# > INTRODUCED PLANTS

## I/ General description and characterization of the NBS entity

### I.1 Definition and different variants existing

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| **Definition** | Introduced plants are new plants that are voluntarily added and that can be solutions in themselves to identified environmental challenges<br>The choice of introduced plants could be considered as a detail of several NBS using vegetation. It is true that it is a part of many other NBS, but actually it also can be considered as a NBS in itself.<br>It is especially important for biodiversity purposes, ecological processes and for the quality of urban green spaces practises. |

**Different categories to classify introduced plants:**
This selection of introduced plants refers to several categories of plants that are in relation to environmental, ecological and aesthetics purposes.

**a. Biogeographical origin of plant species or plant populations**

- *Indigenous species / exotic species*

Indigenous species (or native species) are species naturally present in the considered biogeographical area. They are opposed to exotic species, which grow outside of their biogeographical origin, due to voluntary or involuntary human introduction.
Both types of plants can be offered by horticulturists. For indigenous plants, local transplants can also sometimes be undertaken (seed or vegetative parts, cutting of plants, especially for woody plants). In this case, it is necessary to respect local law that preserve natural areas.

- *Indigenous species of local origin (plant population)*

Another approach can still be added for the choice of species and corresponds to a finer level. Within a given native species, the genetic origin of the plant individuals can be taken into account to favour local geographical plant individuals among the native species. This approach can reinforce ecological issues at developed sites and promote local plant production approaches. Two labels were thus proposed in France.

**b. Plant height, corresponding to different layers of vegetation**

Depending on their growth form, plants will form various vegetation structures, which can be characterized by layers. Four main layers can be distinguished, which will have environmental consequences (ecological habitats, aesthetic characteristics...): tree layer, shrub layer, herbaceous layer and moss or ground layer (Braun Blanquet 1965).

**c. Selection of introduced plant / Plants to avoid or that can be limited**

- *Invasive alien species*

They are plants that have been introduced accidentally or deliberately into a natural environment where they are not normally found, with serious negative consequences for their new environment. They are species that sustain self-replacing populations over several life cycles; produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction; and have the potential to spread over long distances

*Ludwiga peploides*
*(Source: Tela Botanica)*

*Cortaderia selloana*
*(source: Tela Botanica)*

Illustration of invasive alien species in Europe

- *Allergenic species*

Definition: Plants that emit substances (pollen…) that can cause an allergic reaction in humans.
Illustration : French aerobiology network (RNSA) (http://www.pollens.fr/en/)

- *Other criteria: toxic, urticate plants, etc.*

These plants can cause damages to humans according to others criteria. Depending on the uses, some plants can be avoided as toxic plants, urticate...

There are also proposals for classifying plants according to their emission of VOC (for example for trees: hppts://www.selectree.calpoly.edu)

## I.2 Urban challenges and sub-challenges related + impacts

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| **Main challenges and sub-challenges targeted by the NBS** | 04\| Biodiversity and urban space<br>> 04-1 Biodiversity<br>> 04-2 Urban space development and regeneration<br>> 04-3 Urban space management<br>07\| Public Health and well-being<br>> 07-2 Quality of life<br>> 07-3 Health | - Increasing biodiversity<br>- Contributing to preserve ecological continuities<br>- Providing a habitat for birds and insects, and other animals<br>- Anticipating eco-management<br>- Developing resilience of green spaces<br>- Aesthetic value<br>- Contact with nature<br>- Support for education<br>- Avoiding allergies |
| **Co-benefits and challenges foreseen** | 01\| Climate Issues<br>> 01-2 Climate adaptation<br>2\| Water Management | - Different vegetation layers helps reducing heat stress |
| **Possible negative effects** | 07\| Public Health and well-being<br>> 07-3 Health | - Presence of undesired insects<br>- Presence of weeds |

