IN-SYLVA-France, the national RI for forest adaptation and forestry innovations

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CONTEXT and CHALLENGES

- **French Forest** ***(16.3Mha, heterogeneous, 2/3 of broadleaved)***
- **Currently in a unique and unprecedented situation** ***(global change)***
- **Has to deal with three interconnected transitions** ***(climate, energetic, industrial)***
- **Sustainability of the production function of forest ecosystems** ***(increasing demand – fuel wood, bio products)***
- **Carbone sequestration** ***(4P1000, 3S dilemma – Stocks, Sequestration, Substitution)***
- **Adaptation and silvicultural innovation** **(levers: genetic resource, biogeochemical cycles et silviculture)**

IN-SYLVA-France is…

A **multi-organisms and distributed**

National Research Infrastructure

for **adaptive forest management**
that promotes ***in-situ* forest experimentations**
with ***in lab* and *in silico* technologies**
to help setting up innovative projects
for **sustainable forest management**
of temperate and tropical forests
and being a driving force **the European scale.**

IN-SYLVA-France is…

A National Research Infrastructure

that will **address the challenges of Global Changes** *
(sustainability of wood production, C sequestration, CC mitigation),
to answer the questions of **ecological and energetic transitions** (increased demand of fuel wood – energy, bio products),
taking into account the diversity of forest systems

*climate, biological invasions, atmospheric deposition, land use change

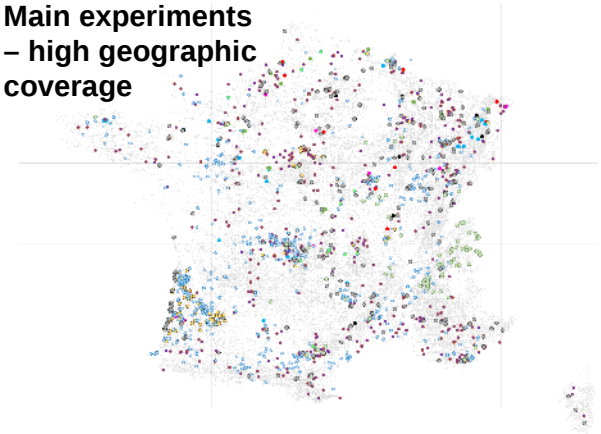
IN-SYLVA-France is…

More than 4 000 ha and 5 000 sites in forest

1 site includes several treatments (experimentation)

A network includes several sites on French territory

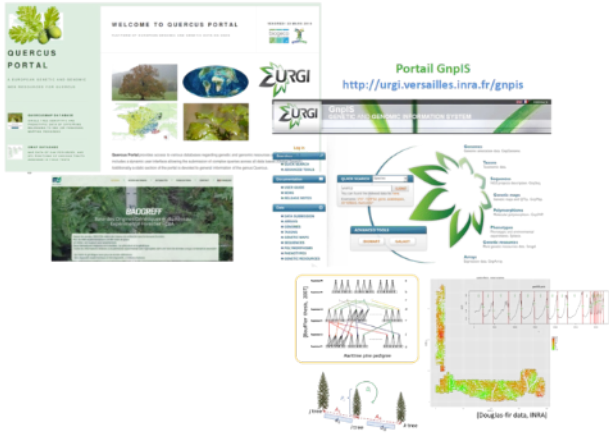
IN-SYLVA-France Main experiments – high geographic coverage



Specialized laboratories and platforms in Functional Ecology, Biogeochemistry, Xylosciences, Genetics, Vegetative Multiplication

High throughput screening

Distributed Information Systems and Modeling Tools



In-situ, in-lab et in-silico long-term facilities, recognized and supported by national partners

IN-SYLVA-France is…

An infrastructure to address research and forest management issues thanks to technological innovations

	Silviculture	Genetic	Biogeochemistry
Silviculture	Forest management practices forest regeneration physiological indicators of stress Decision rules to adapt management practices to biotic and abiotic risks	Genotype x silviculture => forest services (wood, C…)? Ungulates => functional traits ?	Factors of soil sustainability Biogeochemical leverages for better forest resilience to global changes
Genetic	Choice of material for planting, Conservation of FGR Varietal innovation Assisted Migration model	- G x E determinism of traits? - Genetic architecture? - Phenotype prediction? - High-throughput phenotyping	Biogeochemical factors of species distribution => assisted migration, matching between plantations and soil/climatic conditions.
Biogeo-chemistry	Wood harvesting and soil compaction => soil fertility?	Phenotype x Genotype x Env. interaction? spatial scale of local adaptation? Adaptive capacities of the FRMs = f(soil)?	Soil fertility remediation High throughput measurement of soil fertility Physico-chemico-biological indicators of impacts

Research Question Management Question Technological innovation

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Develop models and simulator with genetic, environmental (sensu lato) and silvicultural effects

Research Question Management Question Technological innovation

IN-SYLVA-France is …..

