Forestry

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Introduction

Health & recreation

The Commons

Mobility

Energy

Retail

Production & logistics

Housing

Forestry

Agriculture

Tourism

Landscape system presentations
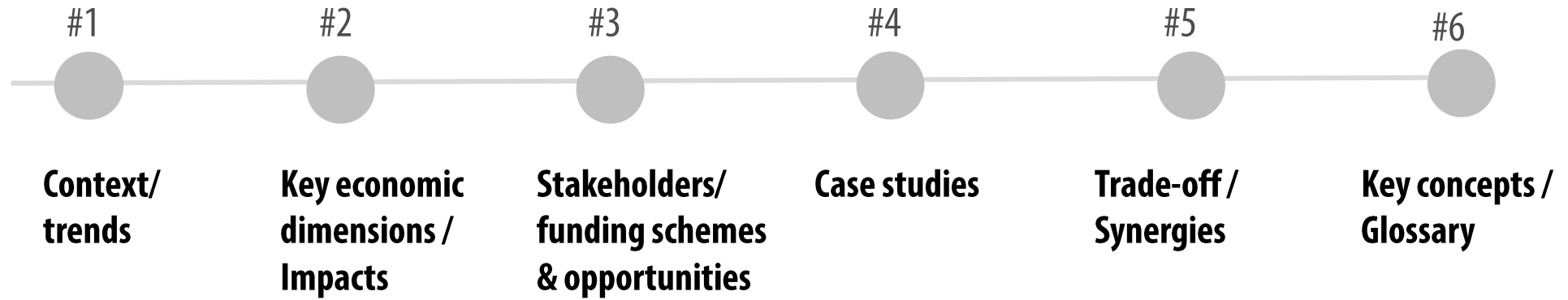
Scenario / Visioning presentations

Social Business modelling

Impact evaluation

PROGRAMME

17:30 – 17:50   Context, trends, key economic dimensions

17:50 – 18:05   Breakout session

18:05 – 18:30   Stakeholders involvement, funding opportunities, case studies, trade offs and synergies

18:30 – 18:45   Feedback, Q & A

Introduction

Most Europeans live in urban areas, and even more of our children will live in urban areas. By 2050 it is expected that 90% of Europeans and the citizens of other developed countries will reside in urban areas. The effect this will have upon humans, ecosystems and the total earth climate system is one of the biggest challenges for sustainable development across the world, and the European continent is no exception to this.

In this context, a 'city' that feels and functions like a forest is increasingly being proposed as a vision for future sustainable cities. Green infrastructure is widely proposed (e.g. by the European Commission) as being a comparably inexpensive and a realistic strategy for delivering nature-based solutions, that support climate adaptation capacity and (sustainable development in Europe's urban areas. Examples of the components of urban green infrastructure include green roofs, permeable vegetated surfaces, street trees, public parks, community gardens, wetlands and not least forests.

Introduction

Research has shown that forested environs are increasingly a key ecosystem service provider in most European cities. Already during 19th century industrialization, many larger cities acquired so called "city forests". As urbanization accelerated during the 20th century, these woodland landscapes were often protected due to their multiple social and environmental values. Today, we use the ecosystem service as an umbrella term for these multiple benefits.

Forest areas were also absorbed or fragmented by urban sprawl to such an extent that remnant areas, along with new forest patches constitute the most frequent type of green in many European cities. While trees are important in parks and along streets, forest environs are generally more multipurpose and able to sustain many uses simultaneously by providing a wide range of ecosystem services such as biodiversity conservation, recreation, drinking water protection, carbon storage, sustainable raw materials, mitigating urban heat island effects etc. Due to their quantity and quality, forest environs located in and around European urban areas are therefore foremost in providing the back-bone of urban green infrastructure

Key forestry terminology

Forest is the land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ (FAO, 2018).

Forestry is the art and science of protecting, conserving and managing forests, tree plantations and natural resources. Since forest ecosystems are incredibly important to the planet, the field of Forestry is just as crucial for the environment as it is for our communities and economy.

Urban forests come in many different shapes and sizes. They include urban parks, street trees, landscaped boulevards, gardens, river and coastal promenades, greenways, river corridors, wetlands, nature preserves, shelter belts of trees. Urban forests, through planned connections of green spaces, form the green infrastructure on which communities depend.

Urban forestry is defined by Jorgensen (1974) as a "specialized branch of forestry which has as its objectives the cultivation and management of trees and forests within cities for their present and potential contribution to the physiological, sociological and economic well-being of urban society.
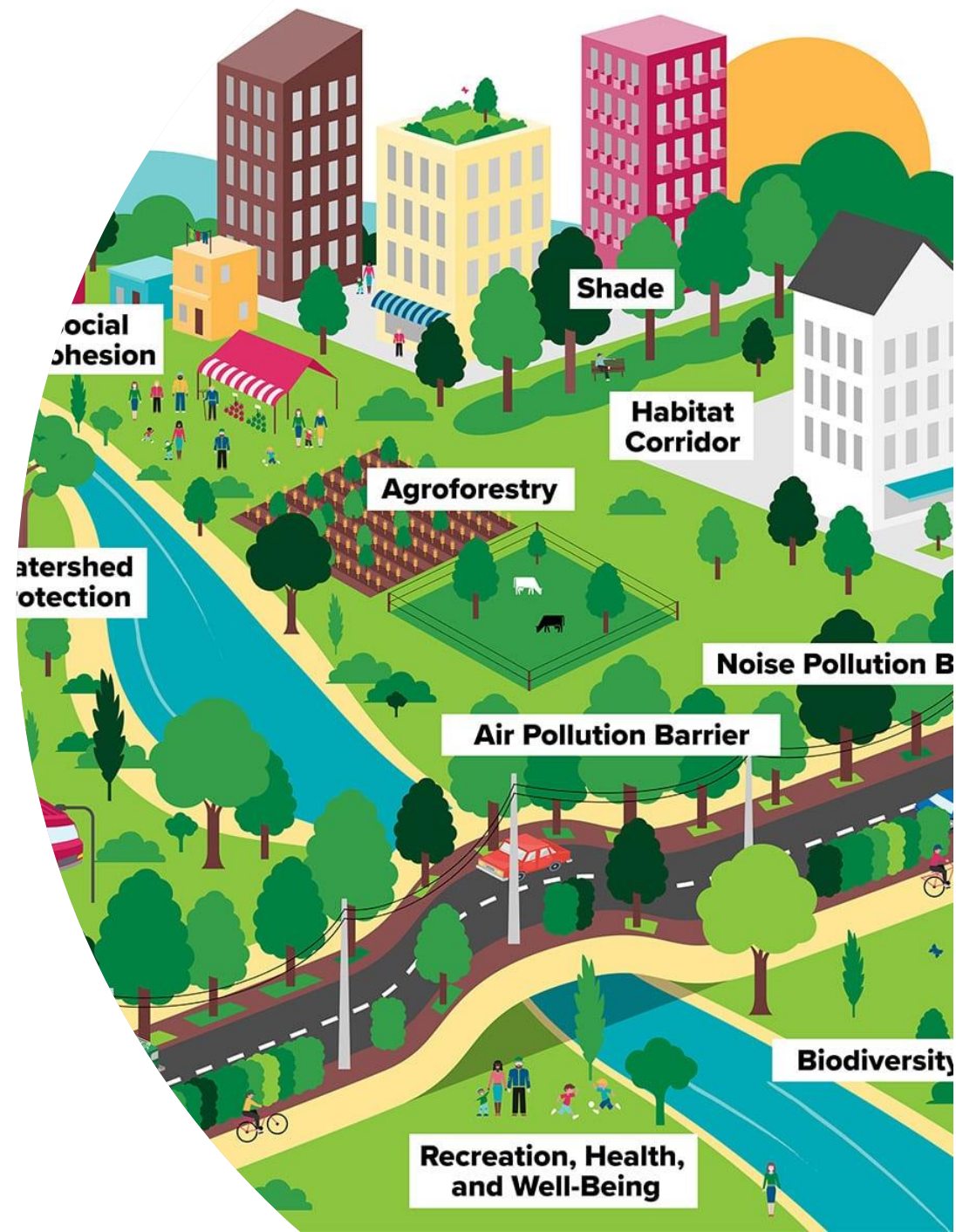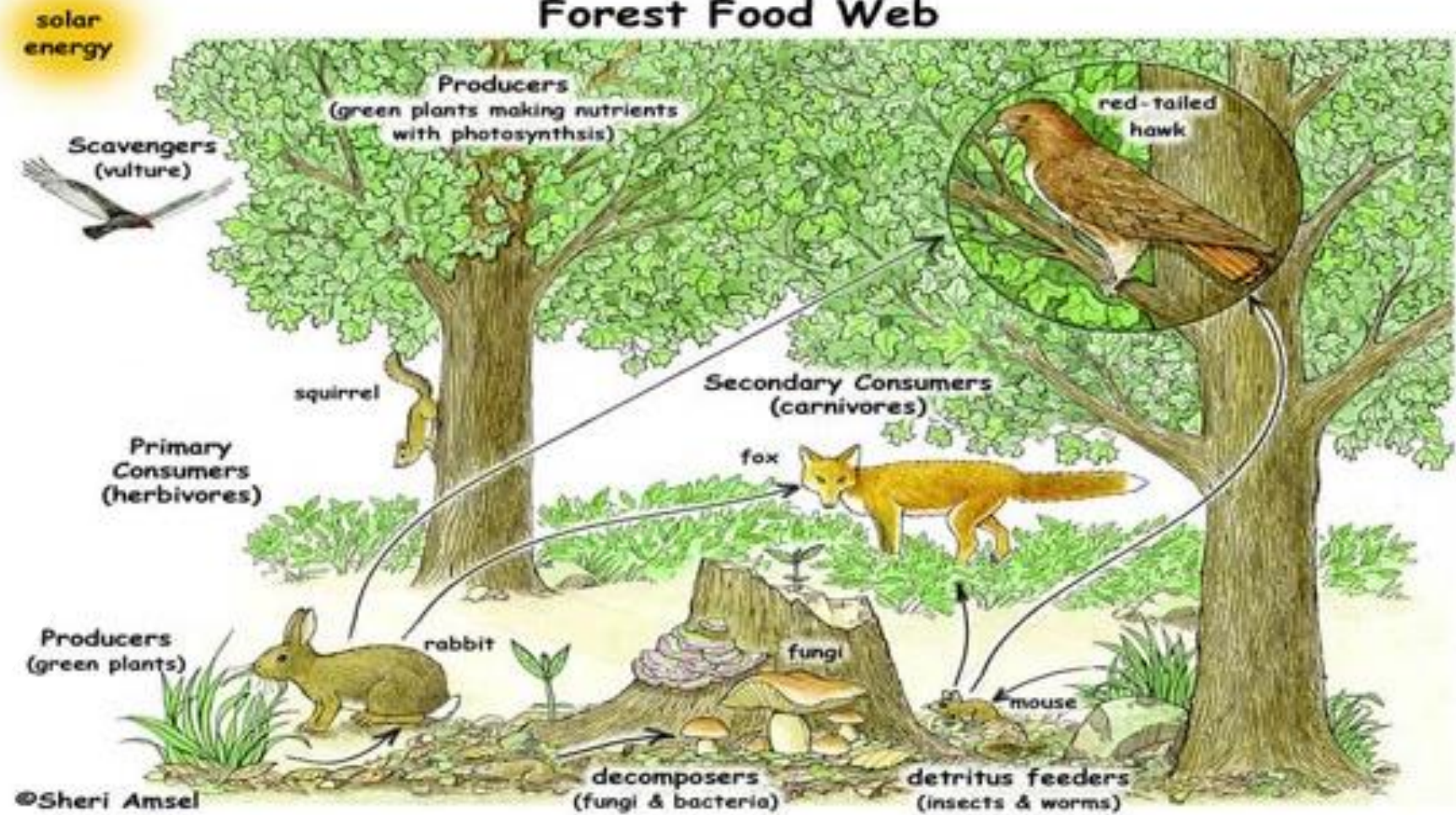
The forest has a meaning beyond the tree communities that form it. It is **an ecological system**. As an ecological system, forest is defined as follows:

"**Forest**, together with trees, other living beings such as plants, animals and microorganisms, is the piece of nature that symbolizes the texture of mutual relations formed by inanimate environmental factors such as soil, air, water, light, and temperature".

