

Understanding and Innovating Urban Governance: Challenges, Tools and Ideas from Contemporary Practices

Nature Based Solutions
the Green Transition and Integrated Urban Action

Course	Economics and European Territorial Planning
Module	Module 1 Introduction and Education to a Common Lexicon
Lecturer	Pietro Elisei University of Rome Tor Vergata
Academic year	2026–2027

This handout explains how European territorial principles become urban policies, governance arrangements and design choices. Its central argument is that a project should never be read as an isolated physical intervention. Every practical action expresses a view of development, mobilises policy instruments, distributes responsibilities among actors and produces territorial effects. The examples therefore follow a common sequence: urban challenge, policy principle, implementation instrument, governance arrangement, design response and expected result.

1 Purpose and learning objectives

Lecture 3 moves from the territorial visions discussed in the previous lectures towards implementation. Polycentric development, territorial cohesion, climate neutrality, no net land take and social inclusion become meaningful only when they shape plans, programmes, investment decisions and urban projects.

By the end of this lecture, students should be able to:

- explain why compact and polycentric development are complementary objectives;
- interpret urban sprawl as an environmental, economic and governance problem;
- define Nature Based Solutions and relate them to ecosystem services;
- connect global commitments with the European Green Deal, investment instruments and the New European Bauhaus;
- distinguish the three broad types of Nature Based Solutions and their planning uses;
- evaluate a practical intervention by linking policy principles, governance and design;
- explain horizontal, vertical and place based governance;
- interpret SPIRE and ROCK as integrated urban policies rather than isolated projects.

2 From European spatial visions to urban form

The European Spatial Development Perspective promoted polycentric development as an alternative to excessive concentration in a single European core. Polycentrism does not mean that every city must perform the same functions or reach the same size. It means building a network in which metropolitan areas, small and medium sized cities, rural centres and specialised territories can cooperate and provide complementary functions.

The Blue Banana, the European Bunch of Grapes and the Pentagon are different interpretations of the European urban system. The first and the third make the concentration of economic power visible. The Bunch of Grapes stresses a more distributed pattern of urban regions. Contemporary growth in Central and Eastern European capitals partly modifies the older geography, but it does not remove the core problem: capital cities may grow while peripheral, rural and former industrial regions continue to shrink.

Polycentrism and the compact city

Polycentric development operates across a system of settlements; compact development concerns the spatial organisation of each settlement. The two principles are complementary. A polycentric Europe requires several well connected centres, while each centre should use land efficiently, mix compatible functions and support public transport, walking and cycling.

Compactness does not mean uncontrolled density. It means reducing unnecessary expansion, regenerating already urbanised land and locating housing, services, employment and public space so that daily life does not depend entirely on the private car. This approach supports the European objective of no net land take by 2050.

3 Urban sprawl as a policy problem

Urban sprawl is low density, discontinuous and often mono functional expansion at the urban fringe. In Italy it is associated with expressions such as *citta diffusa* (Indovina) and *citta infinita* (Bonomi). It can appear as a collection of individual choices, but its cumulative effects are territorial and therefore require public action.

Effect	Why it matters	Policy and design response
Soil consumption	Sealed soil loses ecological and agricultural functions and cannot easily be restored.	Prioritise brownfield regeneration, infill and reuse; establish urban growth limits and soil monitoring.
Car dependence	Separated functions and low density make public transport less viable and increase emissions.	Create mixed use centres, continuous cycling networks and accessible public transport.
Infrastructure costs	Roads, utilities and services must cover larger areas for fewer users.	Evaluate life cycle costs and coordinate land use with infrastructure investment.
Social segregation	Housing groups and activities can become spatially separated.	Combine spatial design with affordable housing, service accessibility and inclusive public space.
Landscape fragmentation	Expansion interrupts ecological corridors and weakens territorial identity.	Protect and reconnect blue green infrastructure at metropolitan and regional scale.

The policy connection is direct: territorial cohesion requires access to services; climate policy requires lower emissions; no net land take requires reuse; and polycentric development requires viable centres rather than scattered construction. Urban form is therefore not only a design issue. It is a material expression of European territorial objectives.