A Research Infrastructure listed on the National road map (May 2018)

Observation and naturalist networks (eg. RENECOFOR)

Monitoring (for example phenology, air pollution, soil monitoring..)

Reference

Extrapolate

National Forest Inventories

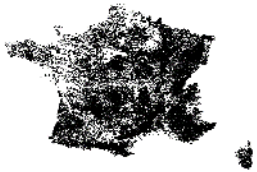
Environmental monitoring, Resource-level patrons

IN-SYLVA Experimental networks

Genotype x Environment x Silviculture Interactions
Adaptation of forests to global changes

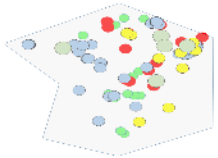
Workshops ICOS / OZCAR / ANAEE

Generic processes, GHGs, Biotic / abiotic interactions



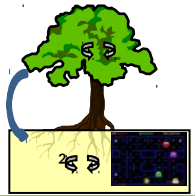
Generalize

Raison



Formalize

Deepen



Assets

Ecological diversity — Experimentation — Instrumentation

Impacts

Forest policy — Innovation — Ecosystem functioning

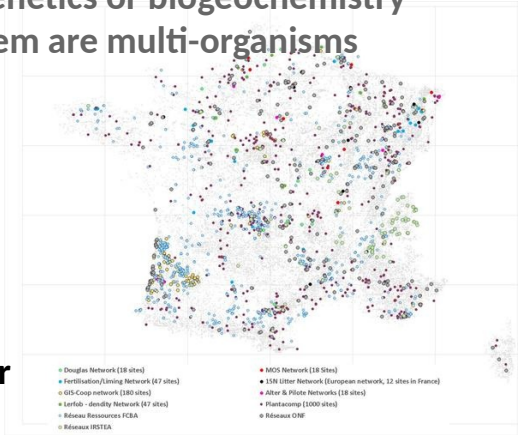
Models

Resource — Empirical — Process-based

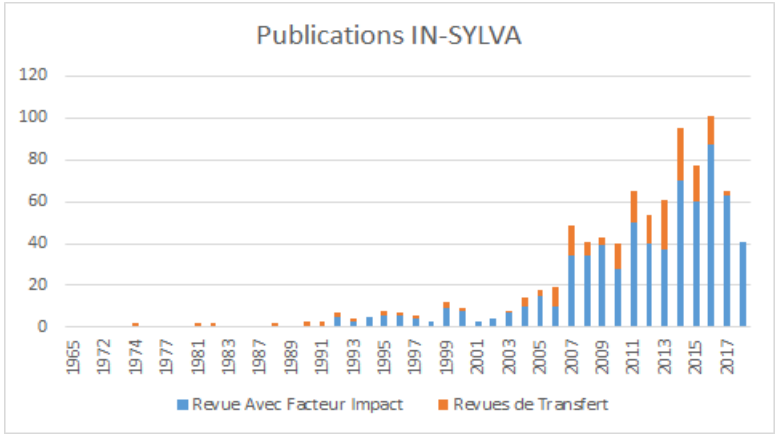
IN-SYLVA-France, is …..

A research infrastructure that brings together all the French R & D actors involved in forest management

28 experimental networks about silviculture, genetics or biogeochemistry most of them are multi-organisms



Staff: 85 FTE
Budget: 10 M€/year
(~50% for staff)



62 publications /year (of which 22% in transfer journals, Guides and reports)

IN-SYLVA-France is …..

A governance adapted to IR objectives

Orientation council
* Users and stakeholders demands

Scientific Council
- Scientific evaluation
- Scientific questions
- New orientations

Trusteeship Council
- Define the strategy
- Define the GTs - permanent and temporary
- Check implementation

Executive council
- Infrastructure monitoring
- Operational implementation

General Assembly
- Exchanges
- Events
- Representation in orientation council

24 researchers (1 foreign, 1 French per discipline)

Oxford, Canadian Forest Service, INIA, Gent University, UCL, WSL, UQAR, FVA, Freiburg University

