



Biodiversity and cities : friends or ennemies ?

Some ideas for urban planning and public policies

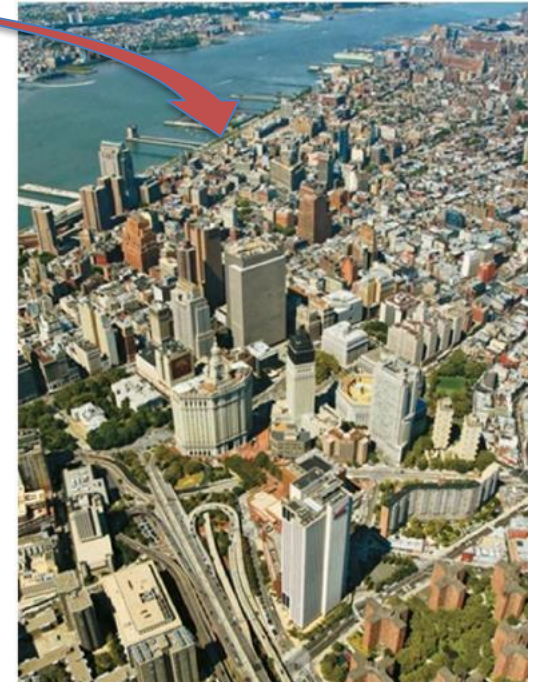
Hélène Soubelet
Directrice générale

What is a city from a biodiversity perspective ?

=> city modifies natural ecosystems, species communities and interactions between species



- loss, degradation and fragmentation of natural habitats
- increased soil sealing
- heat islands,
- water and air pollution,
- noise,
- light
- introduction of invasive alien species



3 Avis ⓘ

[Rédiger un commentaire](#)