Forest Food Web

Trends

Recent trends show that more and more cities and metropolitan territories are turning to Nature-Based Solutions to help develop more sustainable, resilient and healthy urban spaces.

Urban and peri-urban forestry has been gaining attention in recent years as a valuable tool for addressing a number of urban challenges in the development of a more sustainable and resilient city model.

FAO has created the **Trees for the Cities** discussion group to meet the rising demand for a dialogue platform to facilitate regular exchanges and conversations worldwide, regionally and locally among the urban forestry community. This group fills the spaces between meetings of international and regional fora concerning management of trees and forests in urban areas and involving researchers, organizations, institutions, and city managers and administrators. This discussion group can promote and foster the integration of urban and periurban forests in the governance of cities and raise awareness of the wide range of benefits that trees and forests can provide to urban communities.

Trends

FAO called upon cities to invest in forest-based solutions towards a more sustainable and resilient model of urban development. The Call for Action developed by FAO and its partners in preparation to the First World Forum on Urban Forests is intended to provide a vision of how cities around the world could use forests and trees to make cities greener, healthier and happier places to live.

As a first step towards the achievement of this goal, FAO invited communities to become part of the **Tree Cities of the World (TCW) programme**, an international effort to recognize cities and towns committed to ensuring that urban forests and trees are properly maintained, sustainably managed, and duly celebrated.

In 2021, 139 cities in 21 countries earned the TCW recognition, including some cities from France, Spain, Italy, Slovenia, Sweden and United Kingdom from Europe.

https://treecitiesoftheworld.org

Trends

The European Forum on Urban Forestry (EFUF) is a unique meeting place for practitioners, policy-makers, managers and scientists who are active in urban forestry, urban greening and green infrastructure. Since 1997, the EFUF has met annually to discuss new developments, to exchange experiences, and to visit examples of good practices on planning, design and management of urban forests (from woodland to urban parks and street trees).

The European Forum on Urban Forestry is facilitated by the International Union of Forest Research Organization's (IUFRO) Urban Forestry Research Group, and has a strategic collaboration with the European Forest Institute (EFI). Every year, the EFUF takes up an actual theme within urban forestry, such as financing, public involvement, partnerships, and management innovations. the 24th European Forum on Urban Forestry (EFUF) was held from 17-21 May 2022 in Belgrade, Serbia.

https://efuf.org
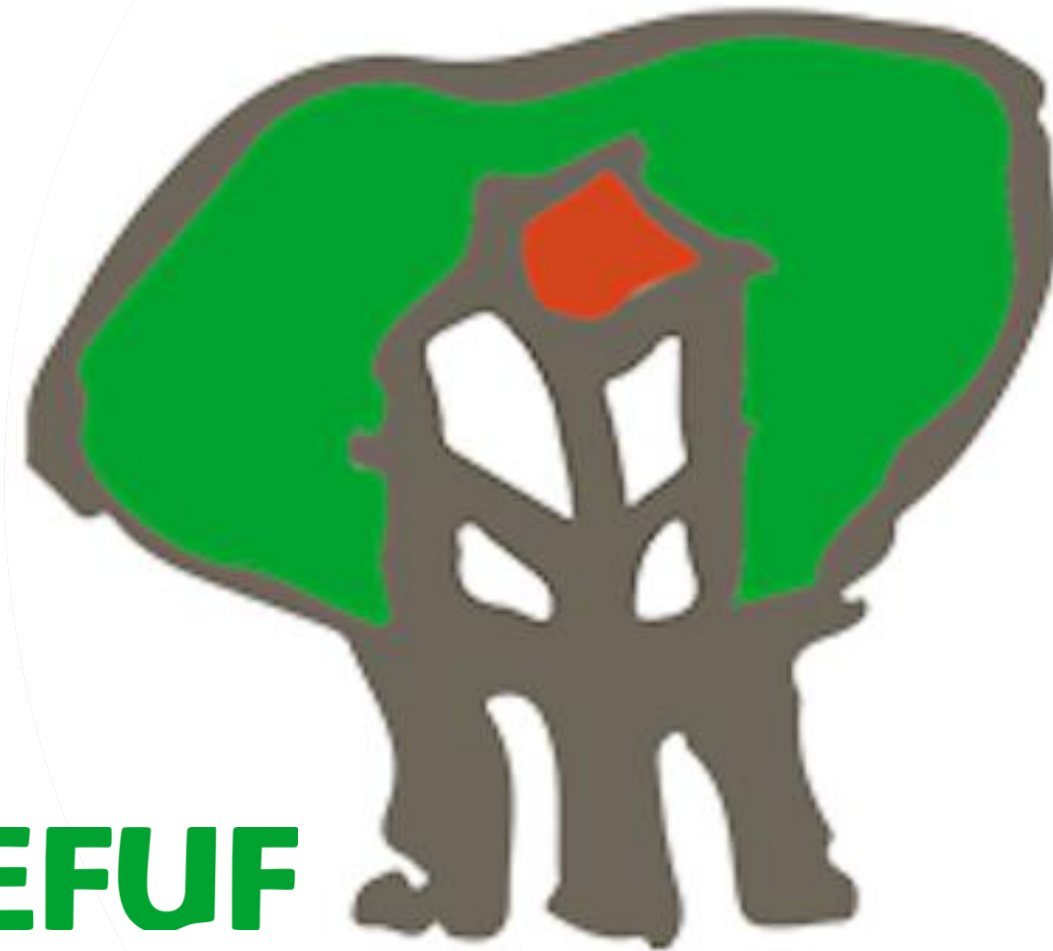
EU Green Deal

The European Green Deal includes several actions directly affecting forests and the forest-based sector. Most of statements on forests express problems like deforestation, threats to forests and biodiversity, and argue for forest and biodiversity restoration and protection. With respect to climate action, forests are mainly addressed as a carbon sink.

There are hardly any statements on the multiple benefits forests provide to society and the benefits which forest-based bioindustry could contribute to a more sustainable and climate-neutral society, and to the Sustainable Development Goals. The EU forest sector can do more and use a wider spectrum of measures to mitigate climate change than the Green Deal proposes. The circular bioeconomy is clearly a missing link in the proposal.

The European Commission has set a very ambitious timetable for the Green Deal. Given the complexity of forest-related issues and the long time period that must necessarily be assessed, this timetable poses serious challenges for sound decision making to reach an optimal balance of all the benefits which forests provide to society.

GREEN DEAL

EU Forest Strategy 2030

The new EU Forest Strategy for 2030 is one of the European Green Deal flagship initiatives that builds on the EU Biodiversity Strategy for 2030 and addresses all the multiple functions of forests.

It contributes to achieving the EU's greenhouse gas emission reduction target of at least 55% in 2030 and climate-neutrality in 2050, and to the EU's commitment to enhance its removals by natural sinks.

The strategy sets a vision and concrete actions for increasing the quantity and quality of forests in the EU and strengthening their protection, restoration and resilience.

EU Biodiversity Strategy

The new European Biodiversity Strategy for 2030, presented in May 2020, set new objectives for the protection of biodiversity in the European Union.

Among these objectives are to increase the quantity, quality and resilience of the forests in order to retain their function for both biodiversity and climate.

The strategy aims for planting at least 3 billion additional trees in the EU by 2030, in full respect of ecological principles.

The strategy mentions the particular benefits of tree planting in cities and the role of The New **European Urban Greening Platform** in facilitating urban tree planting, including under the LIFE programme.

https://ec.europa.eu/info/sites/default/files/communication-annex-eu-biodiversity-strategy-2030_en.pdf

https://platformurbangreening.eu/
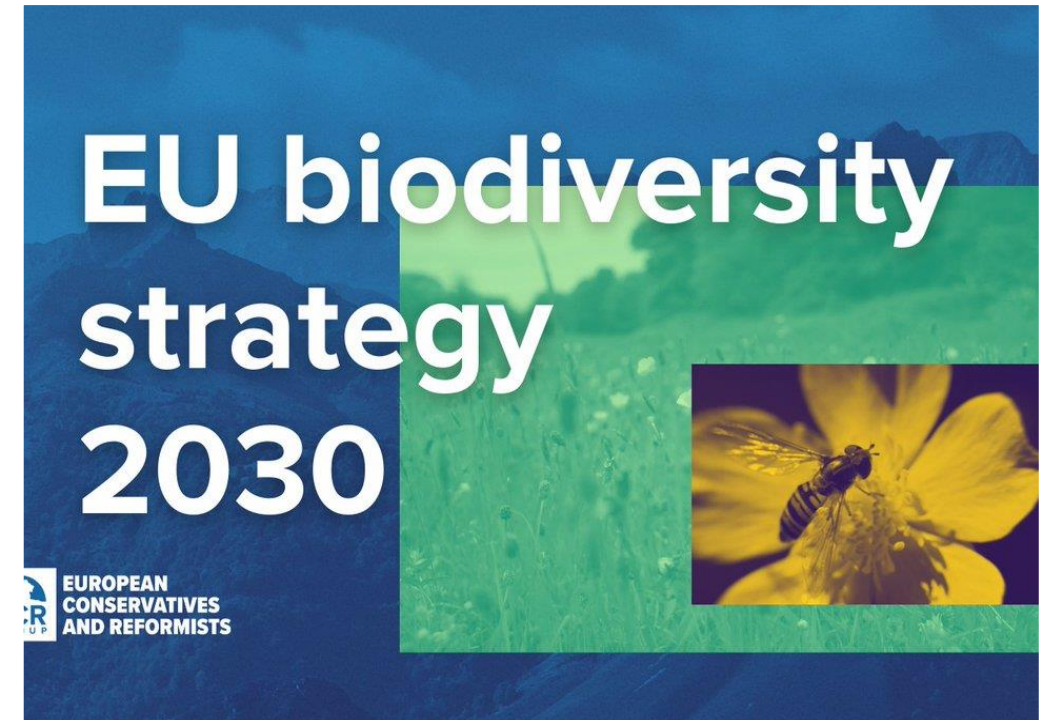
Key economic dimensions

The world is becoming a more urbanized society. Because of these growth patterns, urban forests are more important than ever.

They are dynamic ecosystems that provide critical benefits to people and wildlife. Urban forests help to filter air and water, control storm water, conserve energy, and provide animal habitat and shade.

They add beauty, form, and structure to urban design. By reducing noise and providing places to recreate, urban forests strengthen social cohesion, spur community revitalization, and add economic value to our communities.

