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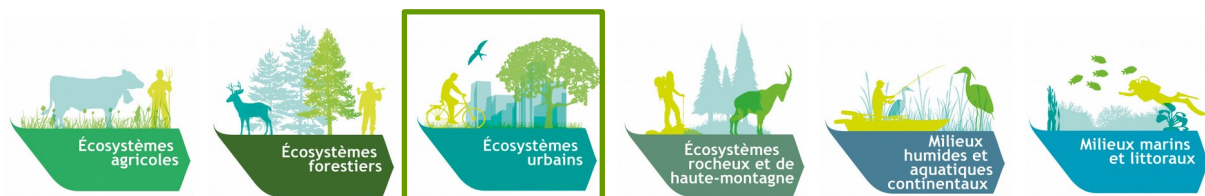
Commissariat général au développement durable



Urban ecosystems in France

Key messages for decision makers

APRIL 2019



Urban ecosystems include a mosaic of terrestrial and aquatic natural areas with highly variable degrees of naturalness that interact with each other, with the urbanized environment and with the more global environment of the city. In metropolitan France, 2.7 million hectares out of 55 are artificialized. Urbanized areas account for 77% of the population and they continue to expand. They cover various realities (scope, governance, etc.) and natural areas take very different forms depending on their size and their degree of naturalness or artificiality: wood, wetlands, vegetable gardens, private gardens, squares, trees alignment, green roofs, etc.

This evaluation was conducted for the EFESSE program by a team from the *Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement* (Cerema) with the support of a working group. It has been reviewed by the EFESSE Scientific and technical advisory board and the key messages for decision-makers on urban ecosystems were discussed and approved on 12 April 2018 by the EFESSE National stakeholders committee. The level of consensus observed and cross-references to the detailed sections of the report are presented in the margins of the messages.

To access the full report (in French): <https://www.ecologique-solidaire.gouv.fr/EFESSE>

Ecological condition, drivers and trends

1. Urbanized environments continue to expand. Urban areas grew by 1.6% between 2000 and 2006, a trend that tends to continue¹. Overseas, La Réunion, Martinique and Guadeloupe offer comparable levels of the order of 11% urbanization while Guyana stands out, remaining below 0.1%². Natural areas represent on average 40% of the area of the 28 French cities with more than 200,000 inhabitants analyzed³. According to the European Urban Atlas, natural areas represent an average of 39 m² per inhabitant within urban areas, but this area is significantly reduced in dense areas, particularly in Paris⁴. Recommendations are an area of 25m² per inhabitant in the peripheral zone and 10m² in a dense zone⁵.

¹ Well established and accepted (§7.1)

² Well established and accepted (§7.1)

³ Well established and accepted (§2.2)

⁴ Well established and accepted (§ 2.2 and 5.2)

⁵ Well established and accepted (§2.2)

2. Landscaped by and for humans, urban ecosystems are highly dependent on soils that give the city its different facets¹. Soils are highly variable in terms of thickness and organic matter content²; they are often artificialized or sealed, compacted³ and sometimes polluted⁴. When they support natural areas, they remain poorly connected, especially by green and blue corridors⁵.

¹ Well established and accepted (§3.3.2)

^{2,4} Well established and accepted (§3.1.1 and 3.4.4)

³ Well established and accepted (§5.2.2 and 6.1.2)

⁵ Well established and accepted (§3.3.3 and 4.2)



The Chemin de l'Île urban park (Île-de-France). © Laurent Mignaux - Terra

3. Urban flora and fauna contain a high proportion of pioneer, ubiquitous, anthropophilic species¹ or species with strong adaptation capacities (i.e. with tolerance to certain pressures)². The diversity of species can be high: for example, Paris has 1382 of 1800 plant species listed in Île-de-France³. These species also have to deal with exotic species that are sometimes invasive and commensal species to humans, horticultural and domestic species⁴.