Mannahatta: A Natural History of New York City

De Eric W. Sanderson

Few species, highly flexible, adaptable, innovative

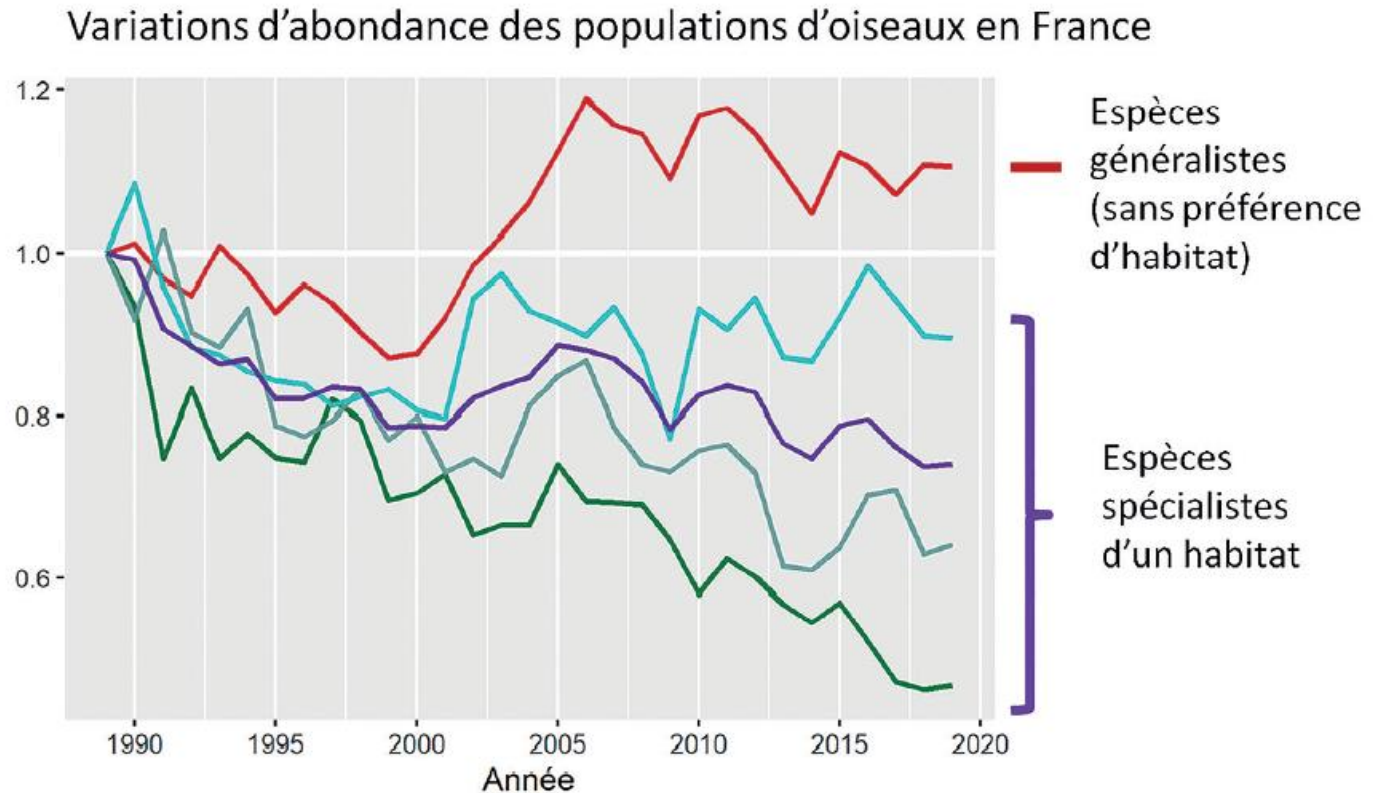
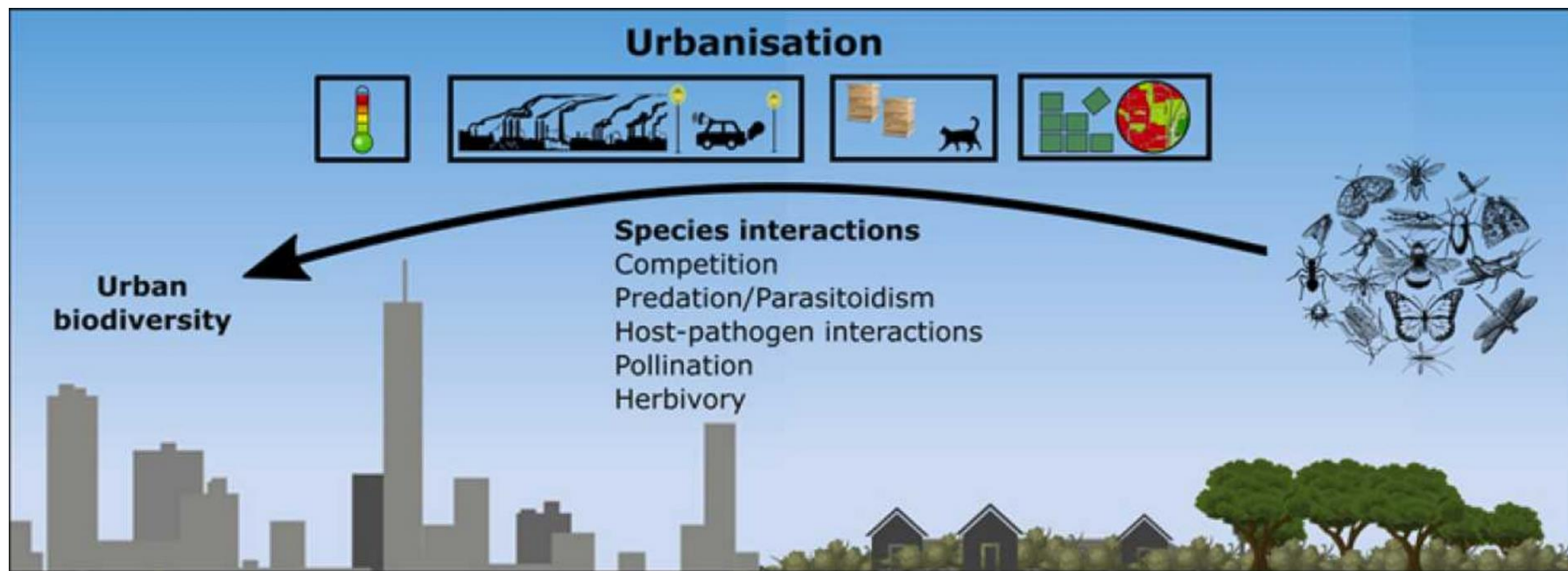


Figure 5.24 : Variation d'abondance des populations d'oiseaux en France : plus d'**espèces** généralistes au détriment des **espèces** spécialistes (adapté de Fontaine *et al.*, 2020 [30]).