Social benefits

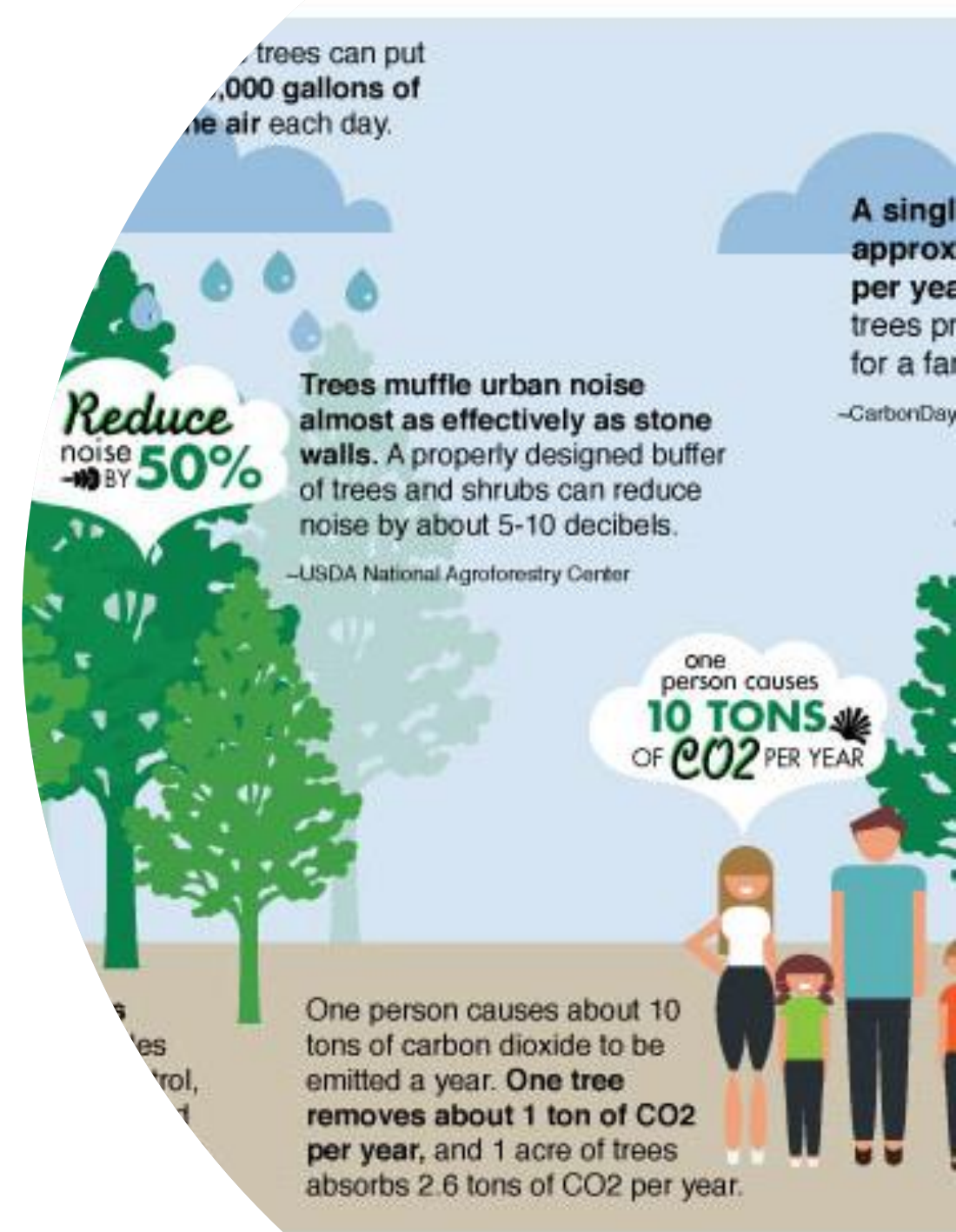The social benefits of urban forests include:

- Urban forests promote physical activity by providing space for recreation and creating an appealing outdoor environment
- Urban forests promote mental well-being and reduce stress, heart rate, blood pressure
- Urban forests can promote healing – people in hospital rooms with views of trees heal faster
- Urban forests make cities more beautiful and can hide unattractive features like walls, freeways, and parking lots.
- Urban forests increase road safety by slowing traffic, reducing stress, or improving driver attention
- Urban forests provide food for people
- Urban forests promote social interaction and a sense of community, including stronger ties to neighbors, a greater sense of safety, and more use of outdoor public spaces

Key economic dimensions

Environmental benefits

The environmental benefits of urban forests include:

- Urban forests reduce air pollution and provide oxygen
- Urban forests reduce the urban heat island effect and reduce the temperature of cities, helping cities adapt to climate change
- Urban forests reduce buildings' energy use, including heating costs
- Urban forests improve water filtration, store water, and reduce stormwater runoff
- Urban forests help provide habitat for wildlife and help preserve biodiversity
- Urban forests provide habitat for wildlife and promote biodiversity

... trees can put
...000 gallons of
...he air each day.

Reduce noise ► BY **50%**

Trees muffle urban noise almost as effectively as stone walls. A properly designed buffer of trees and shrubs can reduce noise by about 5-10 decibels.

—USDA National Agroforestry Center

A singl...
approx...
per yea...
trees pr...
for a fa...

—CarbonDay...

one person causes **10 TONS** OF $CO2$ PER YEAR

One person causes about 10 tons of carbon dioxide to be emitted a year. **One tree removes about 1 ton of CO2 per year,** and 1 acre of trees absorbs 2.6 tons of CO2 per year.

Economic benefits

The economic benefits of urban forests include:

- Urban forests provide ecosystem services
- Urban forests add value for money spent on maintaining them
- Urban forests increase property values
- Urban forests help create attractive business districts and improve visitors' perceptions of them
- Urban forests have a positive influence on visitors' perceptions of a city
- Urban forests provide space for recreation

$2.1 Billion
Total Benefits/Year

18%   **American beech**

9%   **Red Maple**

5%   **American holly**

Species

Ecosystem Services

The value of nature to people has long been recognized, but in recent years, the concept of ecosystem services has been developed to describe these various benefits. **An ecosystem service** is any positive benefit that wildlife or ecosystems provide to people.

The Millennium Ecosystem Assessment (MA), a major UN-sponsored effort to analyze the impact of human actions on ecosystems and human well-being, identified four major categories of ecosystem services:

- Provisioning
- Regulating
- Cultural
- Supporting

Provisioning Services

When people are asked to identify a service provided by nature, most think of food. Fruits, vegetables, trees, fish, and livestock are available to us as direct products of ecosystems.

A provisioning service is any type of benefit to people that can be extracted from nature. Along with food, other types of provisioning services include drinking water, timber, wood fuel, natural gas, oils, plants that can be made into clothes and other materials, and medicinal benefits.

Provisioning
Goods or products produced by ecosystems

Regulating Services

Ecosystems provide many of the basic services that make life possible for people. Plants clean air and filter water, bacteria decompose wastes, bees pollinate flowers, and tree roots hold soil in place to prevent erosion. All these processes work together to make ecosystems clean, sustainable, functional, and resilient to change.

A regulating service is the benefit provided by ecosystem processes that moderate natural phenomena. Regulating services include pollination, decomposition, water purification, erosion and flood control, and carbon storage and climate regulation.

Regulating
Natural processes regulated by ecosystems

Cultural Services

As we interact and alter nature, the natural world has in turn altered us. It has guided our cultural, intellectual, and social development by being a constant force present in our lives. The importance of ecosystems to the human mind can be traced back to the beginning of mankind with ancient civilizations drawing pictures of animals, plants, and weather patterns on cave walls.

A cultural service is a non-material benefit that contributes to the development and cultural advancement of people, including how ecosystems play a role in local, national, and global cultures; the building of knowledge and the spreading of ideas; creativity born from interactions with nature (music, art, architecture); and recreation.

Cultural
Non-material benefits obtained from ecosystems

Supporting Services

The natural world provides so many services, sometimes we overlook the most fundamental. Ecosystems themselves couldn't be sustained without the consistency of underlying natural processes, such as photosynthesis, nutrient cycling, the creation of soils, and the water cycle.

These processes allow the Earth to sustain basic life forms, let alone whole ecosystems and people. Without supporting services, provisional, regulating, and cultural services wouldn't exist.

the underpinning (or supporting) services whic enable other services to function, such as soi formation and nutrient recycling
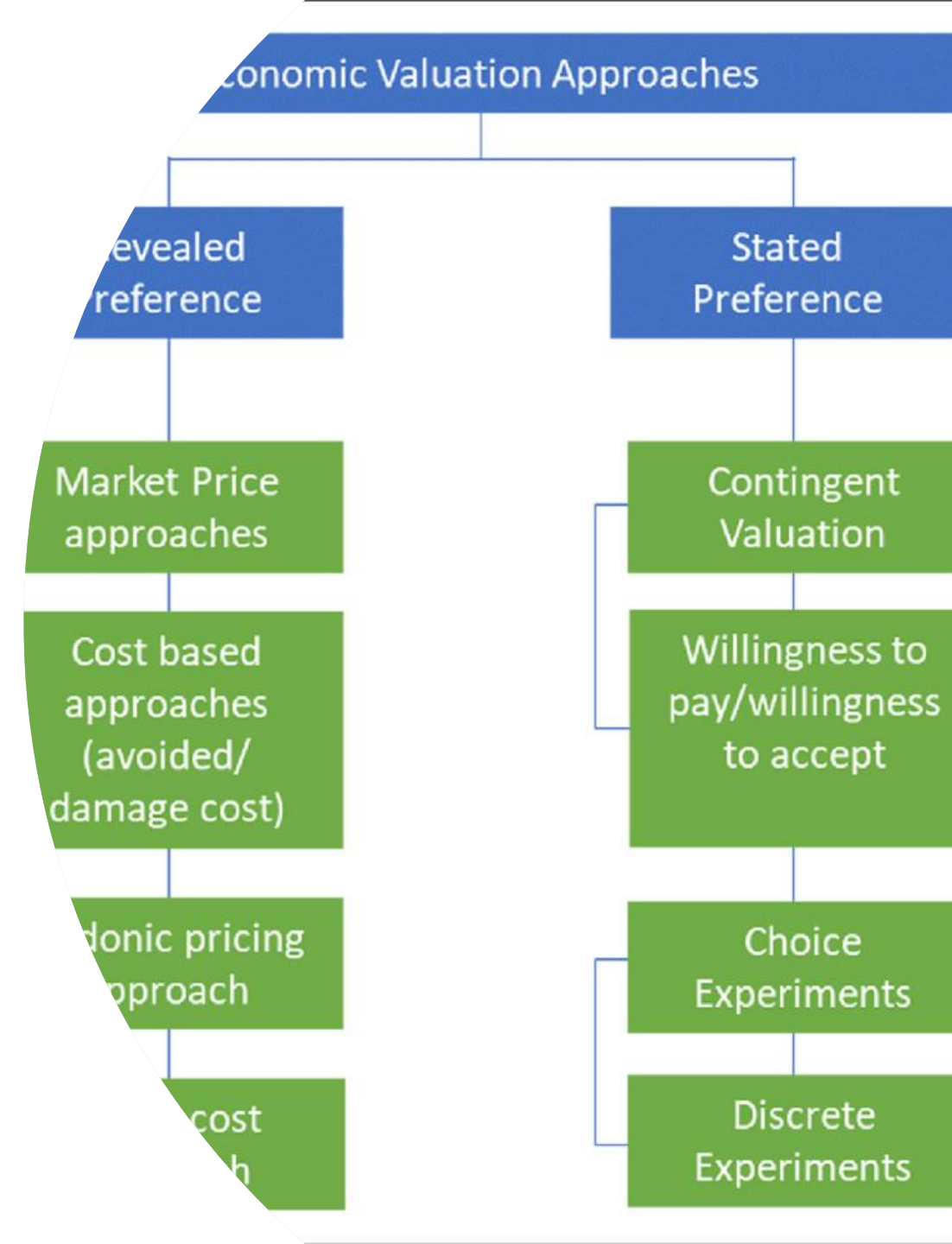
Urban forest and urban economy relations

The term "public value" describes widely held public perceptions regarding the function and service contributions of any public entity (Moore 1995). Perceived public value plays an important role in strategic public services management.

Urban forests will be adequately planned and stewarded only if urban citizens and decision makers recognize and understand the full range of services that forest and green space provide. Expanded public value perceptions precede commitments of adequate budget and staff resources for urban forest infrastructure.

Economic valuation translates urban forest services and functions into terms that enhance public value. The urban forest is an urban resource system that can be cultivated and stewarded on all lands within a municipality, including private and public property. Active management of the urban forest entails costs of planting, maintenance, materials and disposal. These investment costs are readily tallied and accounted for in budgets of municipal agencies or user groups.

Economic Valuation Approaches

Revealed Preference
- Market Price approaches
- Cost based approaches (avoided/ damage cost)
- Hedonic pricing approach
- cost h

Stated Preference
- Contingent Valuation
- Willingness to pay/willingness to accept
- Choice Experiments
- Discrete Experiments

Urban forest and urban economy relations

Returns on investment are less easily calculated. Industrial forests are managed for market goods. Dynamics of supply and demand establish prices and revenues for resource products, such as timber.

In contrast many "products" of urban forests are public goods. Multiple "owners" invest in a city's natural capital, generating "products" in the form of intangible functions and benefits for each resident, visitor and user.