¹ Well established and accepted (§3.2.1)

² Well established and accepted (§3.2.2)

³ Well established and accepted (§3.2)

⁴ Well established and accepted (§3.2.3)

4. Protected areas for their biodiversity and species with high heritage value are identified within urban ecosystems¹. For a sample of 12 inter-communalities of large French

¹ Well established and accepted (§11.1)

² Well established

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cities, the protected areas identified by the National Inventory of Natural Heritage average 4.2% of the territory². Iconic, endemic and / or protected plant species can also be adapted to the city, such as *Angelica heterocarpa* in Nantes³.

and accepted (§2.1 and 2.2, Appendix 28)

³ Well established and accepted (§ 11)

5. Pressures on natural areas are multiple and intense in urban areas; including soil and subsoil sealing¹. Most large urban areas continue to expand or become denser under the influence of a strong demand for constructions of all kinds, continuously consuming more space² and generating: a fragmentation of natural environments³; a disturbance of natural habitats and species⁴; pollution of soils, air and water⁵; noise, olfactory and light pollutions⁶. Inadequate public use of public spaces can also be a source of pressure for biodiversity⁷.

¹ Well established and accepted (§6.1)

² Well established and accepted (§7)

^{3,4} Well established and accepted

(§6.1.2 and 6.2.1)

^{5,6} Well established and accepted

(§6.1.3)

⁷ Well established and accepted

(§6.2.3)

6. Because of a growing demand from city dwellers for a better quality of their living environment (and regulatory requirements), cities slowly evolve and assert themselves "sustainable" and "resilient"¹. Thus, planning approaches are elaborated by seeking to minimize pressures (mitigate climate change, protect and promote biodiversity, reduce pollution, preserve the quality and availability of natural resources, etc.)². Soil quality remains the forgotten element of urban planning³.

¹ Partially established but accepted

² Well established and accepted (§13.3 and 18)

³ Well established and accepted (§18)

Ecosystem goods and services, natural heritage

7. The ecosystem services that urban dwellers benefit from in nature are mainly regulatory and cultural services, and to a lesser extent, provisioning¹. The quantity and quality of ecosystem services depend on the design of the public space and its use². Looking for a mosaic of functional environments and maintaining permeable soils during development operations, engaging in ecological management methods (differentiated management, "zéro phyto", etc.) lead to a diversified offer of cultural and regulating services³.

¹ Well established and accepted (intro of part 3 ; §13.1)

² Well established and accepted (§8 ; 9 ; 10 and 11 et 14.2)

³ Bien établi et accepté (§8 ; 9 ; 10 and 11 et 14.2)

8. Cities are dependent on neighboring ecosystems for their food and drinking water supply¹. Agriculture, water and the city have always been linked. Today, goods produced by urban ecosystems are insufficient to meet the needs of urban populations². Shared and family gardens, urban apiaries offer a production whose importance is today more symbolic than quantitative. Peri-urban farmland is a major issue for the development of local supply³.

^{1,2} Well established and accepted (§9 and 17.2)

³ Well established and accepted (§9)

9. Depending on the shape of the city (eg height and density of buildings, width of streets), natural areas contribute to the regulation of air quality¹ and local climate². They contribute to the improvement of air quality by intercepting or absorbing certain pollutants and atmospheric particles (plants can also emit particles)³. The temperature within the urban heat islands is attenuated by tree areas and aquatic environments (shading, effect on air circulation, evaporation heat reduction and evapotranspiration). This favorable influence is particularly appreciated by city dwellers during the hot season⁴.

^{1,3} Well established and accepted (§8.3)

^{2,4} Well established and accepted (§8.2)

10. The management of rain-fed rainwater (eg ditches, rain gardens), permeable soils, and natural areas contribute to the qualitative and quantitative regulation of the water cycle¹. They reduce the risk of flooding by runoff and the extent of their health and economic consequences (quantitative regulation)². They also play a purification role by retaining and degrading the pollutants contained in the water and significantly reduce treatment costs (qualitative regulation). A community has reduced its operating costs for the networks

^{1,2,3,4} Well established and accepted (§ 8.6)

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(rainwater and wastewater) by nearly one million euros by creating an alternative sanitary network for 25% of the collected rainwater³. The saturation phenomena of the networks have also been divided by three⁴.