## *II/ More detailed information on the NBS entity*

| II.1 Description and implication at different spatial scales | |
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| **Scale at which the NBS is implemented** | The object: a building, a wall, a place, a green space.<br>The district: diversity of plants for example can be done at the quarter scale in order to diversify ecological habitats (forests, open herbaceous areas, …)<br>The city: planning of green infrastructures |
| **Impacted scales** | The 3 scales are impacted<br>Regional scale is also impacted when ecological connectivity is ensured |
| **II.2 Temporal perspective (including management issues)** | |
| **Expected time for the NBS to become fully effective after its implementation** | Immediately if the pre-existent vegetation is conserved.<br>Long term if a forest is expected. |
| **Life time** | The life time depends on the renewal time of the plantations. Itself depends on plant species (2-25 years):<br>- 1-10 years for the herbaceous plants<br>- 4-10 years for the shrubs<br>10-25 years for trees (it is quite short for trees, but the life expectancy is strongly reduced in the unfriendly urban environment) |
| **Sustainability and life cycle** | It depends on plant species.<br>- At the city scale, plantations are more resilient to changes.<br>The complementary of plants of different origin and with different features ensure sustainability. |
| **Management aspects (kind of interventions + intensity)** | - Control of vegetation development.<br>- Realizing new plantations |
| **II.3 Stakeholders involved / social aspects** | |
| **Stakeholders involved in the decision process** | - Owners, co-owners (in case of a joint ownership property)<br>- Users of public areas<br>- Municipality |
| **Technical stakeholder's networks** | - Landscape architects<br>- Landscape planners at the city scale<br>- Specialized green spaces management firms, horticulturist and gardeners.<br>- Naturalists' NGO<br>- horticultural producers |
| **Social aspects** | Environmental education, Awareness campaign, training, participatory process, nature conservation<br>Cultural aspects of plantations |
| **II.4 Design / techniques/ strategy** | |
| **Knowledge and how-know involved** | **Plant choice criteria**<br>These skills concern cultivated plants:<br>- Selection of plant adapted to:<br>• the local climate<br>• the exposition<br>• the soil<br>• challenges targeted<br>• the traffic intensity (the level of perturbation)<br>- Chose the support system well adapted to the plant and to place where vegetation grows<br>- Vegetation management<br>- Botanical skills |

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| | **Landscape architecture and landscape**<br>- Aesthetic expectations (colour, form of foliage, period of flowering/fructification, foliage persistence etc.)<br>- The way plants take part in specific uses (shadow, visual mask, physical separation), etc.<br><br>**Plant supply**<br>- *Horticulture*<br>A large palette of plants can be produced by cultivation. For the 'non-invasive species", see the definition below.<br><br>- *Ecological restoration techniques (ex.: collect of seeds in natural environment)*<br>Some plants are not traditionally cultivated. But their seeds can be collected in the natural environment. It is for example the case of herbaceous plants. This technique is often used in ecological restoration. In this case, it is necessary to respect local law that preserve natural areas. |
| **Materials involved** | - Seeds or plants<br>- Adapted substrate<br>- Maps of ecological habitats |

## II.5 Legal aspects related

Invasive plants (List of plants established by IUCN, www.griis.org)
Protected plants (The IUCN Red List of threatened species, www.iucnredlist.org), refer to national laws

## II.6 Funding Economical aspects

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| **Range of cost** | Very variable depending on the situation and the type of plants. However, some principles can be identified:<br>1°/Seedling and the choice of young plants is more economical<br>2°/ preserve existing vegetation is a main to save money |
| **Origin of the funds (public, private, public-private, other)** | - Depending of the owner |

## II.7 Possible combinations with other kinds of solutions (other environmental friendly solutions or conventional ones)

- Every NBS using alive vegetation

# *III/ Key elements and comparison with alternative solutions*

## III.1 Success and limiting factors

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| **Success factors** | - Ecological and botanical knowledge and awareness of landscape architects and urban green spaces mangers (it is very variable following actors)<br>- Cooperation been landscape architects with different sensibility: for example for designing the green skyline in NY, James Corner (Landscape architect and project manager leader) called in Piet Oudolf (a garden designer with deep knowledge in botany) for the planting design. |
| **Limiting factors** | - The availability and diversity of plants in horticultural trade (Bergues 2010)<br>- The constrains of the urban ecosystem in dense city that limit the palette to fewer plants<br>- Habits/ "traditions" in landscape architecture (for example: monospecific street tree) |

| III.2 Comparison with alternative solutions | |
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| **Grey or conventional solutions counterpart** | - See factsheets of the different NBS using vegetation<br>Urban vegetation with poor diversity is more sensitive to pests and diseases. It implies more intensive management and often-chemical treatments. |
| **Close NBS** | - See factsheet “Choice of plants > Use of pre-existing vegetation”<br>- See factsheet “Choice of plants > Vegetation diversification”<br>- See factsheets of the different NBS using vegetation |

## *IV/ References*

### IV.1 Scientific and more operational references (presented jointly)


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### IV.2 Sources used in this factsheet


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## *V/ Authors*


| Name | Institution / company | Writer/ reviewer |
|---|---|---|
| Véronique Beaujouan | Agrocampus Ouest | Writer |
| Adeline Bulot | Agrocampus Ouest | Writer |
| Hervé Daniel | Agrocampus Ouest | Writer |
| Philippe Bodénan | Cerema | Reviewer |
| Marjorie Musy | Cerema | Reviewer |