The experience of these benefits by any single person does not exclude others from experiencing similar benefits, both immediately and indefinitely. In addition, use or experience of benefits by one or multiple people doesn't diminish the encounters of others, which is considered a non-rival situation by economists.
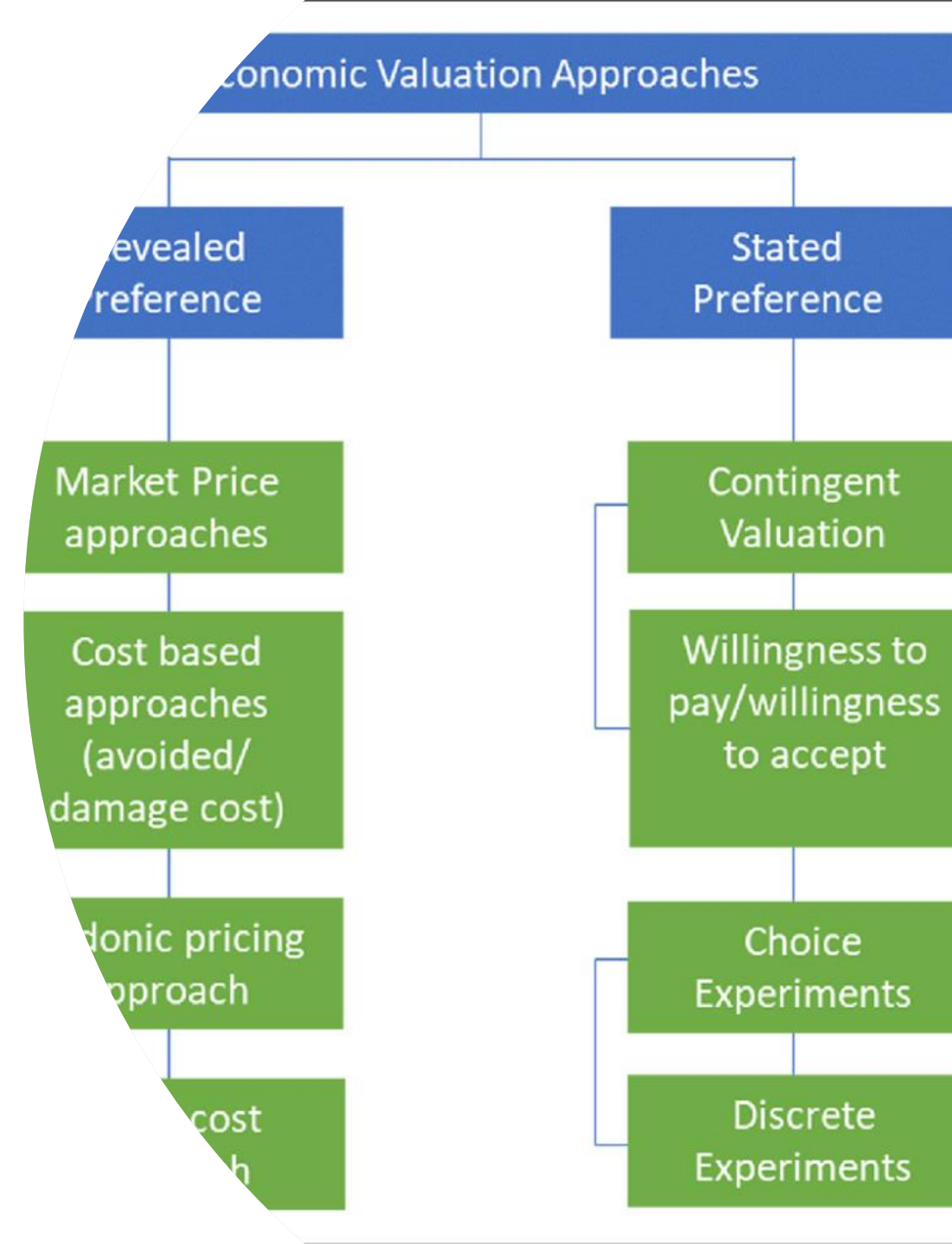
Urban forest and urban economy relations

Economists have developed theory and methods for assessing public goods values. Many approaches were first developed to assess the economic value of non-market wildland resources and are transferable to urban settings.

Valuation studies have addressed many facets of urban forest benefits. Multiple models and methods have been applied to conditions in North American cities, and adaptation to other regions is possible. Urban forest functions and benefits should be enabled in all districts of metropolitan areas for they are important to the full spectrum of socio-economic groups.
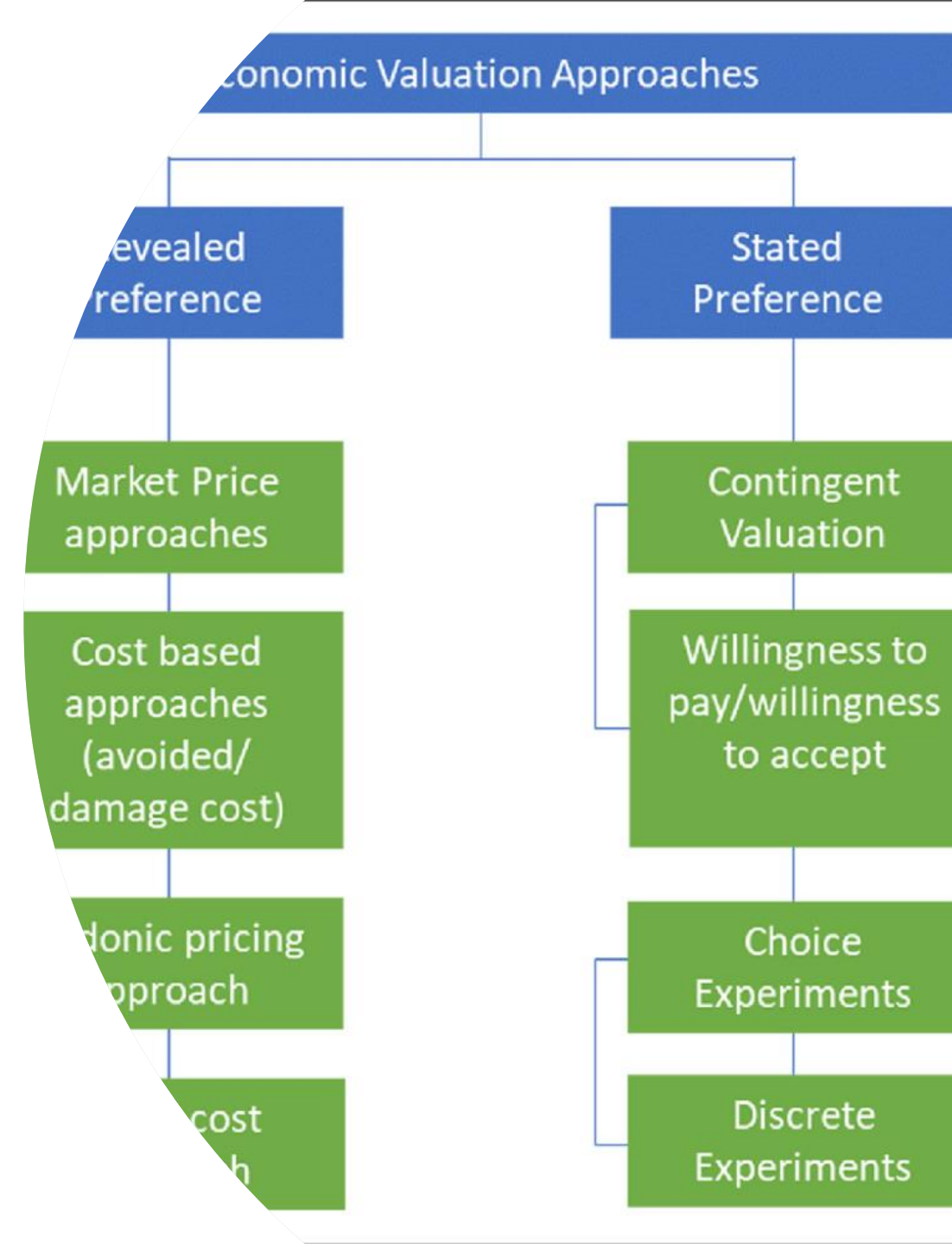
Urban forest and urban economy relations

Urban forests can be planned to directly affect the economic development of a municipality or region. The most direct valuation is to estimate marketable goods, or the value of purchase substitutes. For example, urban agroforestry practices can produce human and animal foods and medicinal materials, thus contributing to urban food security. Localised food production reduces the costs of distribution systems needed if food is transported from rural areas. Useable non-timber forest products include animal fodder, building materials, fuels, and handicraft materials.

Diverse forest products can be inventoried across a city, and use values then compiled, based on prevailing market prices. Regions with a tourism industry can use visitor surveys to tally expenses incurred by forest and green space users using the travel cost method. Users living nearby may spend little, while others may travel some distance, and their spending on meals, fuel, accommodations and souvenirs can be pro-rated depending on the amount of time dedicated to a park or forest visit as part of a total trip.
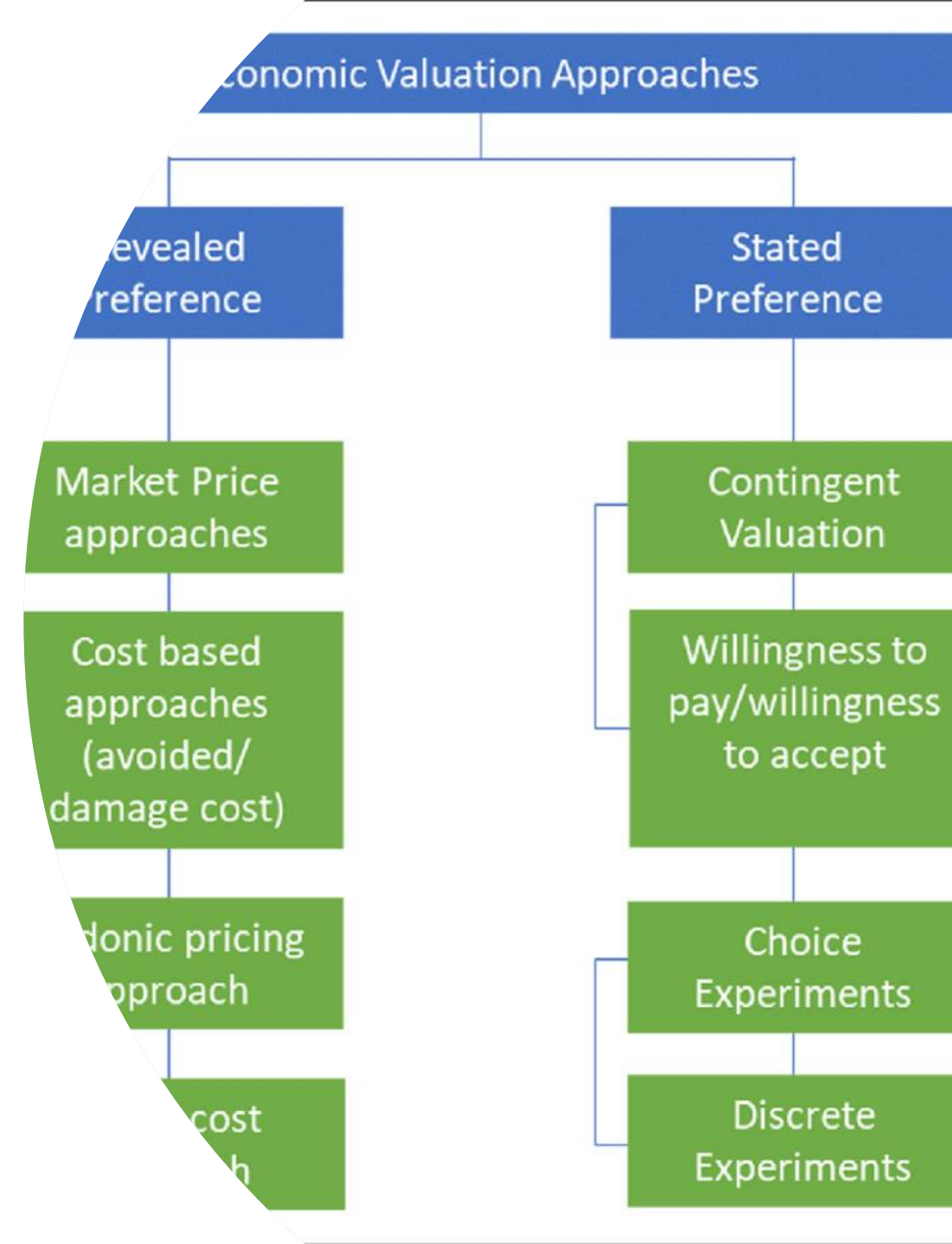
Urban forest and urban economy relations

Hedonic or amenity pricing is the measurement of a price increment that correlates to a desirable condition or situation. Numerous studies have concluded that a quality forest or green space has a positive economic ripple effect on nearby properties. Appraised property values of homes that are adjacent to parks and open spaces are typically about 8 to 20 percent higher than those of comparable properties elsewhere. These values are capitalized by a municipality when property taxes are assessed, or when taxes are paid on a property sale.