Filtering basins of the Chemin-de-l'Ile urban park (Ile-de-France) © Sylvain Giguët - Terra

11. City-dwellers derive numerous educational and recreational services from urban natural areas¹, often designed with the aim of offering them aesthetic and recreational areas². These sites also contribute to the dynamisation and attractiveness of the territory³. For more than 8 in 10 French the proximity of a green space is an important criterion in the choice of their place of residence⁴. However, the proximity of a green space can lead to an increase in property prices⁵. In the same city, there may be an inequality of accessibility to these natural areas⁶.

¹ Well established and accepted (§10.1.2)

² Well established and accepted (§10.2.2)

^{3,4} Well established and accepted (§10 and 17.4)

⁵ Well established and accepted (§10.3.2.2 and 17.3)

⁶ Well established and accepted (§10.2.4 and 17.3)

12. Urban natural areas, when conceived or managed in an ecological way, contribute to the education and awareness of the biodiversity of urban dwellers¹. Cultural educational services are a major issue to raise awareness of biodiversity². They concern all audiences, and often require a mediator³. The naturalistic participatory sciences (Vigie-Nature, Spipoll ...) play a new role; they allow everyone to become an actor in biodiversity policies and build their relationship with nature⁴. For schoolchildren, the proximity of nature spaces is an essential medium of education; the renaturation of school courses could perfectly fit into an educational project⁵.

¹ Well established and accepted (§10.4 and §14.2.1)

^{2,5} Well established and accepted (§10.4 and 18)

^{3,4} Well established and accepted (§10.4)

13. The characteristics of natural areas, with interacting soil, plants and water flows, are the backbone of diversified bundles of ecosystem services¹. The preponderance of tree cover favors bundles of service that include (global and local) climate and air quality

^{1,4} Well established and accepted (§13 and 14)

² Well established and accepted

regulation², while wetlands promote water quality and flood regulation service³. Recreational services are almost always present⁴. (§ 13.1.2.1)
³ Well established and accepted (§ 13.1.2.2)



Crowd at the Buttes-Chaumont urban park (Ile-de-France) © Olivier Brosseau - Terra

14. The proliferation of certain animal or plant species and their promiscuity with humans can lead to health constraints, discomfort and material damage¹. On the other hand, a good functioning of ecosystems favors interspecific competition which limits these constraints². The number of incriminated species is small³. Their proliferation is partly attributable to trophic imbalances as well as to certain practices⁴. But the financial costs for society can be high, as is the case with pollinosis⁵. The prevalence of serious diseases or zoonoses transmitted to humans is low in metropolitan France but remains high in overseas communities⁶.

^{1,4} Well established and accepted (§12)
² Partially established but accepted (§12.4)
³ Well established and accepted (§12.2)
⁵ Well established and accepted (§12.2 and 16.2.5)
⁶ Well established and accepted (§12 and 16.2.5)

Options for integrated and sustainable management

15. The evaluation of urban ecosystem services allows for an integrated approach to territorial projects combining environmental, societal and economic concerns¹. The study of urban ecosystem services needs to be grounded in a territory at a relevant scale and to articulate the biophysical reality of phenomena and areas of governance².

