

Sesame 13 : a decision-making tool to improve the greening of our towns and cities

13 /09/2023



Presentation Outline :

- I. Project background and objectives
- II. Services and constraints considered in Sesame 13
- III. Choice of species for the database
- IV. An application for urban greening professionals
- V. Progress, limits and prospects
- VI. Some Other actions of Cerema



I. Project background and objectives



A partnership with three structures:



INRAE



Département des Bouches-du-Rhône



- A desire to encourage the emergence of urban nature projects as part of the Department's Environmental Agenda.
- Nature-based Solutions Delegation
- In the applications submitted by Communes under the "Provence Verte" scheme, greening projects are sometimes motivated solely by aesthetic considerations, without any long-term environmental thinking.



Cerema *an interdisciplinary scientific and technical resources Centre, placed under supervision of the ministries in charge of ecological transition, sustainable development, town planning and transportation.*

- A partner at the heart of a regional dynamic
- Climate, a compass for its action in its 6 areas of expertise
- Sésame, a local approach to greening the city, adapted to the climatic, ecological and cultural context of a given area.
- Sésame has a dozen or so variations throughout France (Eurométropole de Metz, Bordeaux Métropole, Conseil Départemental de la Seine Saint Denis, Paris, Libourne etc.), considering the different climatic zones of the country.

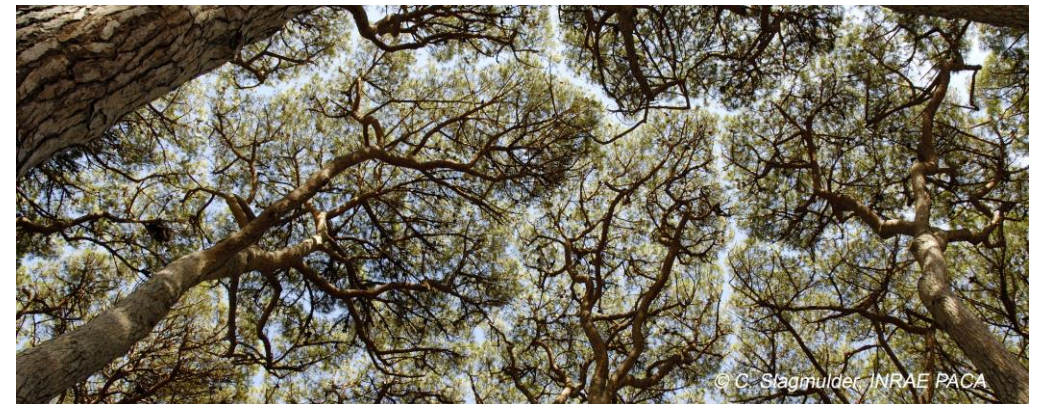


Unité expérimentale Villa Thuret – INRAE

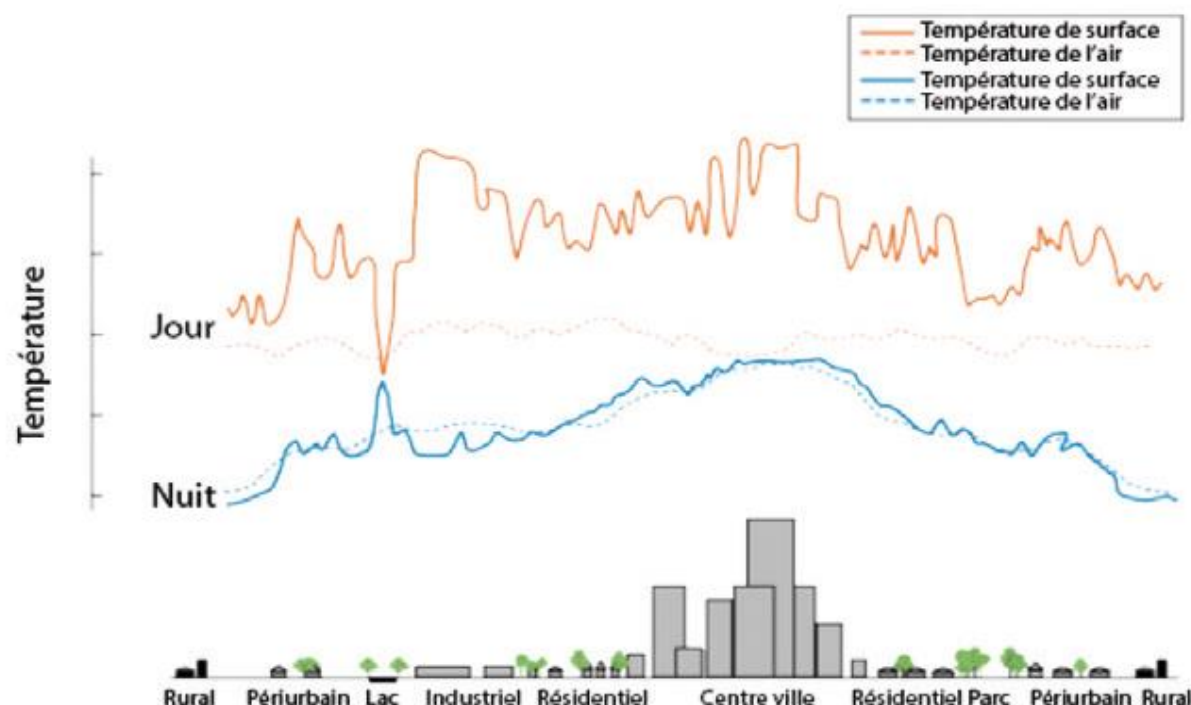
Villa Thuret has been a research site dedicated to botany and acclimatization since 1857