Urbanisation impacts ecological interactions

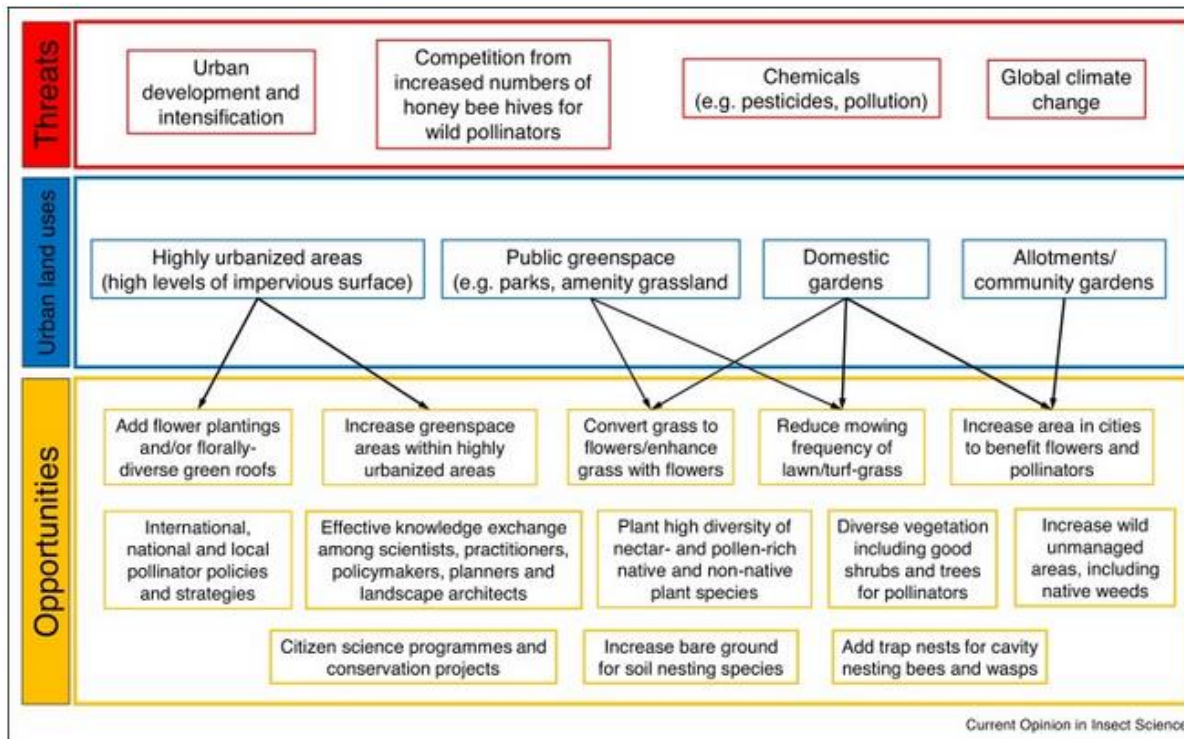


Current Opinion in Insect Science

Volume 52, August 2022, 100922



Urbanisation modifies species richness and composition, but some species are winners

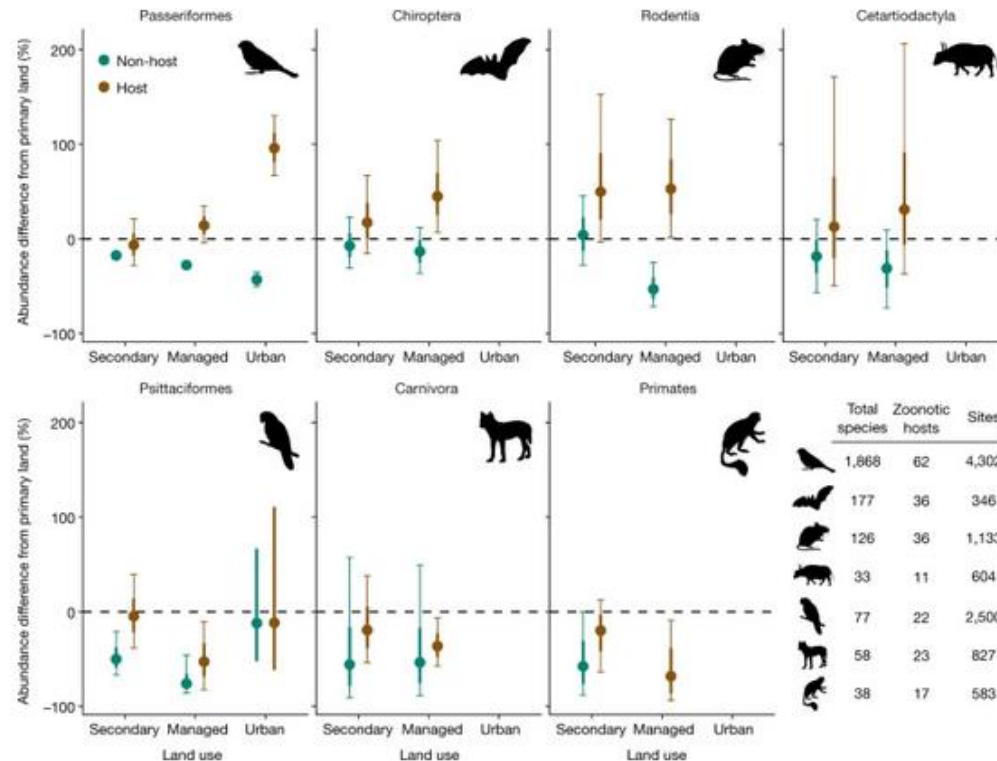


Light pollution is growing very rapidly the world, by an average of 6% per year, and in some regions, darkness no longer exists