One study found that rental rates of commercial office properties were about 7 percent higher on sites having a quality landscape, including trees. Studies on how trees affect shoppers' behaviour in retail business districts employ the contingent valuation method. Consumers claim they are willing to pay about 9 to 12 percent more for products in downtown shopping areas with trees, versus in comparable districts without trees. Customer service, merchant helpfulness, and product quality are all judged to be better by shoppers in places with trees.
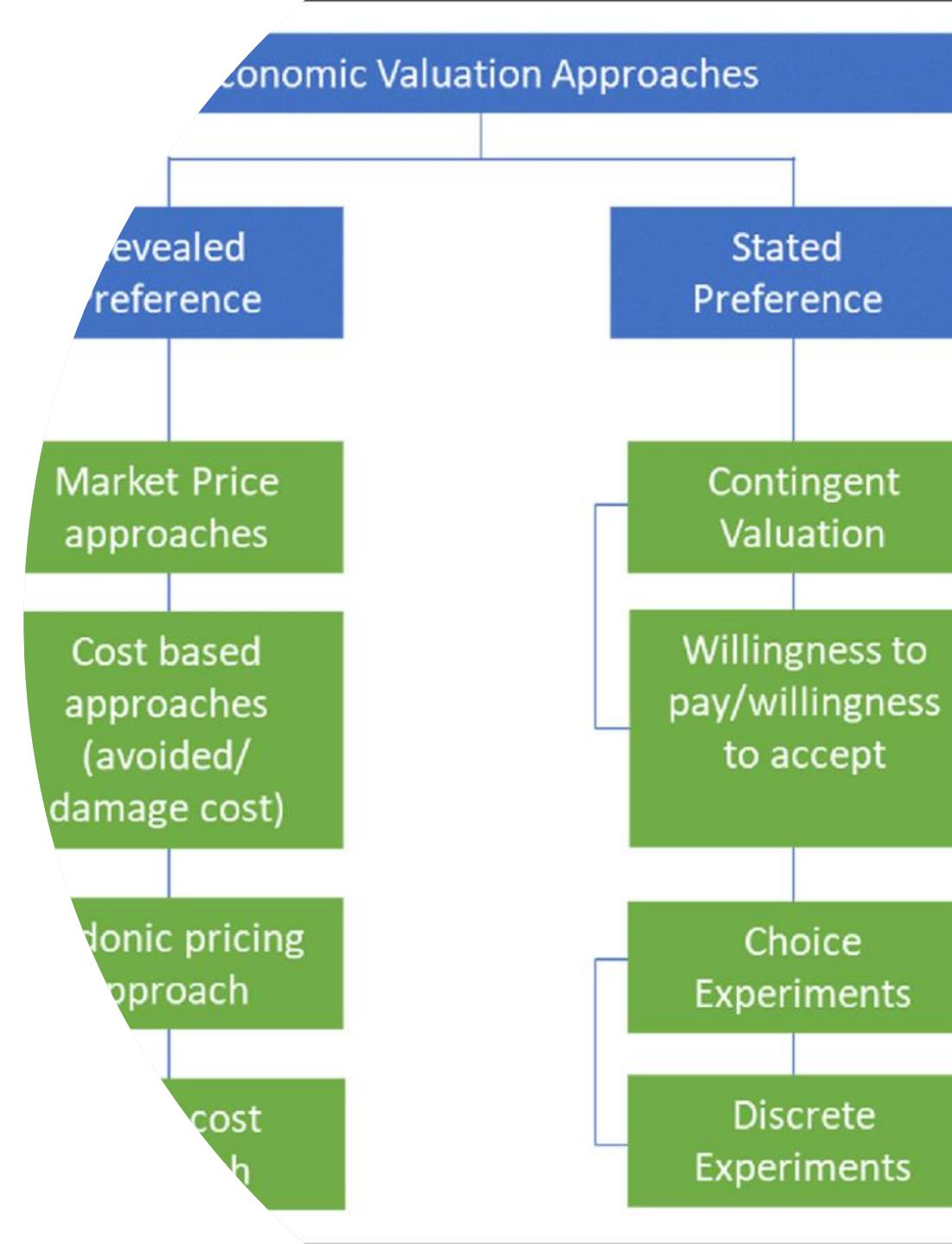
QUESTIONS FOR BREAK OUT SESSION

1. Did you know that there were so many benefits of urban forests / green spaces?

2. Which benefits of urban forests / green spaces are you familiar with more?

3. Does the city you live in have an extensive urban forests / green spaces?

Stakeholders involvement

While urban forest strategies advocate numerous benefits, their successful implementation is complex and depends on climatic and environmental as well as socio-economic factors.

Moreover, a wide range of local, national, and regional stakeholders are usually involved in urban forest decision-making, so a crucial consideration is how governance plays out among these actors.

Since each action regarding the urban forests is unique to the location for which it's developed, the people who review and contribute to the plan come along with the territory. It's not always easy to identify the stakeholders of a project, especially those impacted indirectly.

Stakeholders involvement

Stakeholders could be anyone impacted by forests in an urban area: residents concerned about quality of life, elected officials, city staff, private and business landowners.

Stakeholders may include concerned citizens, large private landholders, and green industry professionals, such as arborists, commercial growers, landscape contractors, and engineering professionals.

Regional groups may be important stakeholders for linking the efforts of neighboring communities for action on larger geographic and ecological issues.

Stakeholders involvement

Among the major stakeholders at European level is **FERN**, an organization based in Brussels, Belgium. Founded in 1995, FERN is an organization dedicated to protecting forests and the rights of people who depend on them. It makes decisions and builds campaigns together with social and environmental organizations and movements in Europe and across the world.

https://www.fern.org

Another non-governmental organizations is the **World Wide Fund For Nature (WWF)**, based in Gland Switzerland, which welcomed the adoption of the New EU Forest Strategy, but critized it that some components were weakened in the final version, shifting towards voluntary measures and lacking clear safeguards to prevent intensified forest management and harvesting.

https://www.worldwildlife.org

Funding opportunities

Interreg Project URBFORDAN: Urban Forests in the Danube Region

URBFORDAN stands for 'Management and Utilisation of Urban Forests as Natural Heritage in Danube Cities'. The Project included seven cities (Golovec hill in Ljubljana (Slovenia), Hármashatár hill in Budapest (Hungary), Făget forest in Cluj-Napoca (Romania), Danube Island in Vienna (Austria), Grmoščica hill in Zagreb (Croatia), Avala in Belgrade (Serbia) and Vovchynets hill in Ivano-Frankivsk (Ukraine).

Total investment for the project 'URBFORDAN' is EUR 2 788 566, with the EU's European Regional Development Fund, European Neighbourhood Instrument and Instrument for Pre-Accession Assistance contributing EUR 2 370 281 through the Interreg "Danube Transnational" Operational Programme for the 2014–2020 programming period.

Funding opportunities

UFOREST - European Alliance on Interdisciplinary Learning and Business Innovation for Urban Forests

The UFOREST project aims at promoting Europe's innovation capacity among universities, cities and businesses to deliver a new approach to Urban Forestry.

UFOREST is a three-year (2020-2023) Knowledge Alliance project co-funded by the Erasmus+ Programme of the European Commission. The project promotes a cross-sectoral alliance that brings together universities, businesses and public administrations of often non-collaborative disciplines such as urban planning and architecture, with forestry and urban ecology, as well as with socio-economic and information and communication technologies (ICT).

The alliance is the basis for the development of new training and it supports to students and practitioners working towards innovative urban forestry projects.

https://www.uforest.eu

Case studies

Forests and green spaces in urban areas provide more than aesthetic benefits. Where there are trees, there are reduced energy costs, decreased stormwater treatment costs, increased property values, increased spending at stores, increased employee satisfaction, and lower health care costs through cleaner air and increased recreational opportunities. A healthy urban forest can produce long-term benefits that all residents can share.

Researchers at the USDA's Forest Service found that U.S. urban forests save $7.8 billion annually in avoided residential heating and cooling costs and an additional $3.9 billion in avoided emissions

ECONOMICS OF URBAN FORESTRY IN THE UNITED STATES

Trees have tremendous impact on local economies and our quality of life. Here's a peek at how America's urban trees are contributing.

More than **500,000** people are employed as a result of urban forestry activities.

Urban trees contribute **$73 billion** in community-wide environmental benefits each year, such as carb on sequestration, air pollution removal, and avoided stormwater runoff.

Communities enrolled in the Tree City USA® program invested on average of **$7.37 per resident** in tree planting and care in 2017, compared to just **$3.00 per resident** in nonparticipating communities.

The urban forestry sector has an annual sales and employment footprint worth **$64 billion.**

Tree cover at private homes adds **$31.5 billion** annually to property values across the U.S.

Top 5 States with Greatest Annual Economic Footprint from Urban Trees		Top 5 States with Greatest Annual Quality-of-life Benefits from Urban Trees	
California	$7.77 billion	Texas	$7.76 billion
New York	$5.14 billion	Georgia	$6.50 billion
Texas	$5.07 billion	Florida	$6.49 billion
Florida	$4.37 billion	North Carolina	$6.23 billion
Illinois	$3.56 billion	Mississippi	$6.77 billion

USDA

Arbor Day Foundation
arborday.org

Case studies

Seattle's Urban Forest Stewardship Plan (Seattle, Washington, USA)

The City of Seattle introduced the Urban Forest Management Plan (UFMP) in 2007 as a guiding document to help address the needs of the local urban forest. The plan set a goal to increase the city's canopy cover to 30 percent by 2037. Resulting
achievements include:

— Creating the Urban Forestry Commission, a ten-member council of volunteers with various specialized backgrounds to advise the Mayor and City Council on policy matters related to the protection, management, and planting of trees in Seattle
— Creating a new, permanent position to grow and manage reLeaf, the City of Seattle's community engagement and outreach program on urban forestry
— Completing an online map of street trees and updating the street tree ordinance
and manual
— Adopting a "Green Factor" policy for new developments, and updating tree regulations for private property
— Using i-Tree Eco to analyze the structure, function, and economic benefits of Seattle's urban forest
- Being named by American Forests as one of the top ten best cities in the US for urban forestry

Case studies

Seattle's Urban Forest Stewardship Plan (Seattle, Washington, USA)

An estimated 2 million metric tons of carbon dioxide equivalent is stored in Seattle's urban forests with an additional 140,000 metric tons of carbon dioxide equivalent sequestered annually. These carbon benefits are estimated to equal $10.9 million in savings from carbon storage and $768,000 annually from carbon sequestration.

- The forest in Seattle removes 725 metric tons of pollution from the environment every year, providing a pollution removal value of $5.6 million annually.

- Seattle's urban forest reduces energy use in residential buildings by roughly 166,000 million British thermal units of natural gas and 43,000 megawatt hours of electricity, for an annual savings of $5.9 million dollars.

Case studies

Municipal Forest Resource Analysis (The City of Boise, Idaho, USA)

Electricity saved annually in Boise from both shading and climate effects of the trees totals $184,117, and annual natural gas saved totals $147,639 for a total energy
cost savings of $331,756 or $14 per tree.