- ▶ **Acclimatisation mission:** introduction, cultivation, accommodation and study of wild plant species, mainly exotic, since 1857.
- ▶ **Botanical garden on Cap d'Antibes, open to the public:** 3.5 ha - One thousand woody species in collection + traceability, herbariums and archives on historical species. Permanent renewal
- ▶ **Participation in various scientific programmes, infrastructures and networks**
- ▶ **Inventory and monitoring database**
- ▶ **ARDEM (= Trees of Tomorrow) database and species sheets accessible on the Villa Thuret website.**



Urban heat islands in the future



More pronounced on summer nights

Global warming should accentuate the phenomenon (more heatwaves)

A phenomenon that also exists in winter, albeit to a lesser degree

If we consider an increase of +2°C in the minimum temperature in winter in dense urban areas:

Currently, for zone of Marseille: conditions in the city centre would be more like those in the countryside of Toulon, Nice, Calvi, Perpignan, Santiago de Chile?

In future projections, it would be more like the countryside in Valencia, Palermo or even Algiers, Tunis, Tangiers, Los Angeles, Adelaide, etc.

What is **Sesame** ?

- EcoSystemic Services provided by Trees Modulated by Species (*Services EcoSystémiques rendus par les Arbres Modulés selon l'Essence*)
- Adaptation to the Bouches-du-Rhône (south of France) context of the methodology implemented by Cerema in Metz (north of France).
- A tool to help design urban greening projects:



Audience targeted by Sesame 13

- ▶ Local authority technical services, the Bouches-du-Rhône Department's business/skills sector, and any planning body interested in urban greening issues.
- ▶ The tool will be freely available to all.



The Users Committee, a privileged forum for discussion with future Sesame 13 users:



- ▶ Gathering user needs and opinions
- ▶ Design and test the tool with SESAME users
- ▶ Connection with reality on the ground