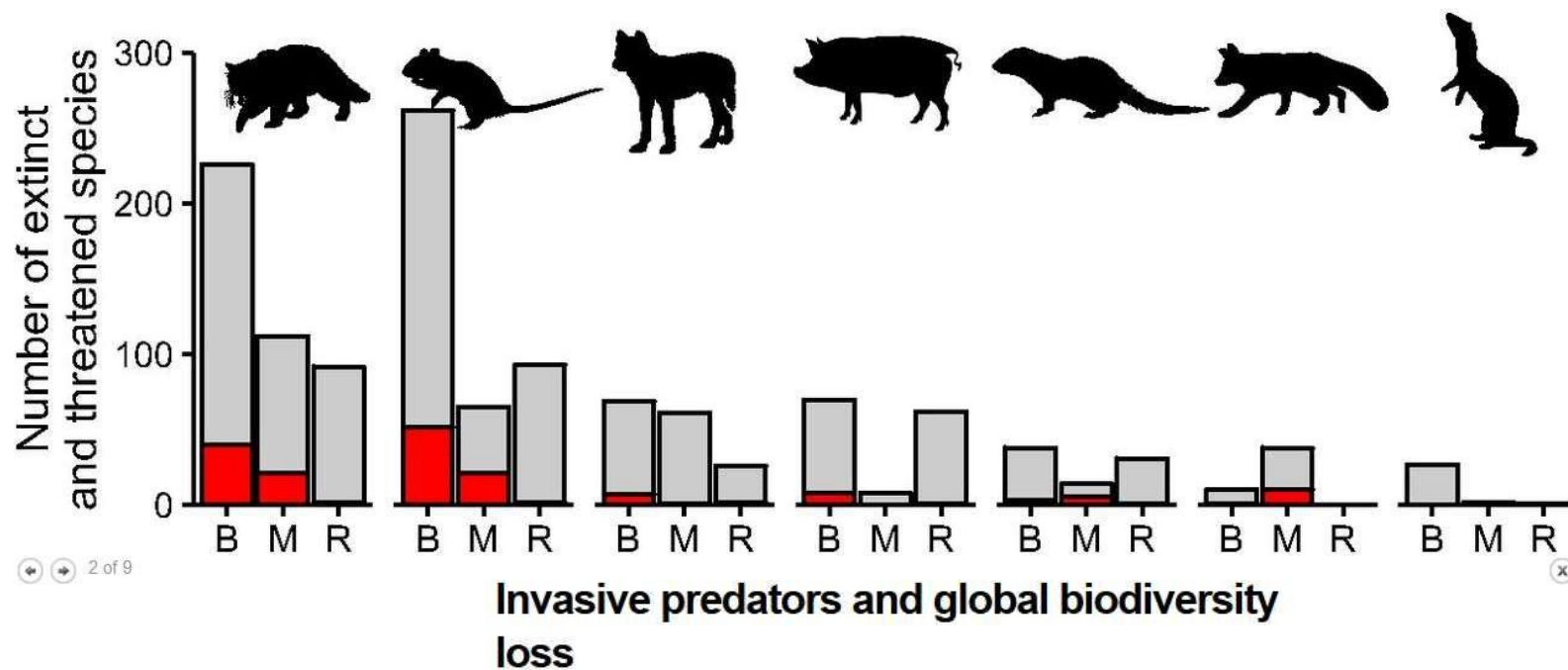


Anthropogenic environments increase infectious risk

Fig. 3: Effects of land use on species abundance of mammalian and avian zoonotic hosts and non-hosts.