4 Nature Based Solutions as policy instruments

Nature Based Solutions are actions that protect, manage, restore or create ecosystems in ways that address societal challenges while producing environmental, social and economic benefits. They include more than adding vegetation to a project. A solution becomes strategic when it responds to a clearly defined problem, works with ecological processes, is planned at the appropriate scale and is supported by governance and maintenance arrangements.

From the mid 2010s, European research and urban innovation programmes increasingly used large demonstration projects to test Nature Based Solutions. This shift helped move the concept from environmental theory to implementation. Cities could combine research, public investment, local experimentation and comparative learning.

Ecosystem services

Ecosystem services are the benefits that people and communities obtain from functioning ecosystems. The concept helps planners recognise values that conventional financial appraisal may overlook. It also provides a bridge between ecological knowledge, policy objectives and design decisions.

Category	Examples	Planning significance
Provisioning	Food, freshwater, timber, fibres and biomass.	Protect productive land and evaluate local resource cycles.
Regulating	Cooling, carbon storage, air filtration, water retention, flood control and pollination.	Design green and blue infrastructure as urban climate and risk management systems.
Supporting	Soil formation, habitat, nutrient cycles and biodiversity.	Maintain ecological continuity and long term ecosystem capacity.

Category	Examples	Planning significance
Cultural	Recreation, health, education, identity, landscape and tourism.	Make nature accessible and integrate it with public space and community life.

A single intervention may deliver several services. A wetland can retain water, reduce flood risk, provide habitat and create a recreational landscape. This multifunctionality is a central design principle: the objective is not simply to minimise damage but to create several forms of public value through the same spatial system.

5 From global commitments to European action

Urban sustainability is structured through a chain of commitments and instruments. The 2030 Agenda establishes universal Sustainable Development Goals. The Paris Agreement frames climate action. The European Green Deal translates these ambitions into a European growth and transition strategy, while sectoral legislation, funding programmes and investment plans support implementation. Local and regional authorities then adapt these objectives to territorial conditions.

Level	Framework or instrument	Function
Global	2030 Agenda and Paris Agreement	Define shared development and climate commitments.
European strategy	European Green Deal	Connect climate neutrality with energy, mobility, biodiversity, food, industry and the built environment.
Finance and programmes	EU budget, cohesion policy, research programmes and recovery instruments	Provide resources, eligibility rules and implementation frameworks.
Design and culture	New European Bauhaus	Connect sustainability with beauty, inclusion and the quality of everyday environments.
Territorial action	Regional programmes, urban plans and local projects	Translate common objectives into place specific decisions, projects and monitoring.

A policy without implementation capacity and funding rarely changes territories. Finance, however, is not neutral. Calls and programmes define eligible activities, partnerships, reporting obligations and indicators. These conditions influence what cities design and how they govern implementation.

6 The New European Bauhaus and the built environment

The New European Bauhaus connects the green transition with the experience and quality of places. Its three core values are sustainability, aesthetics and inclusion. The approach is also participatory, transdisciplinary, multi level and rooted in local contexts. It asks not only whether a project reduces emissions, but also whether it is accessible, meaningful, durable and capable of creating belonging.

A contemporary extension of Vitruvius

The classical Vitruvian principles of firmitas, utilitas and venustas can be read as durability, usefulness and beauty. Contemporary urban policy expands this framework. Durability includes low carbon materials, adaptability and life cycle performance. Usefulness includes universal access, services and social value.

Beauty concerns sensory quality and identity rather than decoration alone. Resilience and comfort add the capacity to cope with shocks and support everyday wellbeing.

Design question	Foundational principle	Policy connection
Will the intervention endure and adapt?	Durability, resilience and life cycle thinking	Climate adaptation, circular economy and responsible use of resources.
Can different groups use and access it?	Utility, inclusion and universal accessibility	Territorial justice, social cohesion and the right to services.
Does it create a meaningful place?	Beauty, identity and belonging	New European Bauhaus and heritage based development.
Does it improve ecological performance?	Nature integration and multifunctionality	Green Deal, biodiversity policy and Nature Based Solutions.
Were local actors involved in shaping it?	Participation and co ownership	Place based and network governance.