II. Services and constraints considered in Sesame 13

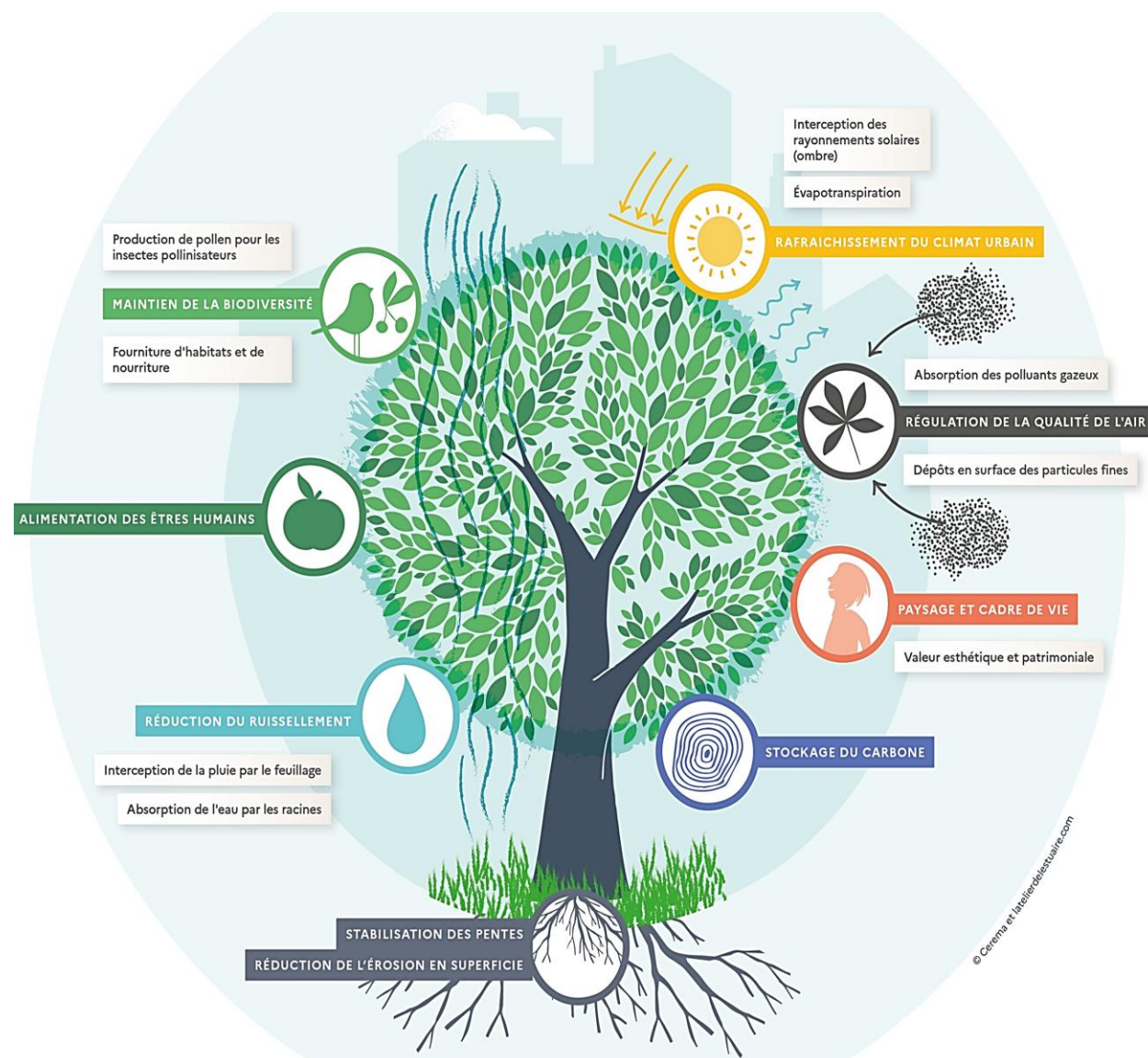


What are the ecosystem services?

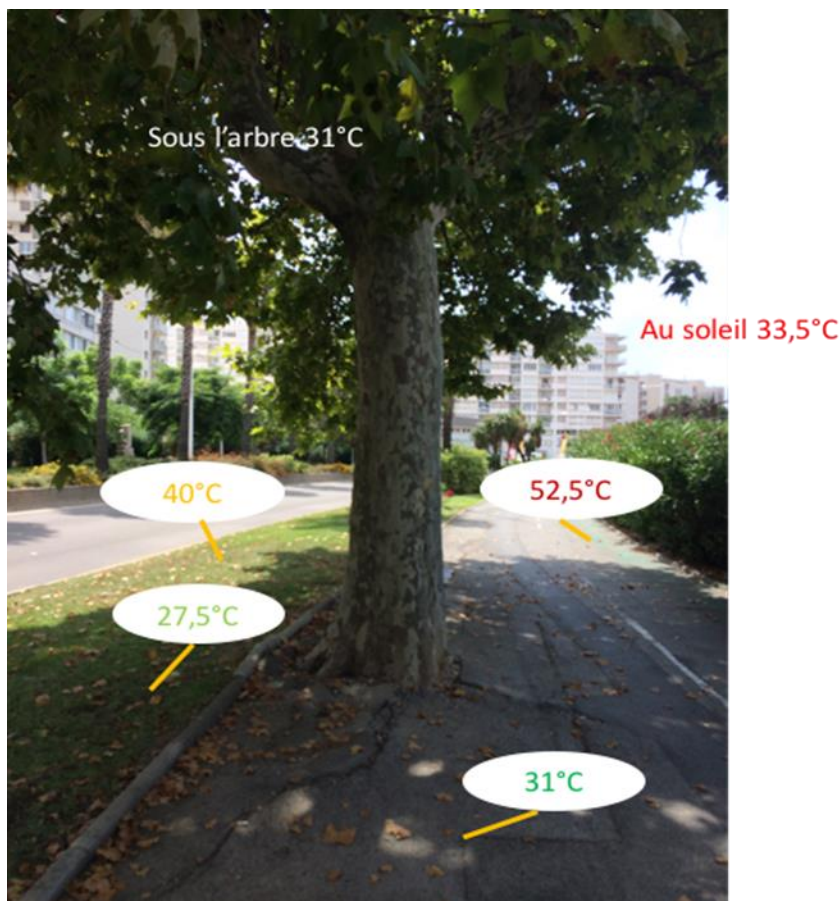
- ▶ The concept of ecosystem services has been around since the 1970s: originally, it originated in the world of conservation and focused primarily on ecosystem degradation (Ehrlich and Mooney, 1983; Gómez-Baggethun et al., 2010; Barnaud et al., 2011).
- ▶ This concept has been widely disseminated since the Millennium Ecosystem Assessment (MEA) in 2005.
- ▶ It refers to the benefits that humans can derive from the functioning of ecosystems.

The urban tree, shrub ...

- ▶ Trees and shrubs provide services that are not well known to the public or to developers. These services vary greatly from one species to another.
- ▶ Tree and shrub species are more or less adapted to the local climate, to the difficulties of the urban climate and to the expected constraints of climate change.
- ▶ Trees and shrubs also represent constraints (allergenic pollens, dimensions, etc.) that need to be taken into account.



EXAMPLE OF A URBAN TREE SERVICE : REGULATION OF LOCAL CLIMATE



Example of temperature records :

In Toulon town centre, grass in the sun is 40°C and tarmac in the sun 52.5°C, while in the shade of a tree the surface temperatures are 27.5°C and 31°C respectively.

*Source Profil climatique de la ville du Pradet
(Acterra, 2018)*

How does Sesame work ?