Cities can encourage invasive species that threaten biodiversity



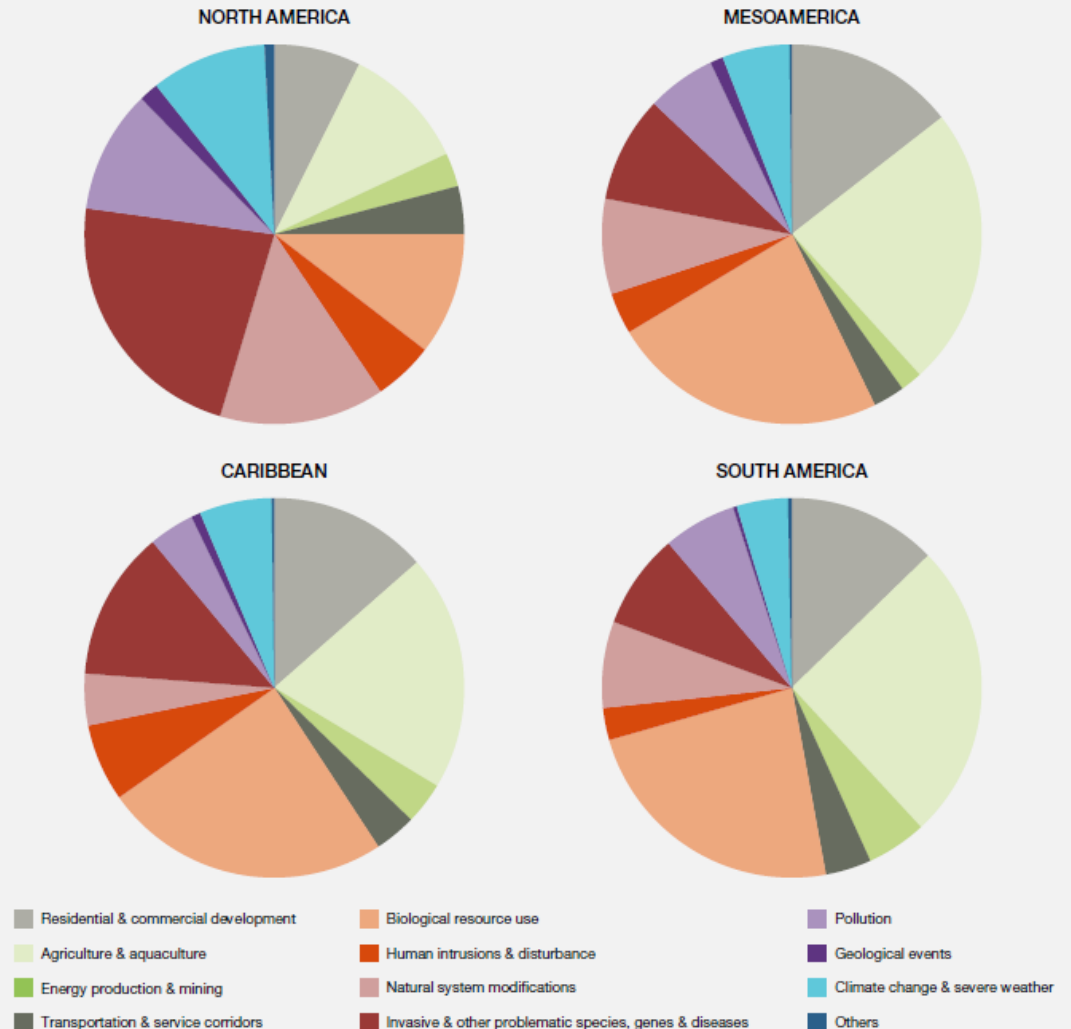
Tim S. Doherty, Alistair S. Glen, Dale G. Nimmo, Euan G. Ritchie, and Chris R. Dickman
PNAS October 4, 2016 113 (40) 11261-11265; first published September 16, 2016; <https://doi.org/10.1073/pnas.1602480113>

Ecological footprint of cities is not only a question of spatial coverage

- ⇒ 75% of the land-based environment have been significantly altered by human actions
- ⇒ Cities represent 3% of the earth surface

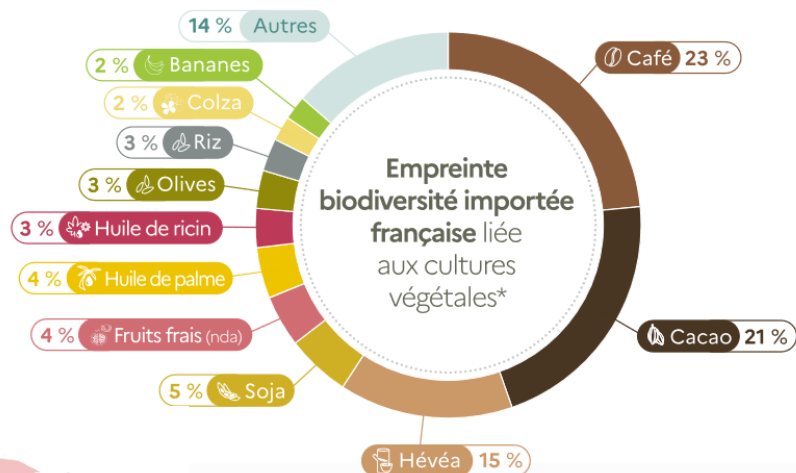
Figure 31 Comparison of the main causes of extinction risk in the Americas.

When a species is threatened by more than one cause, all causes were included to calculate the proportion.
Source: Data from IUCN Red List threat classification, IUCN (2017).