Citywide, Net CO2 reduction valued at $6,060 or $0.26 per tree. Net annual air pollutants removed, released, and avoided are valued at $6,292 or $0.27 per tree.

Boise's trees intercept rain, reducing stormwater runoff with an estimated value of $96,238., at $4 per tree.

The estimated total annual benefits associated with aesthetics, property value increases, and other less tangible improvements are approximately $561,917 or $24 per tree on average.

The grand total for all annual benefits – environmental and aesthetic – provided by trees is $1,002,263, an average of $43 per tree.

Case studies

Benefits and Costs of Street Trees in Lisbon, Portugal

The computer tool i-Tree STRATUM was used to calculate the benefits of urban trees in Lisbon, Portugal. This study described one of the first applications of STRATUM outside the U.S.

Lisbon's street trees are dominated by Celtis australis L., Tilia spp., and Jacaranda mimosifolia D. Don, which together account for 40% of the urban trees.

- These trees provide services valued at $8.4 million annually, while $1.9 million is spent in their maintenance. For every $1 invested in tree management, residents receive $4.48 in benefits.
- The value of energy savings ($6.20/tree), CO2 reduction ($0.33/tree) and air pollutant deposition ($5.40/tree) were found.
- The large values associated with stormwater runoff reduction ($47.80/tree) and increased real estate value ($144.70/tree) were substantially greater than values obtained in U.S. cities.

Trade offs

In economics a trade-off is expressed in terms of the opportunity cost of a particular choice, which is the loss of the most preferred alternative given up. A tradeoff, then, involves a sacrifice that must be made to obtain a certain product, service, or experience, rather than others that could be made or obtained using the same required resources.

Urban forestry is worth the investment from equity, environmental, and economic perspectives—but everything has its price. We need to utilize the benefits of urban forestry and address their potential trade-offs.

In forestry, trade off often refers to a "situation in which land use or management actions increase the provision of one ecosystem service and decrease the provision of another".
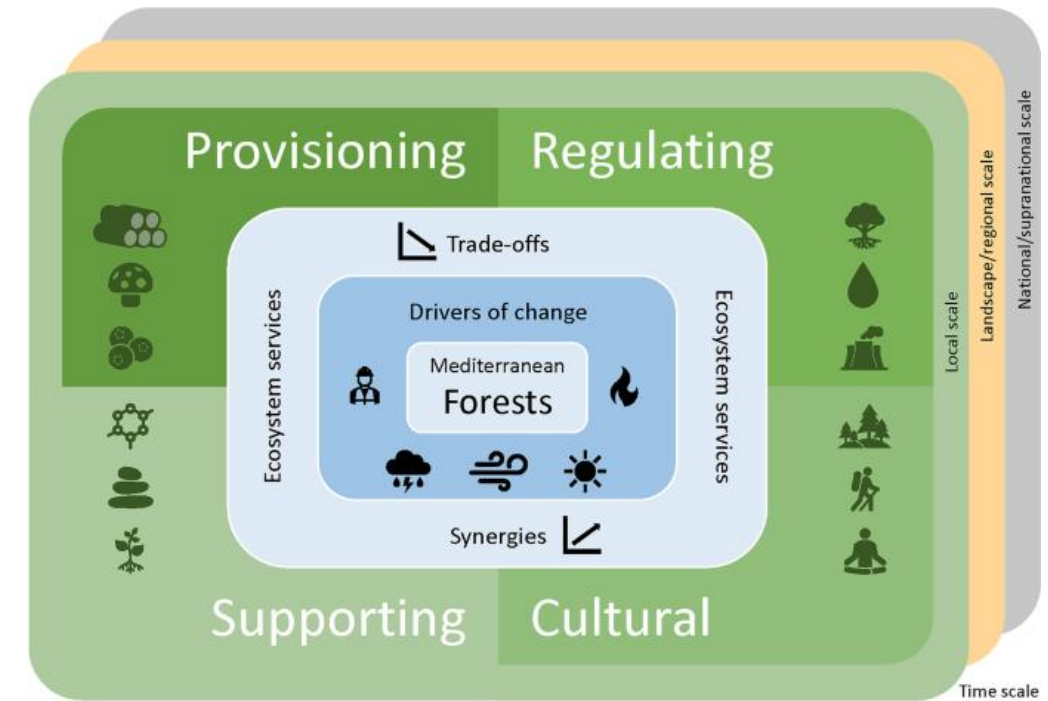
Trade offs

In urban and peri-urban forests, the challenges to keeping a healthy and functioning forest are more than those for forests in rural areas. Urban are warmer than rural areas, and they are prone to diseases and urbanization. Climate change impacts, such as heatwaves and drought, can be more severe in urban than in rural areas due to high impervious cover, pollution, high density of human population, commercial, and industrial activities.

The situation of trade-offs may also arise in urban tree and forest management. For instance, urban tree species are often selected for their aesthetic values and multiple other ecosystem services, such as potentials for cooling urban climate, pollution reduction, noise reduction, habitat provision, erosion control, and many others. Urban tree species should also have high resiliency to drought, diseases, and heatwaves. These requirements for multiple ecosystem services can result in trade-offs.
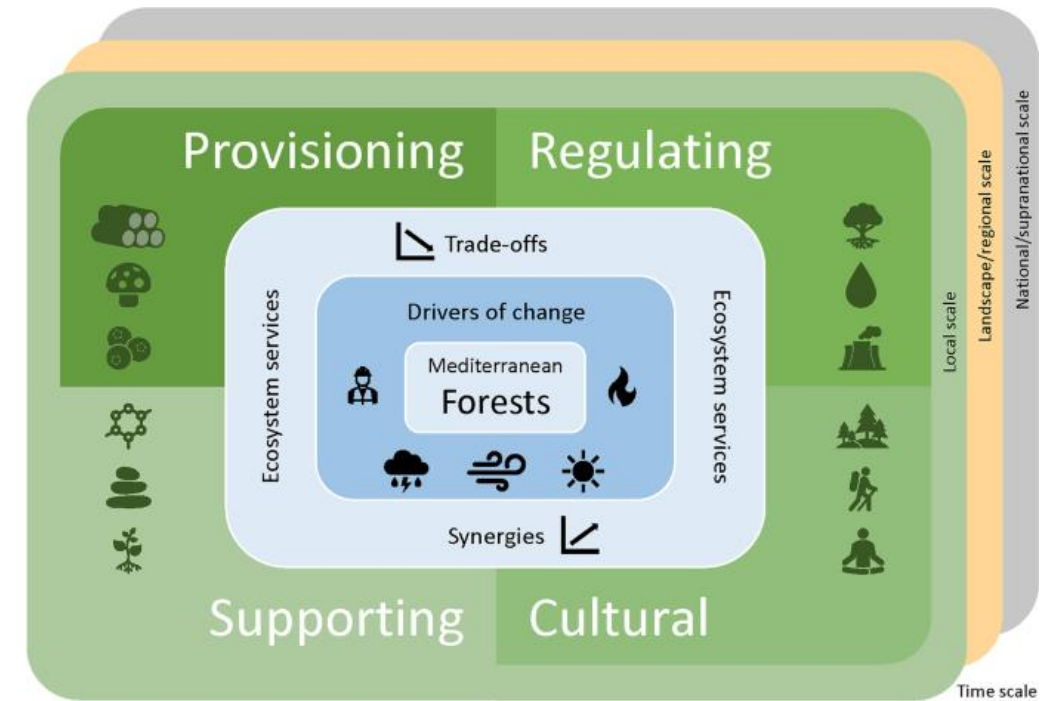
Trade offs / synergies

As with natural resource management generally, urban forestry stakeholders confront multiple, often competing objectives as they try to optimize ecosystem services while minimizing ecosystem disservices and effectively allocating limited financial resources.

The combination of services and disservices leads to tradeoffs and synergies.The figure simplifies ecosystem services and disservices into a two-dimensional space to depict scenarios of positive synergies (high services, minimal disservices), tradeoffs (services and disservices have similar magnitudes), and negative synergies (high disservices, minimal services).

When ecosystem services are high and ecosystem disservices are low, there are positive synergies. Negative synergies result from circumstances when ecosystem disservices are high and ecosystem services are low. Tradeoffs arise when high ecosystem services are accompanied by high ecosystem disservices.
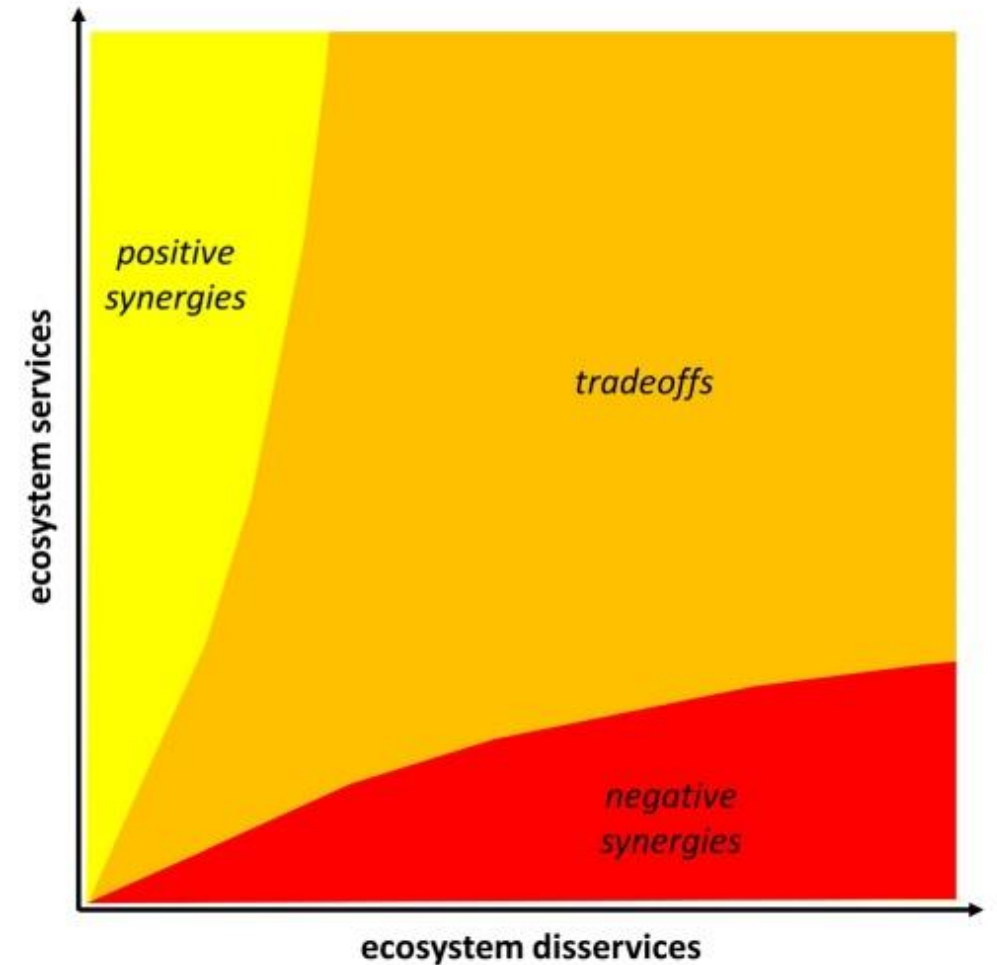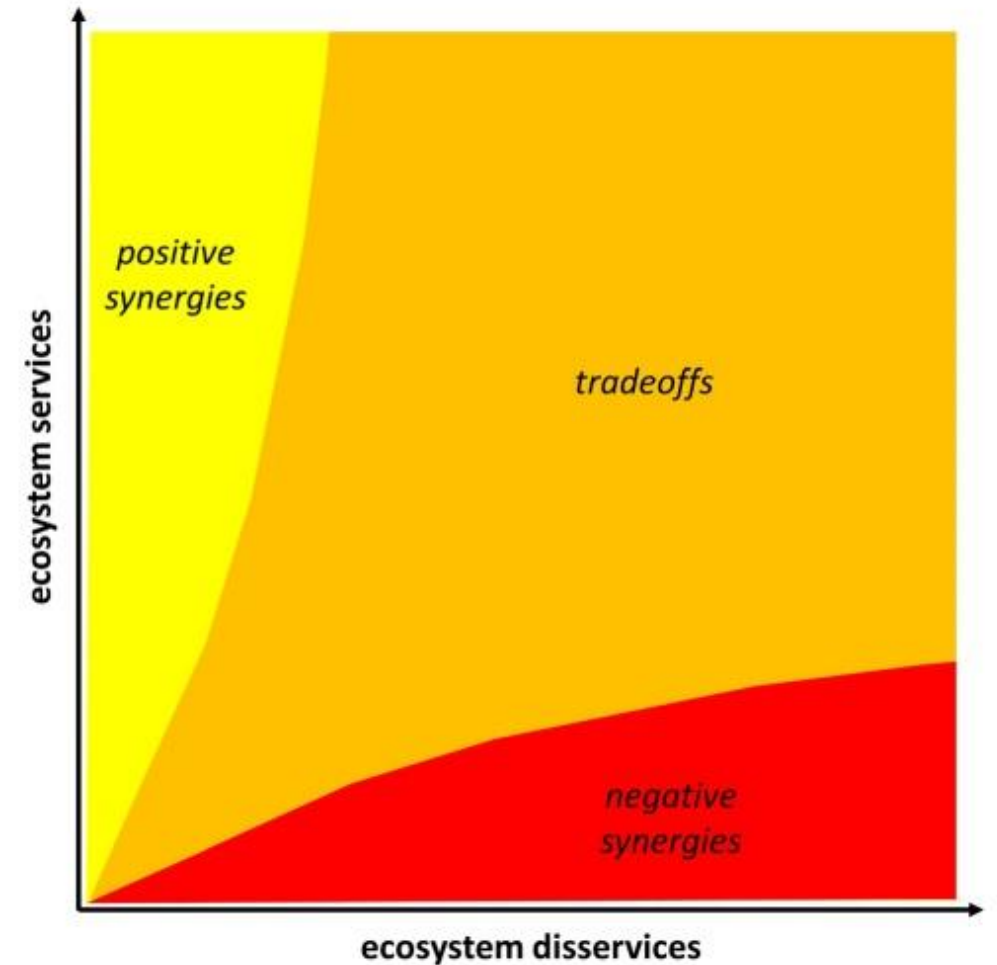
Positive synergies