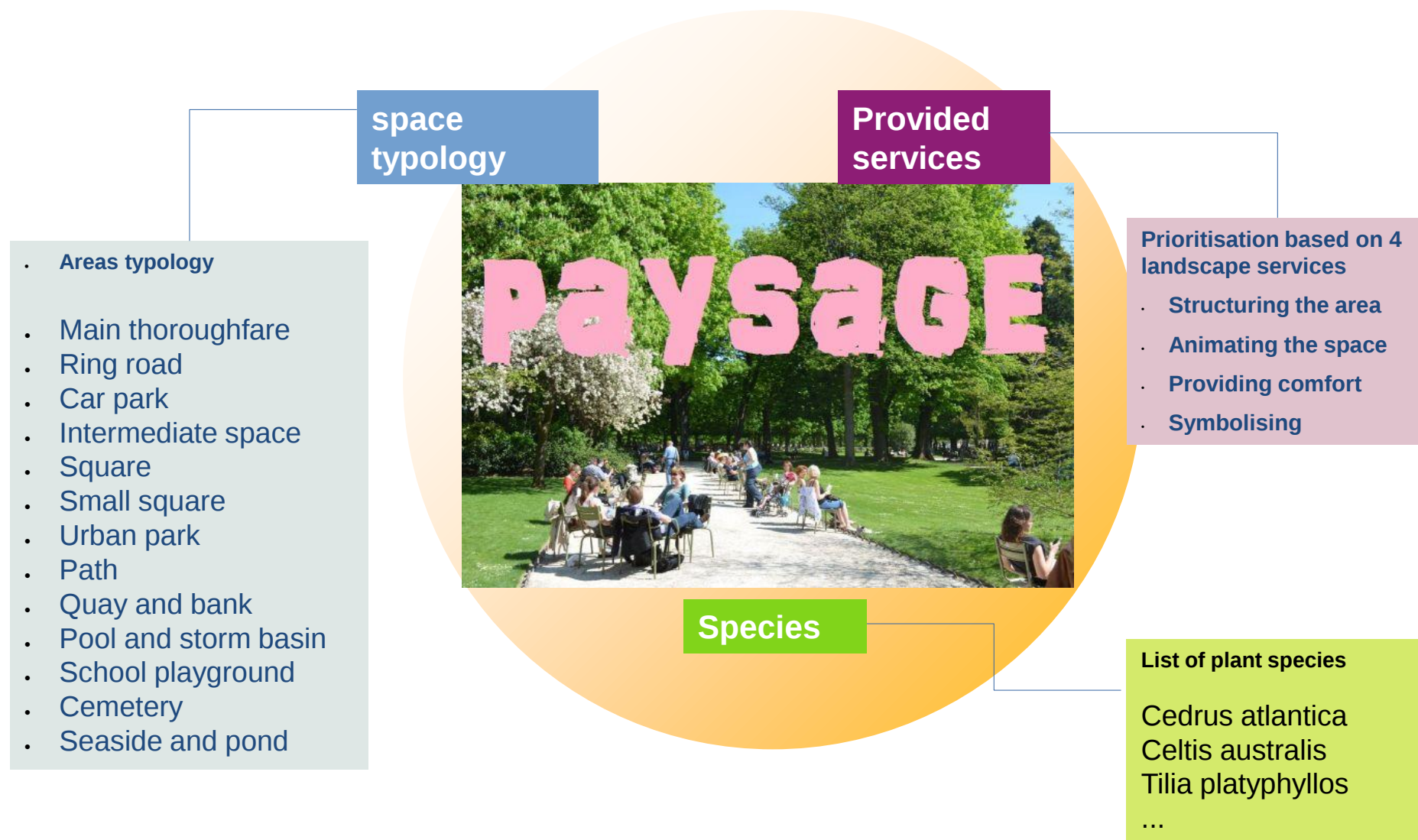
With Sesame tools it is possible to :

- Estimate the services provided in the city by the plant species entered in the database,
- Identify the species best suited to the user's greening project,
- Identify the constraints posed by the different species.



Landscape and quality of life

Landscape and quality of life





Regulation of local climate

Regulation of local climate

Criteria assessed, partly linked to shading

Tree size
Width of crown
Minimum leaf size
Maximum leaf size
Tree habit
Leaf shape
Foliage density
Leaf roughness

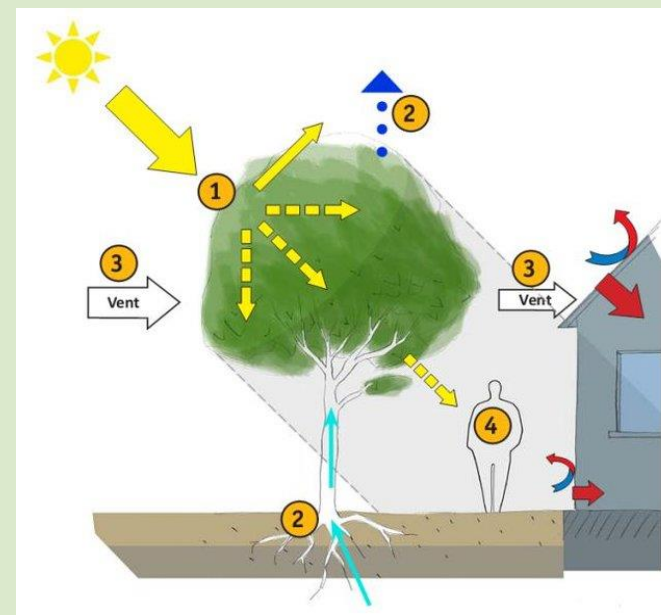


Diagram describing how a tree works and the different mechanisms for regulating the urban climate (VegDUD – 2014)