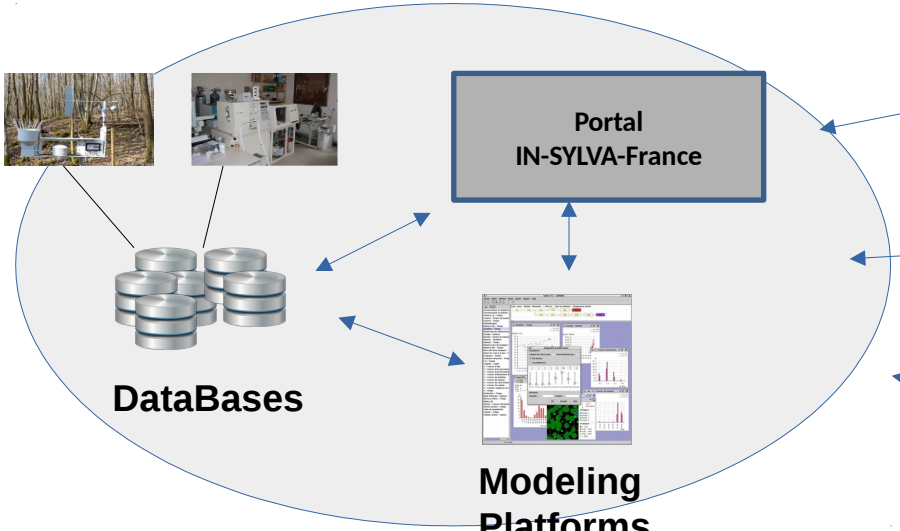
Université de Rouen, BSA, AgroParisTech, IGN, CNRS, CNES, INRA, IRSTEA

Work group	Work group	Work group	Work group	Work group	Work group	Workshop	Workshop
Strengthen and adapt networks	Light in-situ instrumentation	Develop high throughput measurement capabilities	Develop varieties and silvicultures	Federate information systems	Develop decision support tools	……	……

IN-SYLVA-France develops…..

An information system adapted to the objectives of the RI, a Major Issue!

with a web portal for the discovery of resources

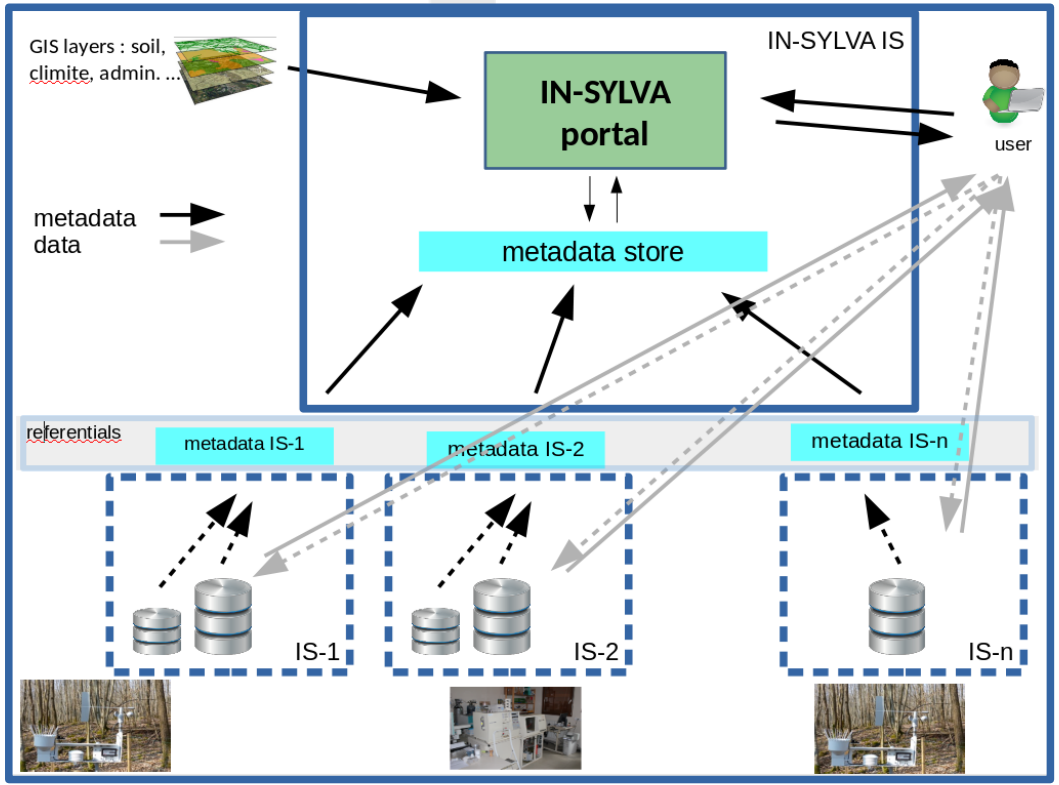


Metadata portals (geoportal…)

Data repositories

Controlled vocabularies (thesaurus, ontologies...)

A distributed information system for FAIR data management



- rich metadata interoperable with international standards (ISO, EML…)

- controlled vocabularies:
  * IN-SYLVA partners & networks
  * observed/measured variables
  * experimental treatments
  * taxon
  * units

- shared within IN-SYLVA community

- connected to IS of other env. RI

- open to the world for research and management

IN-SYLVA-France

- brings together resources for silviculture, genetics and biogeochemistry experimentations
- develops innovative solutions
- brings to knowledge existing resources including data from experimentations
- develops data/metadata interoperability
- is for researchers, forest managers, policy makers, education... and citizens
- contributes to Open Science
- as the French national component to future EU and international RI

The web site of IN-SYLVA-France

https://www6.inra.fr/in-sylva-france/