Positive synergies are win–win scenarios in which multiple services are increased while disservices are reduced. Positive synergies generally imply circumstances in which the holistic impact is greater than sum of each individual component.

Urban forestry programs have been broadly framed as simultaneously achieving economic, social, and environmental benefits, reflecting expectations for positive synergies.

Positive synergies are sometimes presented through the lens of co-benefits: a program that targets one particular ecosystem service (e.g., stormwater runoff reduction) is concurrently expected to produce other benefits (e.g., aesthetic improvements, increased real estate prices).

Negative synergies

Negative synergies are lose–lose scenarios in which disservices are exacerbated while ecosystem services are reduced, and the negative impacts compound.

An example of negative synergy is when recently planted trees die from insufficient maintenance and fail to survive to maturity when environmental benefits are greatest. Such dead trees require carbon and other greenhouse gas emissions to install but do not endure long enough to provide carbon sequestration benefits.

While there may be a brief period of aesthetic appeal from newly planted trees, once the trees are dead, they can contribute to landscape disorder and reflect poorly on the local community.
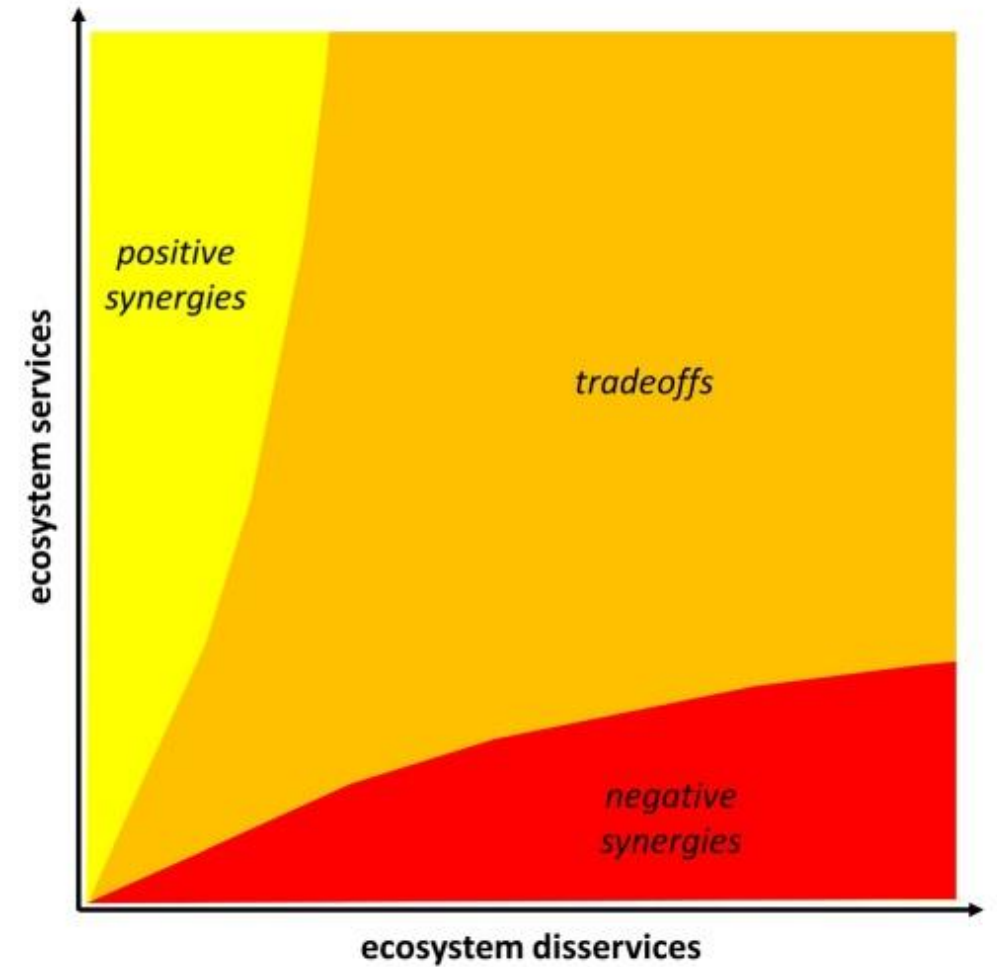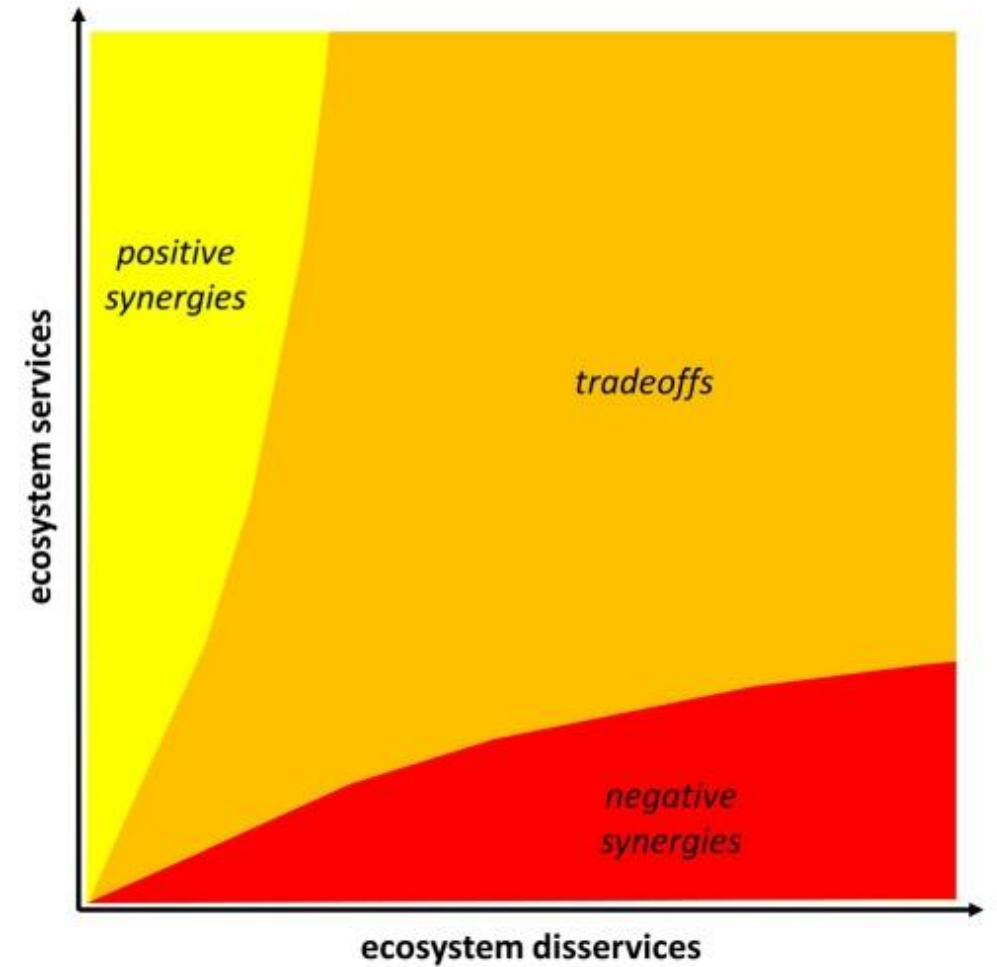
Trade offs

The concept of tradeoffs reflects the reality that optimizing one particular ecosystem service could:

a)   reduce other benefits,

b)   increase undesirable disservices, or

c)   both a and b.

Decisions about whether to plant non-native species involves tradeoffs between priorities to provide services and avoid disservices.

A specific example of tradeoffs related to non-native species in an urban park is a *Pyrus calleryana* tree that survived terrorist attacks on the grounds of the World Trade Center in New York City. This tree became a powerful social symbol of resilience (an ecosystem service), and was propagated by local urban foresters despite their concerns with this species' invasive properties (a disservice) (McMillen et al. 2019).

Trade offs / synergies

The flower diagrams depicts scenarios with multiple ecosystem services (yellow) and disservices (red) for urban trees. The length of each 'petal' reflects the relative magnitude of each service or disservice.

Scenarios with far more services than disservices are positive synergies (a), while similar levels of services and disservices are tradeoffs (b), and far higher levels of disservices compared to services are negative synergies (c).

The grey circles reflect management costs, with dark grey indicating higher costs. The inner-most circle represents installation costs, medium circle short-term maintenance, and large circle long-term maintenance.