Biodiversity

Chevêche d'Athéna,
Athene noctua

Biodiversity approach



Citron de Provence - *Gonepteryx cleopatra*

Food resource

Wikipedia

**Breeding site
Shelter
Perch**



Nid d'oiseau - bird's nest

Rex, Wikimedia commons

Biodiversity



Cerema

Pyracantha, source de nourriture hivernale

Winter food



Cerema

Tilia platyphyllos

Attractive species for pollinators

Criteria assessed

Native or non native character

Recommended by local biodiversity guides

Ability to host insects

Plant of interest to pollinators

Edible for avifauna and medium-sized fauna

Ability to generate pollen and nectar

Of interest to lepidopterans (biomass)

Ability to create habitats and act as a host plant

Ability to create cavities

Phenological lag compared with other species

Biodiversity
indicator



Air quality regulation

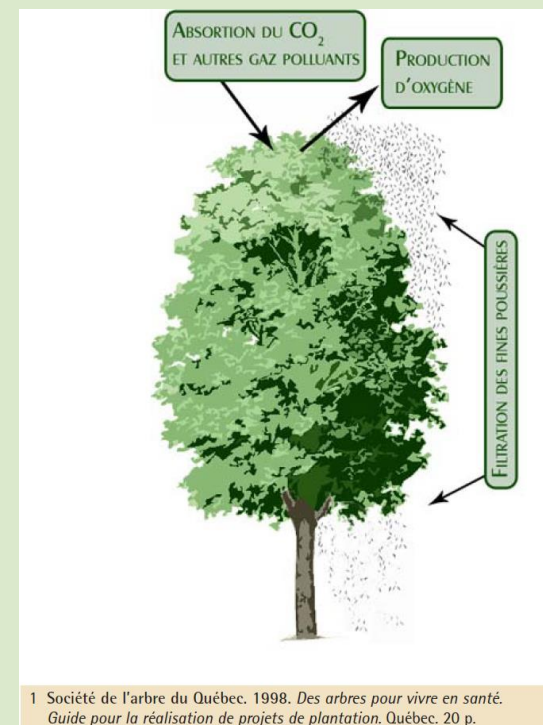
Air quality regulation

Criteria assessed

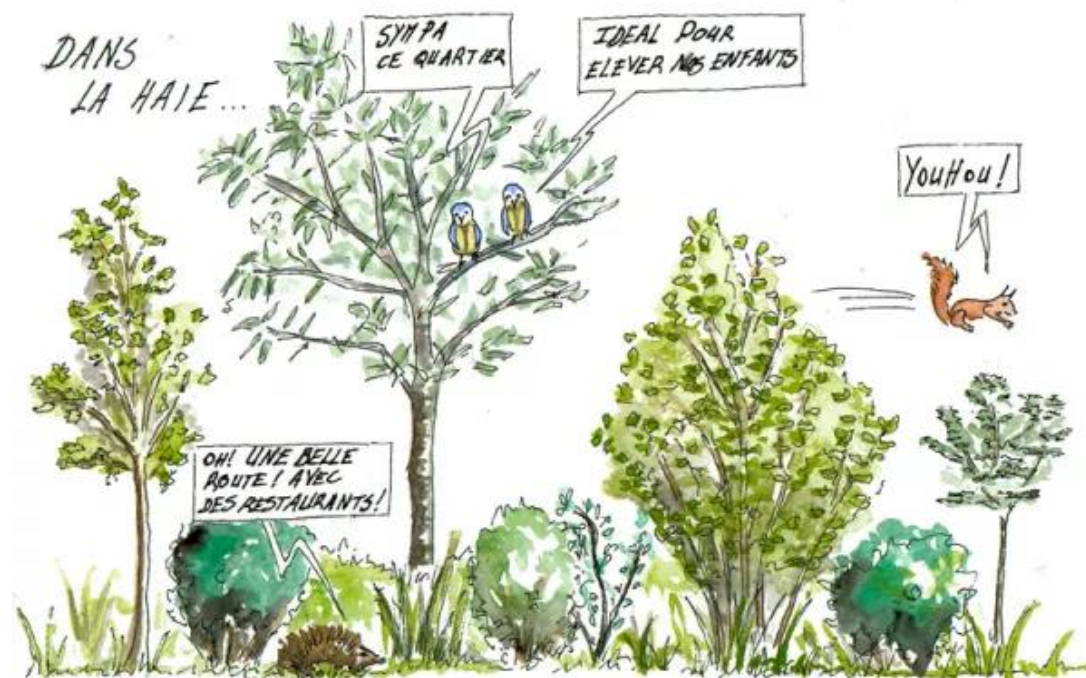
Foliage persistence
Leaf roughness
Coniferous/leafySize (height)

Width of crown
Minimum leaf size
Maximum leaf size
Tree habit
Leaf shape
Foliage density

Leaf area



The concept of a species bundle approach to optimise the chances of planting success



© Clotilde GARNIER / dessin-nature.com

- ▶ the bundles are separate from the tool in the species sheets, which include the plant communities adapted to the same soil conditions
- ▶ This is a qualitative approach, as the criteria need to be cross-referenced without losing sight of the overall effect of the bundle, in phyto-sociological, ecological and landscape terms: the bundle must "make sense".

Constraints considered ?