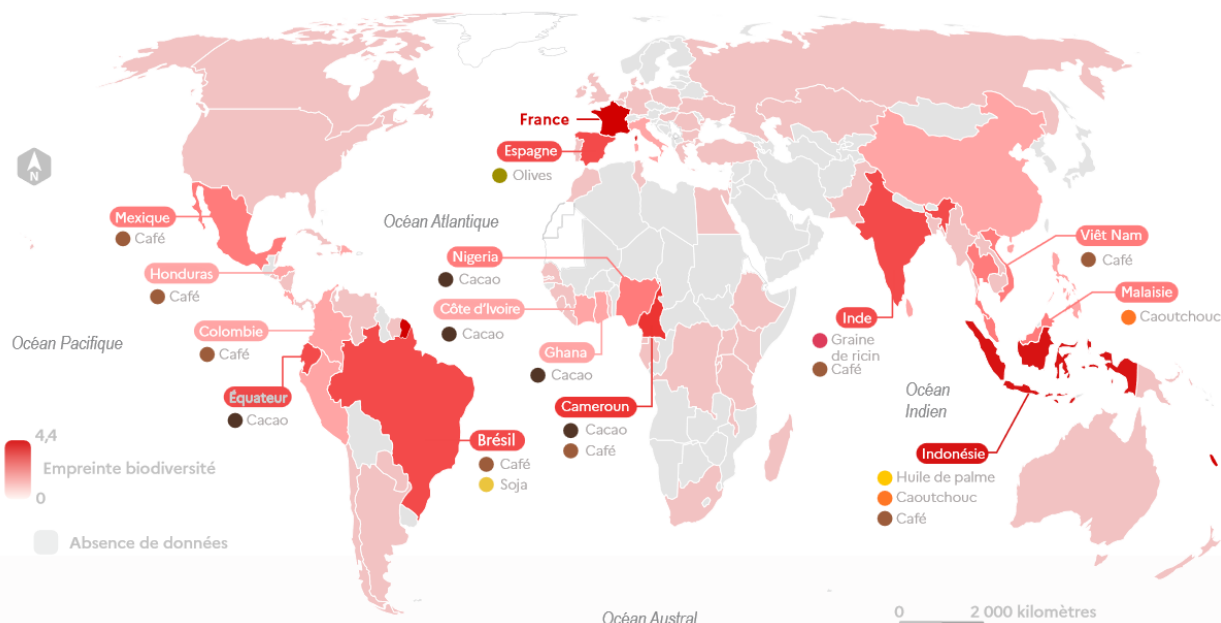


Consumption, the first indirect factor of impact on biodiversity

Comprendre
pour agir



* Seuil de représentation des cultures :
> 2 % de l'empreinte



=> Cities import land use change, pollution and other impacts abroad

Figure 7. Empreinte biodiversité française liée aux cultures végétales.

Cities as a solution for biodiversity conservation

From Bottleneck to Breakthrough: Urbanization and the Future of Biodiversity Conservation

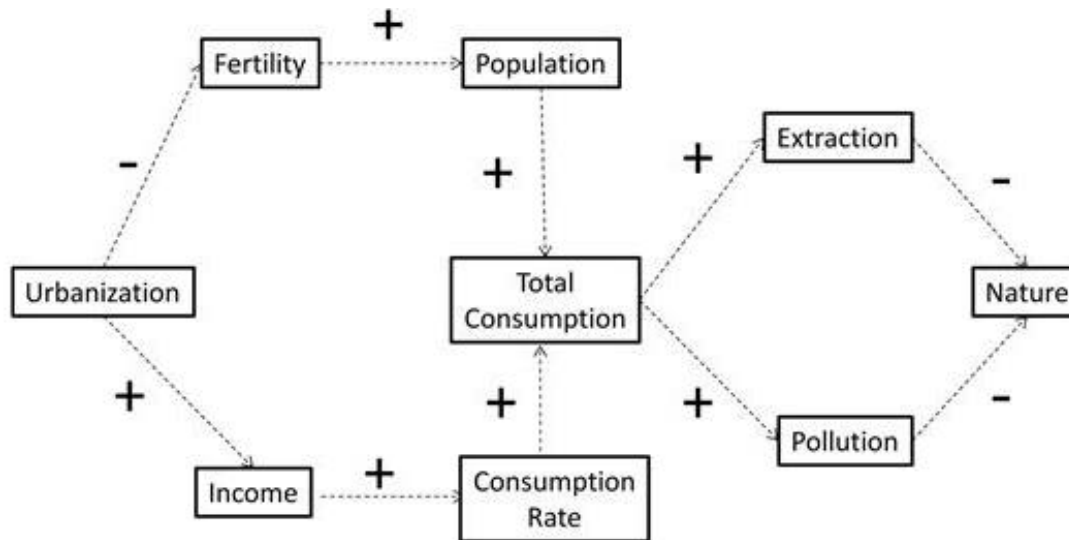
Eric W Sanderson ✉, Joseph Walston, John G Robinson

BioScience, Volume 68, Issue 6, June 2018, Pages 412–426, <https://doi.org/10.1093/biosci/biy039>

Published: 22 April 2018

The end of poverty

The end of population growth




Urbanization as a driver of change in population, consumption, and technology



Cities as a solution for biodiversity conservation

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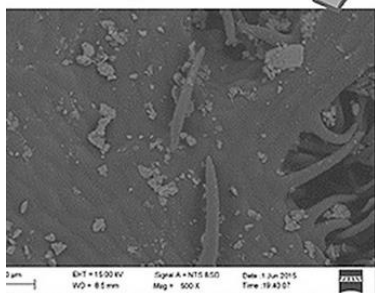
Published: 22 April 2018

Conservation during bottleneck	Conservation after the breakthrough
Protect threatened elements of biodiversity	Restore surviving elements of biodiversity
Establish protected areas as bastions of the wild	Manage protected areas as source sites for rewilding
Leverage rural-to-urban migration to reshape threats to biodiversity and reduce poverty	Leverage urban-to-rural support for conservation
Contribute to safe, livable, and sustainable cities	Deconstruct infrastructure that is no longer needed
Enact regulation to limit destructive natural-resource extraction and pollution	Enact economic measures to shape consumption