7 Green cities require access networks and behaviour

The amount of green surface alone does not determine the environmental quality of a city. Green areas must be connected, accessible, safe and maintained. Rome contains extensive green and agricultural land within its administrative boundary, yet many residents cannot easily reach or use this environmental asset. A park that is closed, poorly maintained or disconnected from public transport does not provide the same public value as an accessible green network.

Reading practical examples through policy and design

Example	Policy principle	Design and governance lesson
Rome and its green assets	Environmental resources should contribute to territorial justice and everyday health.	Measure accessibility and quality, not only hectares. Connect parks, streets, rivers and public transport; clarify maintenance responsibilities.
Termini and Via Veneto	Public space should support climate adaptation and pedestrian comfort.	Shade, trees and permeable surfaces must be placed where exposure and footfall are high, while respecting underground services and heritage constraints.
Copenhagen cycling	Low carbon mobility requires coherent incentives and networks.	Safe continuous routes, limited and priced parking, public transport integration and a supportive cycling culture reinforce one another.
An isolated cycle route in Albano	Infrastructure should form a usable network rather than an individual object.	A disconnected segment attracts limited use. Route continuity, destinations, safety, communication and stakeholder support determine performance.

Behavioural change is not produced by communication alone. People respond to the structure of choices created by policy and design. Parking rules, street allocation, pricing, safety, route continuity and service proximity make some behaviours easier than others. Nudging can support change, but it cannot compensate for unsafe or incomplete infrastructure.

8 Three broad types of Nature Based Solutions

Nature Based Solutions can be organised into three broad types according to the degree of intervention. The categories overlap, but they help planners choose an approach that fits the condition of the ecosystem and the societal challenge.

Type	Planning approach	Examples	Policy and design requirement
1 Protection and minimal intervention	Maintain existing ecosystems and allow natural processes to continue.	Protected landscapes, forests, river systems and large urban parks.	Prevent fragmentation; regulate incompatible uses; secure long term stewardship and public access where appropriate.
2 Managed and multifunctional ecosystems	Improve the performance of existing or designed green systems.	Ecological corridors, sustainable drainage, green roofs, walls, pocket gardens and productive landscapes.	Combine several ecosystem services; connect sites into networks; plan maintenance from the beginning.
3 Restoration and new ecosystems	Recover degraded land or create ecological functions where they were lost.	Brownfield remediation, restored wetlands, daylighted streams and phytoremediation landscapes.	Integrate risk assessment, land reuse, ecological succession and future urban functions; support no net land take.

9 Brownfields phytoremediation and circularity

Brownfields are previously developed sites that are abandoned, underused or affected by real or perceived contamination. Their regeneration links several European objectives: it limits further land take, removes environmental risk, reconnects fragmented neighbourhoods and can create new economic and social functions.

Phytoremediation uses plants and associated biological processes to stabilise, extract or transform contaminants. It may be less disruptive and less expensive than excavation, but it is not suitable for every contaminant, depth or redevelopment timetable. The design must therefore begin with site investigation, contamination pathways, exposure risks, plant selection, monitoring and a clear destination for the treated land and biomass.

Experiments with hemp and other plants illustrate the circular economy ambition of recovering value from a remediation process. Yet biomass that contains accumulated metals cannot automatically be treated as a safe construction or energy material. Any reuse requires testing, regulatory approval and risk controlled processing. Circularity is credible only when materials remain traceable and environmental burdens are not transferred elsewhere.

10 Case study SPIRE in Baia Mare

Baia Mare in Romania has a long mining and metallurgical history. The cyanide spill of 2000 made the environmental risks of this industrial legacy visible across the Someş, Tisza and Danube river systems. The city also contains land affected by heavy metals and industrial decline. SPIRE addressed this legacy through Nature Based Solutions, land regeneration, community action and a local incentive mechanism.