Some examples :

- Toxic fruits ;
- Allergenic pollen ;
- Roots damaging coatings ;
- Honeydew production ;
- Flammability
- Etc ...



The constraints are filled in for each species in the database and listed in the species sheets.



III. Choice of species for the Sesame 13 database



Drawing up a species list

- ▶ *Choice based on criteria to meet current and future challenges*
 - ▶ Adaptability to more severe droughts
 - ▶ Hardiness (increase in the number and intensity of climatic events)
 - ▶ Avoidance of invasive exotic species
 - ▶ Limited number of protected species
 - ▶ At this stage, health constraints are not eliminatory

- ▶ *A range of species to meet different landscape needs*
 - ▶ Native species
 - ▶ Exotic species: elimination of species that are known to be invasive.

List of species

- Diversity of plant types to form "species groups":



Choisya ternata
Bush

Types	Native species	Non native species
Trees	40	60
Shrubs	30	18
Bushes	51	25
Vines	4	14
Total	52 %	48 %



Wisteria sinensis – Vine



Myoporum laetum
Shrub

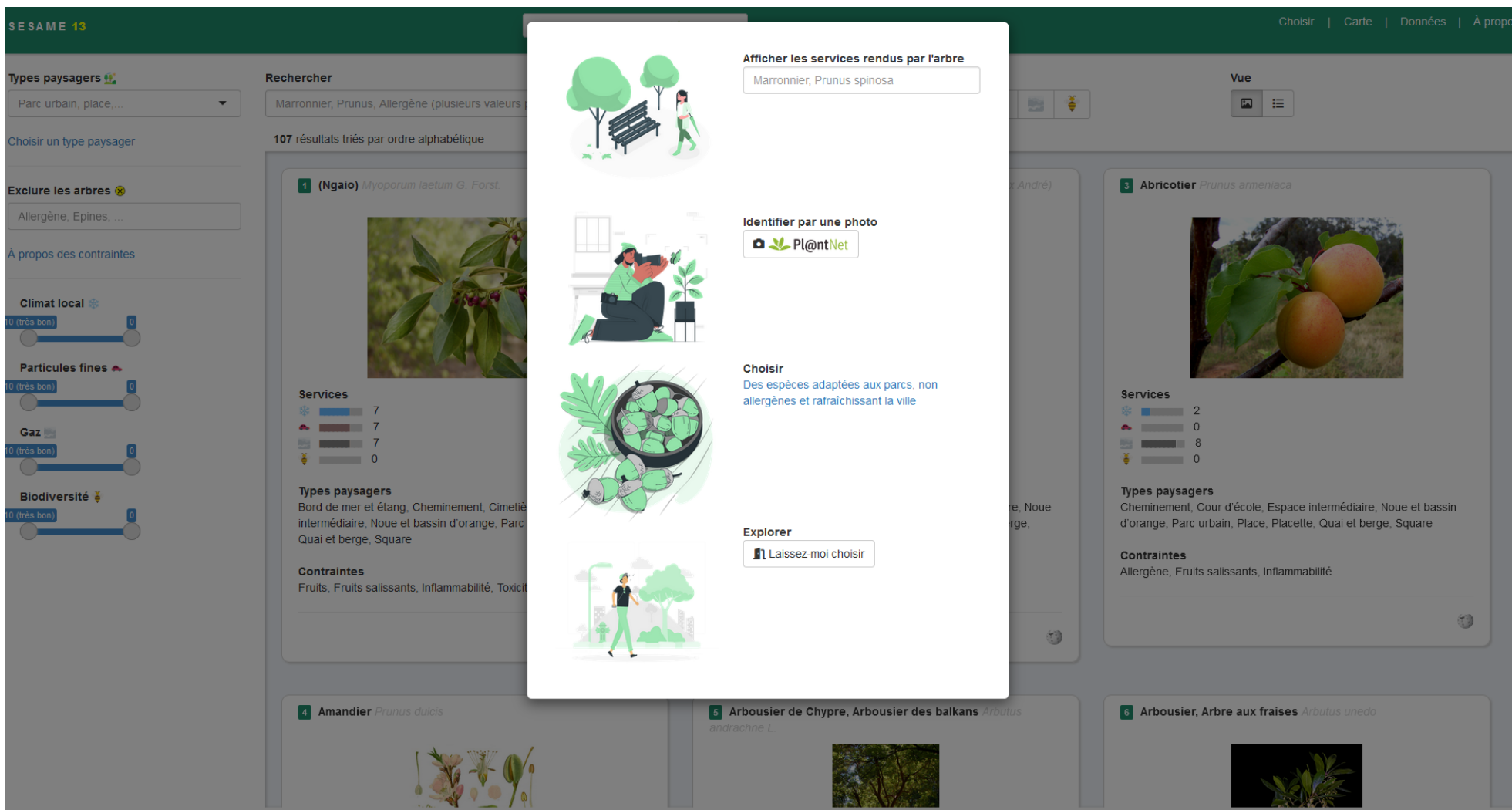
IV. An application for urban greening professionals



Web application development and commissioning:



Sésame 13 application test : <https://cerema-med.shinyapps.io/sesame-alpha/>



The screenshot displays the Sésame 13 application interface. The top navigation bar includes links for 'Choisir', 'Carte', 'Données', and 'À propos'. The main interface is divided into several sections:

- Types paysagers**: A dropdown menu showing 'Parc urbain, place,...'.
- Rechercher**: A search bar containing 'Marronnier, Prunus, Allergène (plusieurs valeurs...)'. Below it, it states '107 résultats triés par ordre alphabétique'.
- Exclure les arbres**: A section with a search bar containing 'Allergène, Epines, ...'.
- À propos des contraintes**: A section with various filters and sliders for 'Climat local', 'Particules fines', 'Gaz', and 'Biodiversité'.
- Services**: A section with a list of services and their corresponding values (e.g., 7, 7, 7, 0).
- Types paysagers**: A list of landscape types including 'Bord de mer et étang', 'Cheminement', 'Cimetière intermédiaire', 'Noue et bassin d'orange', 'Parc', 'Quai et berge', and 'Square'.
- Contraintes**: A list of constraints including 'Fruits', 'Fruits salissants', 'Inflammabilité', and 'Toxicité'.

A central modal window is open, titled 'Afficher les services rendus par l'arbre'. It contains a search bar with 'Marronnier, Prunus spinosa' and a button 'Pl@ntNet'. Below the search bar, there are four illustrations: a person sitting on a bench, a person kneeling next to a plant, a bowl of acorns, and a person walking in a park. The modal also includes a section 'Identifier par une photo' with a 'Pl@ntNet' button, a 'Choisir' section with the text 'Des espèces adaptées aux parcs, non allergènes et rafraîchissant la ville', and an 'Explorer' section with a button 'Laissez-moi choisir'.

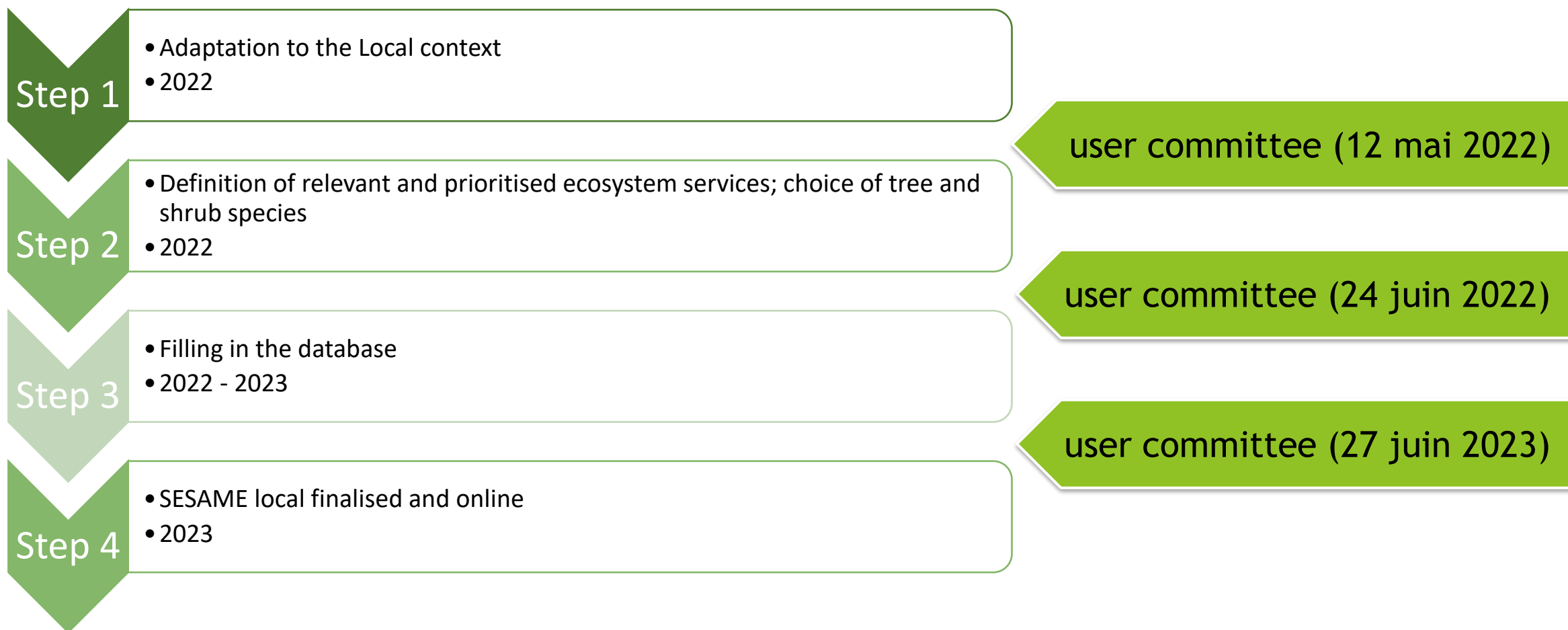
The background shows a list of search results, including:

- 1 (Ngaio) *Myoporum laetum* G. Forst.**
- 3 Abricotier *Prunus armeniaca***
- 4 Amandier *Prunus dulcis***
- 5 Arbousier de Chypre, Arbousier des balkans *Arbutus andrachne* L.**
- 6 Arbousier, Arbre aux fraises *Arbutus unedo***

V. Progress, limits and prospects



Project schedule



Sesame 13: help, but not a panacea



Sesame 13, is:

- A tool to help design greening projects
- Help in finding the right plants for the user's project, in a context of climate change
- A reliable database, supplemented by experts
- Informative species sheets
- A web application that is accessible to all, but designed for greening professionals

Sesame 13, isn't:

- A turnkey tool for drawing up plans for a greening project. The expertise of landscape architects and planners is still essential for sketching out a project.
- A tool for identifying the perfect species. Each species has its strengths and weaknesses, depending on the context of the project!
- Does not check the availability of nursery plants.