(a) positive synergy
(b) tradeoff
(c) negative synergy
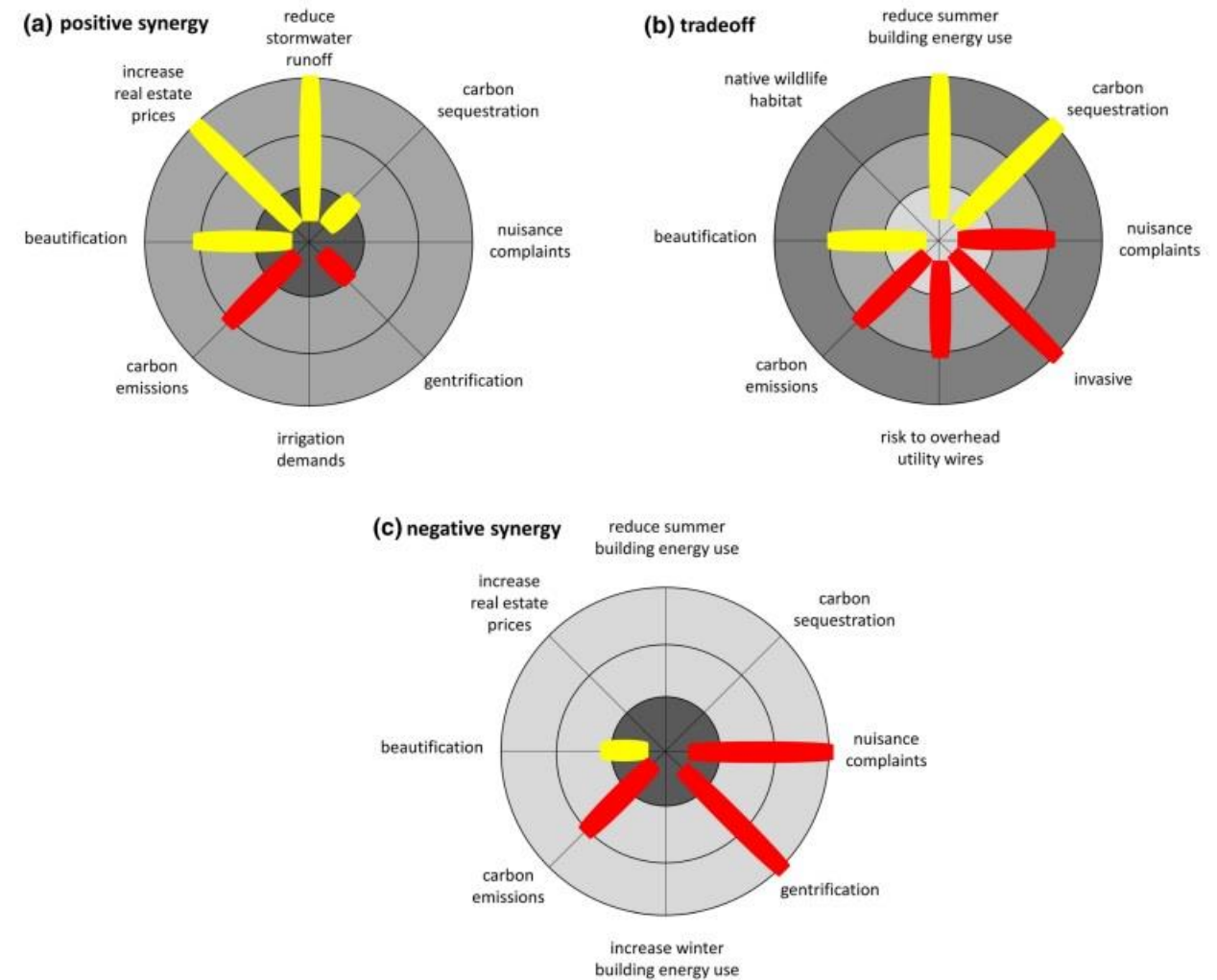
Final remarks

Cities, which are already responsible for around 75% of global CO2 emissions, are also at the forefront of fighting climate change and simultaneously are particularly vulnerable to its impacts.

Urban trees and forests have been highlighted as a solution that can help to achieve the SDGs and make the cities resilient to the future impact of larger populations, higher temperatures, pandemics, weather extremes and natural disasters.

Sometimes called a nature-based solution, sustainable urban forestry was identified by experts from national governments, city governments and civil society as a cost-effective option to future-proof.

Highlighting the contribution of urban forests to sustainable development and climate action, the European Union, is discussing moving towards legally mandated targets to increase green spaces and canopy cover in European cities up until 2050.

https://unece.org/media/news/366653
https://treesincities.unece.org/

Final remarks

The new EU forest strategy for 2030 is one of the flagship initiatives of the European Green De
the EU biodiversity strategy for 2030.

The strategy will contribute to achieving the EU's biodiversity objectives as well as greenhou
reduction target of at least 55% by 2030 and climate neutrality by 2050.

It recognizes the central and multifunctional role of forests, and the contribution of the entire fo
chain for achieving a sustainable and climate neutral economy by 2050.

Even though there are not clear clear objectives regarding the urban and periurban forestry, Th
vision and concrete actions to improve the quantity and quality of EU forests in general.

https://environment.ec.europa.eu/strategy/forest-strategy_en
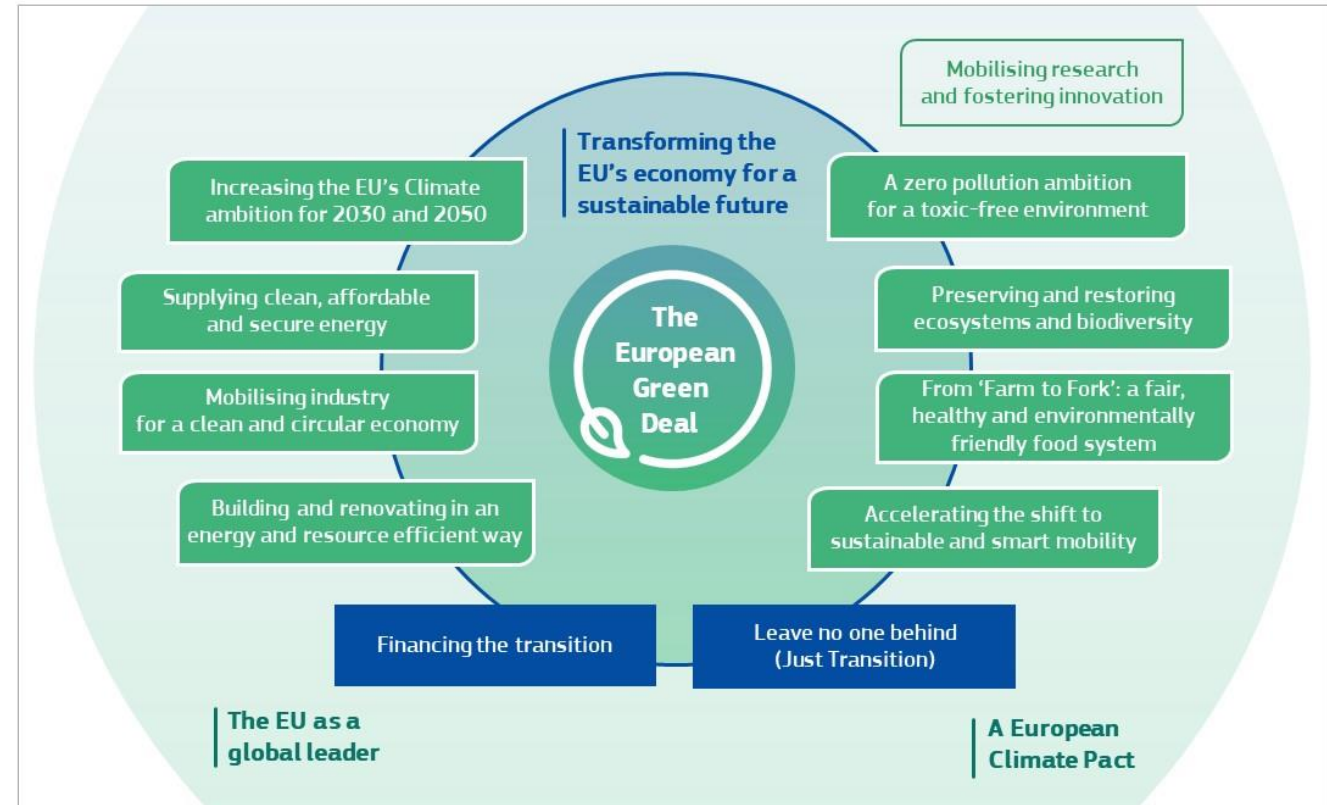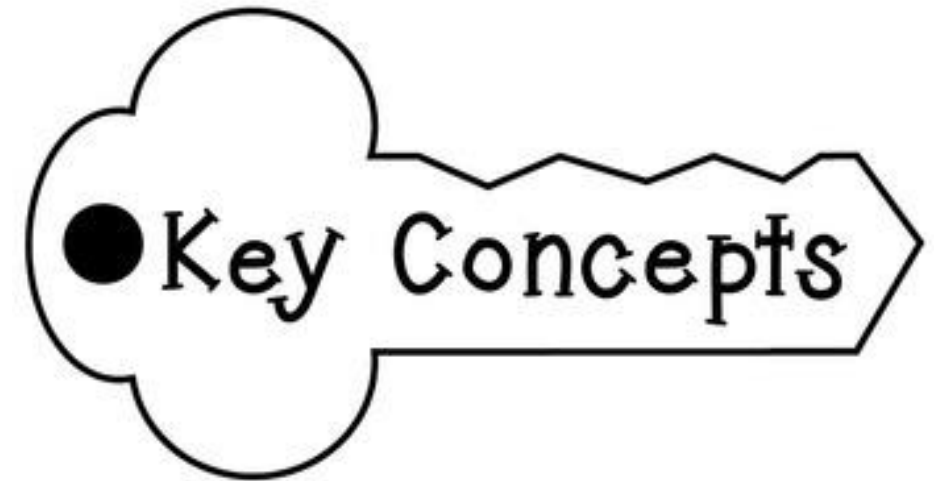
Key concepts

Urban forestry

A specialized branch of forestry which has as its objectives the cultivation and management of trees and forests within cities for their present and potential contribution to the physiological, sociological and economic well-being of urban society.

Urban Green Space (UGS)

Urban land, partly or completely covered with grass, trees, shrubs, or other vegetation. Urban Green Space includes parks, community gardens and cemeteries, but also rooftop gardens and vertical gardens, meadows and woods. UGS is also referred to as blue-green zone, because urban water such as ditches, canals, inland waterways and rivers and riverbanks, is considered as UGS.

Green infrastructure (GI)

A strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services such as water purification, air quality, space for recreation and climate mitigation and adaptation. This network of green (land) and blue (water) spaces can improve environmental conditions and therefore citizens' health and quality of life. It also supports a green economy, creates job opportunities and enhances biodiversity.

Key concepts

Ecosystem services

The benefits that flow from nature to people. They can be provisioning (e.g. the supply of food, clean air and water and materials), regulating (e.g. water and climate regulation, nutrient cycling, pollination, or the formation of fertile soils), or cultural (e.g. recreation opportunities, or the inspiration we draw from nature).

Economic benefits of green space

Values quantified in monetary terms. Placing accurate economic values on green infrastructure or its greenspace components is far from easy, but is becoming more important to support the case for sustained investment. Although the vast majority of the evidence points to green infrastructure benefiting many vital aspects of social and environmental sustainability, the challenge is to make decision-makers and others aware of the evidence, including the economic value of such benefits, and to help the Government to meet policy objectives in the best possible way.
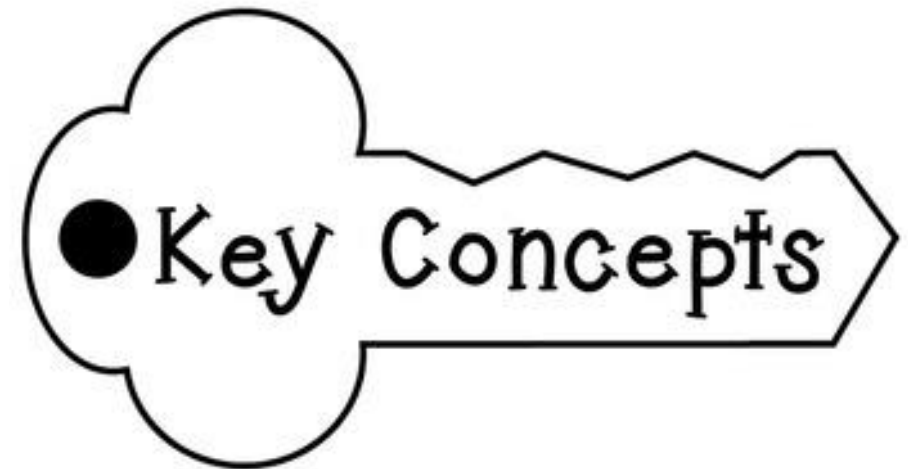
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GENERAL QUESTIONS TO THINK ABOUT

1. Do you think that the creation of a green (and blue) infrastructure should be a strategy of urban planning and policy?

2. Do you think that economic value (valuation) of urban forest and green spaces can be a useful tool to persuade decision-makers to invest more on them?

3. Considering that the existing urban areas have already been developed, what type of urban forest / green infrastructure practices can be possible?

THANK YOU