The policy to project chain

Dimension	How SPIRE operationalises it
Urban challenge	Contaminated and underused land, environmental risk, fragmented blue green systems, weak local economic opportunities and limited trust.
Foundational principles	No net land take, polluter and risk awareness, ecosystem restoration, circular economy, social inclusion and place based development.
European instrument	The Urban Innovative Actions framework supported experimentation that combined urban policy, research, implementation and learning.
Governance model	Municipality, technical and research partners, businesses and citizens form a quadruple helix. Community participation is a delivery mechanism, not an optional consultation.
Spatial and ecological design	Phytoremediation areas and productive landscapes reconnect degraded land with the wider green and blue system and prepare sites for future uses.
Behavioural and economic design	The iLEU local reward system recognises approved environmental actions such as walking, cycling and participation, while encouraging circulation within a local network.
Expected territorial value	Reduced risk, restored land, ecosystem services, new skills and enterprises, stronger social cohesion and an alternative image for the city.

SPIRE is important because remediation is not treated as a technical operation separated from the city. The design connects soil, vegetation, mobility, digital tools, local economic exchange and community participation. Its effectiveness depends on long term monitoring, legal compliance, a sufficiently large network of participating actors and a credible future use for regenerated land.

What students should learn from SPIRE

A case study should not be copied as a package. The transferable element is the method: diagnose the environmental and social problem together; connect the project to European and local policy; create a governance coalition; combine spatial, ecological, economic and behavioural instruments; test assumptions; and monitor both risk reduction and public value.

11 Case study ROCK and heritage led regeneration

ROCK was a Horizon 2020 project on the regeneration and adaptive reuse of historic city centres. Bologna coordinated the project and the University of Bologna provided scientific leadership. Role model cities shared tested practices with replicator cities through mentoring, living laboratories and common tools.

The project treated cultural heritage as an active resource for sustainable urban development. This does not mean turning historic centres into consumption landscapes. Heritage led regeneration must balance conservation, accessibility, residential life, climate performance, cultural production and local economic activity.

Principle	Policy or governance expression	Design implication
Accessibility as autonomy	Cultural heritage and public space should be usable by different groups.	Remove physical, sensory, economic and informational barriers; connect sites through legible public space and mobility.

Principle	Policy or governance expression	Design implication
Sustainability as transition	Adaptive reuse reduces demolition and can support low carbon urban regeneration.	Work with existing buildings and public spaces; improve environmental performance while respecting heritage values.
Collaboration as alliance	Living labs bring municipalities, cultural institutions, universities, firms and communities into shared experimentation.	Co design interventions, collect feedback and adjust actions rather than relying on a closed master plan.
Digital support	Sensors and interoperable platforms can help understand flows, environmental conditions and use patterns.	Collect only useful data, establish ownership and privacy rules, and translate evidence into transparent decisions.
Transfer and replication	European programmes create learning between cities.	Transfer principles and protocols, but adapt solutions to local institutional and spatial conditions.

ROCK demonstrates that design quality is produced through a process as well as through physical form. Heritage, environmental technologies, accessibility, data and participation are coordinated through governance. The project is therefore connected to cohesion policy principles, the place based approach and the New European Bauhaus values of sustainability, beauty and inclusion.

12 Understanding urban governance

Bruno Dente defined governance through the formulation and implementation of public policies involving multiple actors of different types and administrative levels that interact intensively. This definition is especially useful for urban policy because cities cannot be governed by one institution acting alone. Land, mobility, housing, energy, environment and economic development involve different competences and interests.

A narrow definition of governance as the exercise of political authority and institutional resources emphasises formal power. A broader interpretation examines how public authorities, private actors, civil society, universities and communities negotiate decisions and implement them. Government remains essential, but it increasingly acts as regulator, coordinator, investor, guarantor of public interest and manager of networks.

Three modes of coordination

Mode	Main mechanism	Strength and risk
Market	Exchange, price and competition.	Can mobilise investment and innovation, but does not automatically protect public goods or weaker groups.
State	Authority, law, command and control.	Can guarantee rights and long term direction, but may become rigid, fragmented or distant from local knowledge.
Network	Negotiation, reciprocity, trust and shared interests.	Can integrate knowledge and resources, but requires transparency, accountability and clear public leadership.