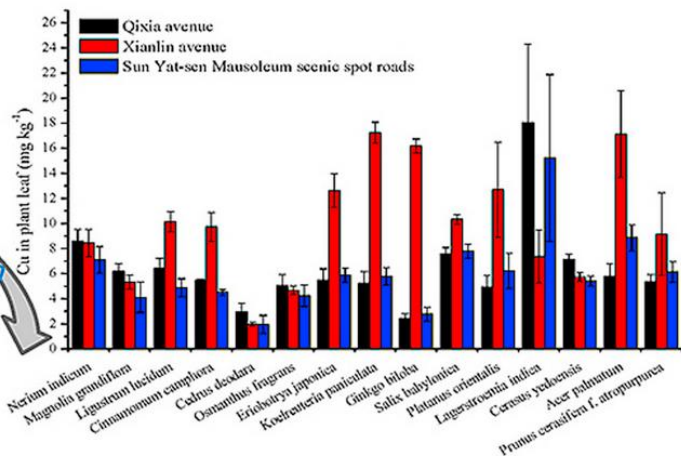
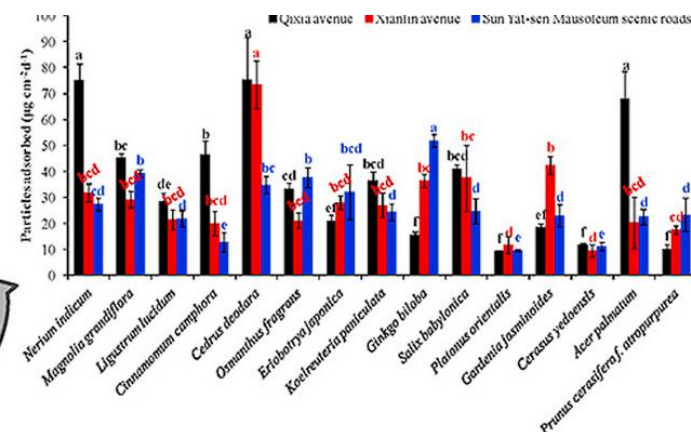
Assessment of foliar dust particle retention and toxic metal accumulation ability of fifteen roadside tree species: Relationship and mechanism

Mingyun Jia ^{a, b}, Dongqin Zhou ^{a, b}, Shipeng Lu ^{a, b}, Jinping Yu ^{a, b} 吴