Lancement de l'application le 5 juin 2023 : Territoire de Metz et son agglomération.



Sésame

Intégrer l'arbre dans vos projets
de renaturation urbaine

Présentation

Ressources

Vos retours

Lancer l'application

Sésame, outil pour intégrer l'arbre dans vos projets de renaturation urbaine

Face au changement climatique et à l'urgence écologique, les villes
doivent s'adapter et se végétaliser, afin de rester vivables pour tous.

Destiné aux collectivités, Sésame permet d'identifier les espèces les
plus à même de produire les services attendus dans le cadre de projets
d'aménagement ou de végétalisation.

Découvrir >



L'outil Sésame, planter sans se planter

Une démarche territorialisée adaptée au contexte climatique, écologique, culturel d'un territoire

VI. Some other actions of Cerema



Life ARTISAN Project

« Achieving Resiliency of French Territories by triggering Implementation of Nature-based Solutions for climate change Adaptation at a National Scale »

✓ Support the implementation of the **National Adaptation to Climate Change Plan (PNACC)** through the mainstreaming of NbaS

✓ **Multi-partnership project** led by OFB, the French Biodiversity Agency

✓ **Multi-scale project** with many actions (*about 100*)

National Actions

National network, support to stakeholders, Online platform and Resource Center

Regional Facilitation

14 regional network, nature-based adaptation strategies

Demonstrator Program

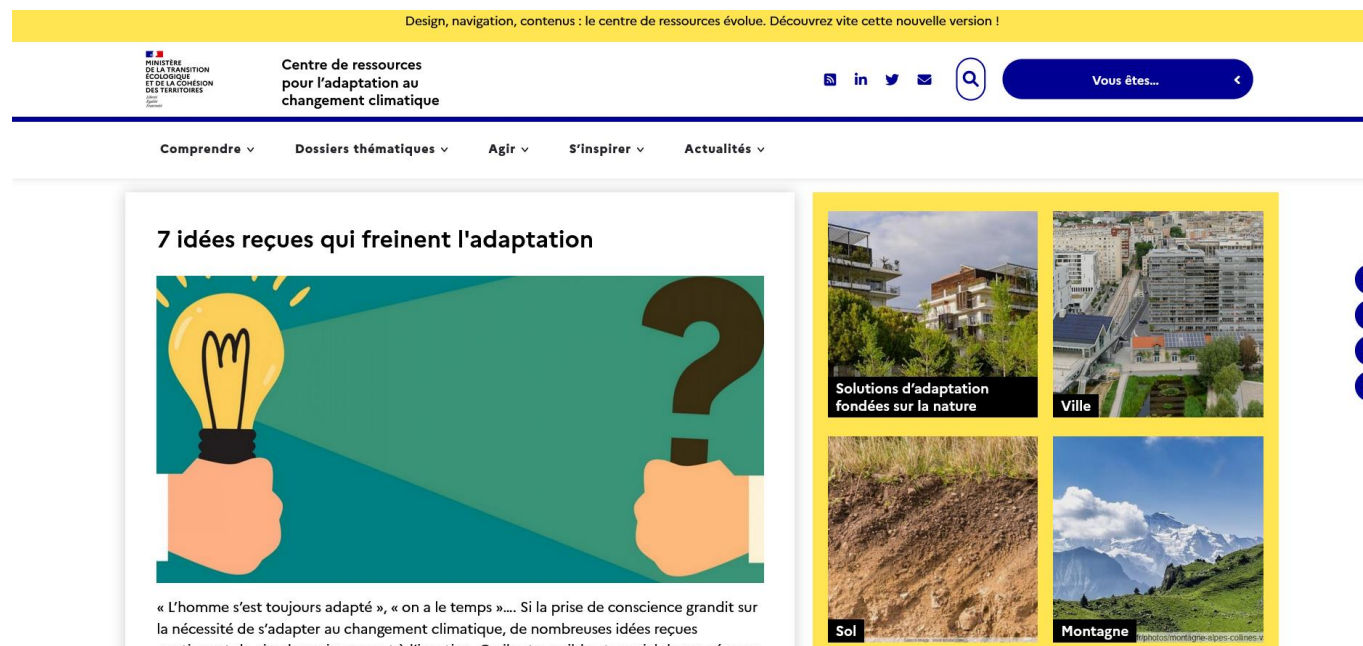
10 pilot sites, monitoring



Online Platform and Resource Center: the Resource Centre for Adaptation to Climate Change (*an information section, a document database*)



<https://www.adaptation-changement-climatique.gouv.fr/>



Highlighting exemplary initiatives carried out by different types of local actors (local authorities as well as businesses)...

A living nature based solutions laboratory

Thanks for your attention
Merci pour votre attention !

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