-vienne/) (http://www.eptb-vienne.fr/-Plantes-invasives-.html)
Loire-Atlantique departmental federation of pest-control groups (FDGDON 44)	In compliance with regulations: ■ organisation of monitoring on populations of harmful aquatic rodents; ■ control campaigns including both direct interventions and coordination of collective projects. (http://www.fdgdon44.fr/)

Sèvre-Niortaise basin interdepartmental institution (IIBSN)  	■ Technical group working on invasive plant species in the Sèvre-Niortaise basin since 2010. ■ Acquisition and sharing of data and management feedback on these species (maps, interventions and monitoring, methods and tools, tools to disseminate information and raise awareness, etc.). (http://www.sevre-niortaise.fr/accueil/des-thematiques-du-bassin-versant/les-plantes-exotiques-envahissantes/) (http://www.gt-ibma.eu/strategies-ou-en-sont-les-institutions/strategies-infranationales/iibsn/)
Board for balanced management of the Gardons basin (SMAGE)  (http://www.les-gardons.com/)	Management of invasive plant species as part of the Natural environment policy since 2009: ■ overall management plan starting in 2011; ■ steering committee and drafting of inventories; ■ management operations for water primrose (*Ludwigia* spp.) and knotweed (*Fallopia* spp.); ■ initial tests on management of ligneous species planned for 2013; ■ efforts to raise awareness of elected officials and the general public. (Reygrobellet, personal pub., 2013 for the Biological invasions in aquatic environments site: http://www.gt-ibma.eu/smage-gardons/)
Beuvron basin management board (SEBB)  (http://www.bassin-du-beuvron.com/)	Efforts to control invasive animal and plant species: ■ interventions against water primrose (*Ludwigia* spp.) since 2004, in a partnership with the Departmental committee for the protection of nature and the environment (CDPNE) and the Loir-et-Cher federation for fishing and the protection of aquatic environments: ■ management experiments for Asian knotweed (*Fallopia* spp.); ■ programme to control (2002-2008) and eradicate (2009-2014) American bullfrogs (*Lithobates catesbeianus*). (http://www.gt-ibma.eu/strategies-ou-en-sont-les-institutions/strategies-infranationales/gestion-de-la-grenouille-taureau-en-sologne/)
Géolandes board  	Management of invasive alien plants in lakes and ponds of the Landes department: ■ initial restoration work when colonies have already achieved considerable size; ■ repeated maintenance work; ■ creation of a monitoring and maintenance system. (Fournier, Zuazo, 2012)
Departmental, regional and national hunting federations	Participation in: ■ monitoring of invasive alien mammal and bird populations (inter alia in a partnership with ONCFS); ■ preparation of hunting programmes and population-control efforts (Canada goose, Sika deer, etc.).