^{1,2} Well established and accepted (§13 and 14)

16. Ecosystem service evaluation can be a decision-support tool¹. It supports certain current practices: ecological engineering, nature-based solutions, alternative rainwater management. These practices make it possible to optimize the provision of ecosystem services and respond to local issues². Several communities are already working in this direction. The example of the *Métropole de Lyon* demonstrates the efficiency of integrated approaches: promoting the cooling of the *rue Garibaldi*, which is subject to the heat island effect, the winter rainwater is also stored until the hot season, watering the planted paths and

¹ Well established and accepted (§8 ; 9 ; 10 ; 11 ; 12 ; 13 and 14)
² Well established and accepted (§8 and 18)
³ Well established and accepted (§8)
⁴ Well established

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allowing large trees to play their role of "urban natural air conditioner"³. The use of state and transition models allows to determine the influence of management and planning of a natural area on its ecological state and ecosystem services⁴. and accepted (§13; 14 and 18)

Knowledge and data gaps

17. Biophysical knowledge (the functioning and spatial interdependence of ecosystems, the relationships between ecosystem functions and services) **is a necessary and central step for a robust and reliable assessment of urban ecosystem services**¹. The detailed description and mapping of urban natural areas is also a prerequisite for any evaluation but is not currently available for all local authorities². Ecosystem services modeling and assessment tools exist, but they require these input data³. ¹ Well established and accepted (§2 ; 3 and 8) ² Well established and accepted (§1 ; 2 and 3) ³ Well established and accepted (§8)

18. The development of valuation methods for urban cultural services is necessary¹. The evaluation of these services can be done using methods using data on the individual's feelings and subjective assessments². It would be useful to supplement them with quantitative data such as urban park visits that could be used to establish an attendance indicator³. A lack of knowledge has been found on the role that access to natural areas can play in strengthening or mitigating existing socio-economic inequalities⁴. ¹ Well established and accepted (§10) ² Well established and accepted (§10.2.2) ³ Well established and accepted (§10.2.5) ⁴ Well established and accepted (§10.2.4 and 18)

19. Monetizing urban ecosystem services is possible but this remains complex¹. Existing results are based on one-off experiments with non-transferable results due to the strong heterogeneity of urban contexts². Other disciplines (sociology, urbanism) adopt postures and mobilize methods that sometimes generate contrasting results³. ^{1,2,3} Well established and accepted (§8 and 17)



Bois de Vincennes (Ile-de-France) © Antonin Vergez



The EFESSE is a program and a science-policy-society platform led by the Ministry for an Ecological and solidarity transition. It aims at revealing the multiple values of biodiversity in order to facilitate their

integration in public policies and private decisions in France. The program builds on a shared conceptual framework and a national governance that brings together experts, policy makers and stakeholders. After a first phase ending with the publication of six broad assessments covering French ecosystems, EFESSE is starting a second phase whose operational and strategic character will be reinforced in order to develop the tools required to foster the ecological transition of the French society.

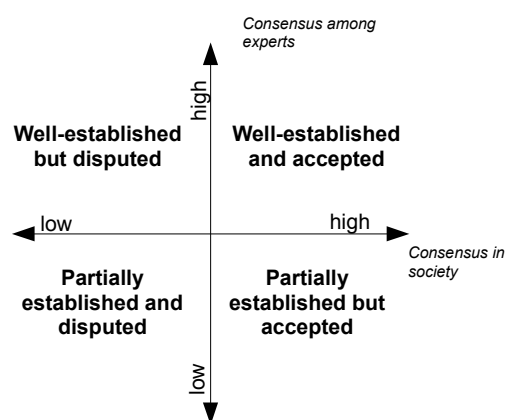
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The key messages for decision makers

The key messages for decision-makers are co-written by the EFESSE project team of the Ministry for an Ecological and solidarity transition and by the authors of the studies. In order to enhance their scientific credibility and their legitimacy in the eyes of decision-makers, they are subject to scientific advice and stakeholder approval.

Every assertion composing these messages is qualified on two dimensions. The **scientific consensus**, first, is informed on two levels. It is proposed by the authors of the study and submitted to an arbitration by the EFESSE Scientific and technical advisory board. The **societal consensus**, on the other hand, is informed on two levels. Unless opposition is expressed, the level of consensus is considered high. It is degraded as soon as a stakeholder disputes the assertion and makes the reasons for its disagreement explicit. This gives rise to the four qualifications which are presented opposite and indicated in the margin of the messages.



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