13 Multi level horizontal and place based governance

Urban governance has a vertical and a horizontal dimension. Vertical governance connects the European, national, regional, metropolitan and municipal levels. Horizontal governance connects public bodies with firms, universities, non governmental organisations, associations and residents. These dimensions intersect in a specific territory. This intersection is the essence of a place based approach.

Governance dimension	Core question	Example in an urban project
Vertical	Which level has the competence, funding or regulatory power?	EU programme finance, national environmental law, regional management authority and municipal implementation must be aligned.
Horizontal	Which actors possess knowledge, resources, rights or interests?	Residents, landowners, utilities, transport operators, businesses and universities contribute different capacities.
Place based	How do the problem and available assets differ in this territory?	A contaminated industrial corridor requires different instruments from a historic centre or a shrinking rural town.
Integrated	How can sectoral policies be combined around a common outcome?	Land use, mobility, climate adaptation, housing, culture and economic development are designed as one strategy.

Stakeholder participation should be organised according to the phase and decision. Problem definition, option design, implementation and monitoring may require different actors and methods. Participation is meaningful when it can influence choices, responsibilities are clear and results are communicated. It should create co ownership without allowing powerful interests to replace democratic accountability.

14 Governing the digital transition

Digital technologies can improve mapping, monitoring, service coordination and participation. GIS, sensors, mobile devices and interoperable platforms can reveal spatial patterns and help authorities adjust policies. A smart city, however, is not a city with the largest number of devices. It is a city that uses knowledge and technology intelligently to improve sustainability, inclusion, resilience and quality of life.

Digital systems create governance questions: who owns the data, which problem is being measured, who can access the information, how long it is retained, whether different systems can communicate and whether a city becomes dependent on one supplier. Proprietary and fragmented databases can create vendor lock in and prevent integrated policy.

Emotional and behavioural data intensify these concerns. Sensors may help identify places that generate stress or insecurity, but the same data can enable surveillance and manipulation. The policy principle should be proportionality: collect only what is necessary for a legitimate public purpose, protect privacy, make decision rules transparent and maintain democratic oversight.

15 The integrated territorial approach

An integrated approach begins with a territorial problem rather than with a sectoral funding line. It combines policies, governance levels, finance, professional competences and stakeholders around a defined place and

outcome. The spatial scale may be a neighbourhood, city, functional urban area, river corridor or cross border region.

1. Define the territorial problem and the population affected, using both data and local knowledge.
2. Identify the foundational principles and public values that must guide action.
3. Map competences, governance levels, stakeholders, conflicts and available capacities.
4. Select policy, regulatory and financial instruments that can work together.
5. Translate objectives into spatial and service design, including maintenance and life cycle responsibilities.
6. Implement through transparent partnerships and visible early improvements while protecting the long term strategy.
7. Monitor environmental, social, economic and spatial outcomes and adapt the intervention when evidence changes.

The plan is therefore not a static image of a final condition. It is a framework for coordinated decisions and learning. Flexibility does not mean lack of direction. Long term principles should remain stable, while instruments and actions adapt to new information and changing conditions.

16 A framework for reading any practical case

Students should use the following framework whenever a lecture, examination question or professional situation introduces a project or case study.

Step	Question to ask
1 Challenge	What territorial problem is being addressed, for whom and at what spatial scale?
2 Principle	Which public values or European principles justify intervention?
3 Policy	Which strategy, law or programme translates the principle into a mandate?
4 Instrument	Which funding, regulation, plan, incentive or partnership enables implementation?
5 Governance	Which actors and levels decide, finance, implement, maintain and monitor?
6 Design	Which spatial, ecological, social, economic or digital elements structure the solution?
7 Impact	Which results are expected, how will they be measured and which risks may be transferred elsewhere?

This sequence prevents two common errors: describing a project without understanding why it exists, and repeating policy principles without explaining how they change decisions on the ground.

17 Key connections across the lecture

Concept	Connection
Polycentric development	Distributes opportunities among connected centres and reduces excessive concentration.
Compact city	Uses land and infrastructure efficiently within each centre and supports proximity.
No net land take	Prioritises reuse, regeneration and restoration over expansion.