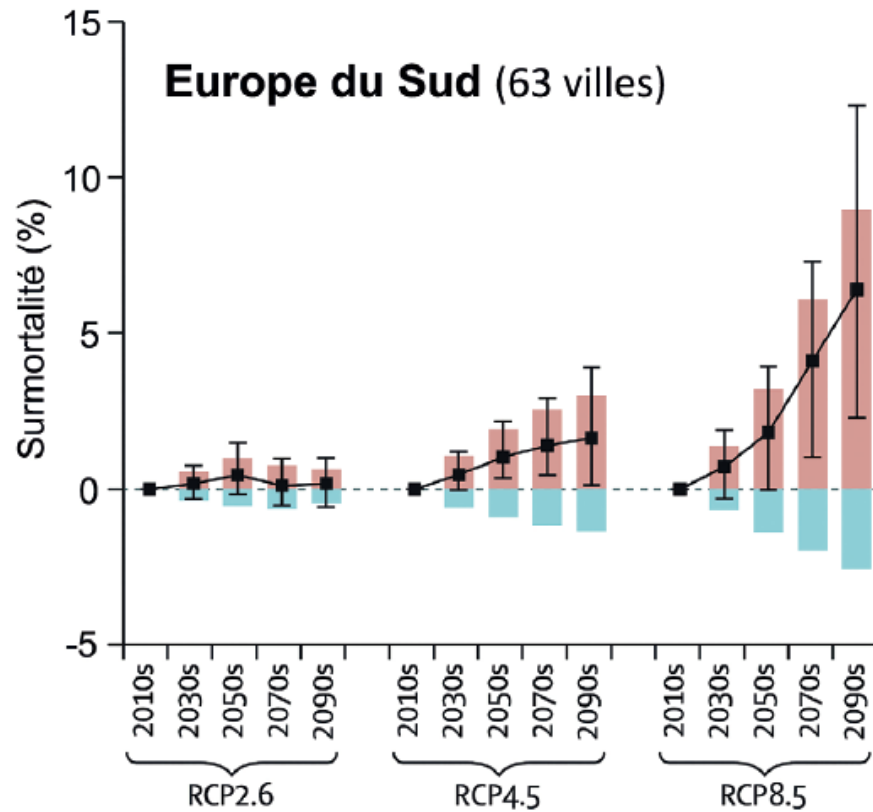


Foliar dust retention

Foliar metals absorption



Nature based solution : Trees for cooling cities



The many benefits provided by the Cheonggyecheon River Restoration

space for recreation and recuperation

reduced particulate pollution



tourism

flood protection

areas for wildlife and biodiversity

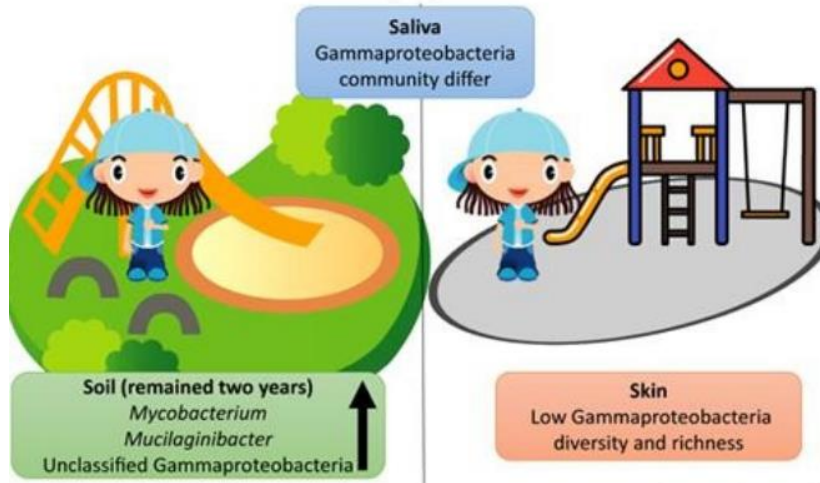
reduced urban heat-island effect

Restoring biodiversity has great effects on microbiota



Biodiversity intervention day-cares

Standard day-cares

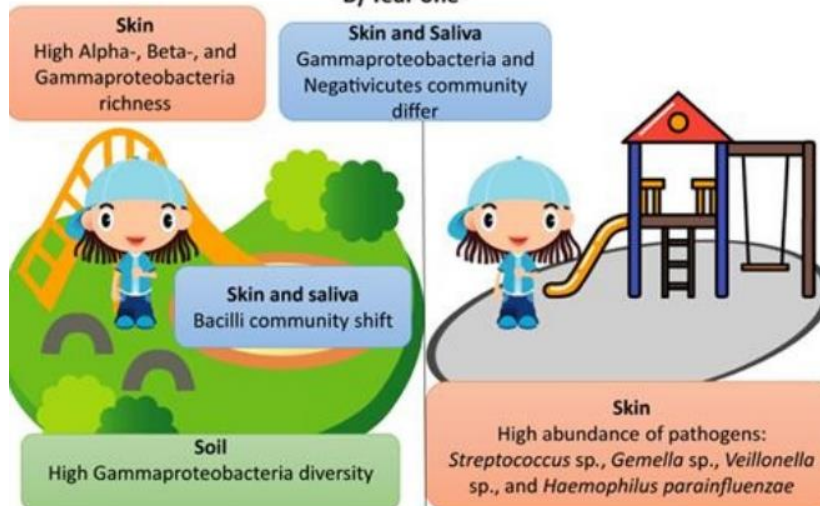
A) Day 28



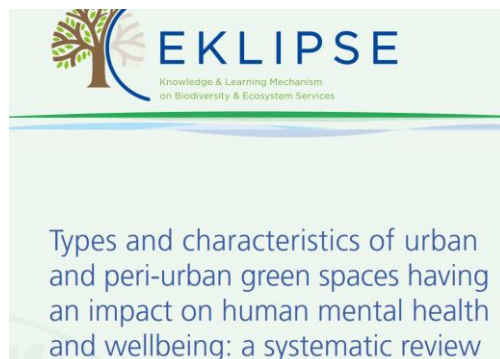
Long-term biodiversity intervention shapes health-associated commensal microbiota among urban day-care children

Marja I. Roslund ^a, Riikka Puhakka ^a, Noora Nurminen ^b, Sami Oikarinen ^b, Nathan Siter ^c, Mira Grönroos ^a, Ondřej Cinek ^d, Lenka Kramná ^d, Ari Jumpponen ^e, Olli H. Laitinen ^b, Juho Rajaniemi ^c, Heikki Hyöty ^b, Aki Sinkkonen ^f  
the ADELE research group¹

B) Year one



Restoring biodiversity has great effects on mental health



	Mental health			Severity mental disorder			Prevalence mental disorder			Satisfaction with life			Quality of life			Subjective wellbeing			Affect			Vitality			Restorative outcomes			Perceived stress			Physiological stress			Problem behaviour			Brain activity		
	+	□	-	+	□	-	+	□	-	+	□	-	+	□	-	+	□	-	+	□	-	+	□	-	+	□	-	+	□	-	+	□	-	+	□	-			
UGS																4	2	1				1	1	2															
Park		1		4						1						13	2		2			4		3	2	8	11												
Garden				4	2	1						1				2	2						1		3	3		3	1	1			1						
Forest				1												18	8	3	4			4		2	1	12	12	1											
Grassland														1		2		1					1	1		2													
Trees & p				1								1				3	1		1			2			1		1												
Biodiversity																	1					1	1		1	1													



Thank you for your attention !