Concept	Connection
Nature Based Solutions	Use ecosystem processes to address climate, health, biodiversity and social challenges.
New European Bauhaus	Adds beauty, inclusion, participation and belonging to the green transition.
Place based governance	Adapts common principles to territorial conditions through multi level and horizontal coordination.
Digital governance	Uses data for public value while protecting interoperability, privacy and democratic control.
Integrated development	Combines sectoral policies, finance, design and governance around shared territorial outcomes.

18 Essential vocabulary

Term	Working definition
Urban sprawl	Discontinuous, low density and often mono functional outward urban expansion.
Ecosystem services	Benefits that people and communities obtain from functioning ecosystems.
Nature Based Solutions	Ecosystem based actions that address societal challenges and create multiple benefits.
Brownfield	Previously developed land that is abandoned, underused or affected by contamination.
Phytoremediation	Use of plants and associated biological processes to manage contaminants.
Adaptive reuse	Reusing an existing building or place for new or renewed functions.
Multi level governance	Coordination among public authorities operating at different territorial levels.
Network governance	Coordination through interaction, negotiation, reciprocity and trust among interdependent actors.
Place based approach	Policy designed from the specific needs, assets, institutions and knowledge of a territory.
Vendor lock in	Dependence on a supplier because data, software or infrastructure cannot easily be transferred.

19 Review and study guidance questions

These questions are intended to test deep understanding. Students should be able to define the concepts, explain the relationships among them and apply them to an unfamiliar territorial case.

1. Why are polycentric development and the compact city complementary rather than competing ideas?
2. How does urban sprawl conflict with territorial cohesion, climate neutrality and no net land take?
3. When does urban greenery become a Nature Based Solution rather than a decorative element?
4. Explain the four categories of ecosystem services through one urban intervention.
5. Reconstruct the chain from the Paris Agreement and the 2030 Agenda to a local urban project.

6. Why must funding be considered part of policy design rather than a later administrative detail?
7. How does the New European Bauhaus expand a purely technical interpretation of sustainability?
8. Use Vitruvius to evaluate a contemporary public space, adding resilience and inclusion.
9. Why is the quantity of green space an insufficient indicator of a green city?
10. Compare the Rome, Copenhagen and Albano examples through accessibility, network design and behaviour.
11. Distinguish the three types of Nature Based Solutions and identify when each is appropriate.
12. Explain how brownfield regeneration supports both environmental policy and territorial development.
13. What conditions must be checked before biomass from phytoremediation can enter a circular material chain?
14. Analyse SPIRE using challenge, principle, instrument, governance, design and impact.
15. Why is the iLEU mechanism a governance and behavioural instrument rather than simply a currency?
16. Analyse ROCK as an example of heritage led regeneration and explain the risks of tourism led mono functionality.
17. Compare market, state and network governance. Why are hybrid arrangements common in urban policy?
18. Distinguish vertical, horizontal and place based governance using one concrete example.
19. When does participation create genuine co ownership and when can it become symbolic?
20. What makes a city smart beyond the presence of sensors and digital platforms?
21. Which governance rules should apply to emotional, behavioural and mobility data?
22. Apply the seven step case reading framework to a project that was not discussed in the lecture.

20 Selected references and policy documents

- European Commission. European Green Deal and related policy initiatives.
- European Commission. New European Bauhaus framework and compass.
- European Commission. Nature Based Solutions research and innovation policy.
- European Commission. European Spatial Development Perspective, 1999.
- European Union. Territorial Agenda 2030, 2020.
- United Nations. Transforming Our World The 2030 Agenda for Sustainable Development, 2015.
- United Nations Framework Convention on Climate Change. Paris Agreement, 2015.
- ROCK Project. Regeneration and Optimisation of Cultural Heritage in Creative and Knowledge Cities.
- SPIRE Project. Smart Post Industrial Regenerative Ecosystem, Baia Mare.
- Dente, B. Policy analysis and the governance of complex public action.

21 Course information

The presentation and this handout should be studied together. The presentation provides diagrams, images and project material; the handout explains the conceptual relationships and supports progressive preparation for the examination. The planned in course examination consists of multiple choice questions, two open questions and a short oral component in English. Administrative details and dates remain subject to confirmation through the official course communication channels.