Birzeit University

Department of Architectural Engineering and Urban Planning

ENPL421 – Environmental Planning

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Lecture 2: Tools for Sustainability Planning

Contents

Environmental Planning Toolbox

Introduction

A set of methods “toolbox” useful for achieving aims of sustainable/environmental planning

- The “toolbox” available to planners is increasingly **large and varied**. New mechanisms are invented almost daily. Each has **strengths and weaknesses**
- Possible options include many **traditional** urban planning strategies such as comprehensive planning and zoning—**if handled in creative and proactive ways**
- Some new tools that have **been developed particularly** with sustainable development in mind, such as sustainability indicators, green development rating systems, and ecological footprint analysis
- Most **important is to choose appropriate** tools for each situation, and to **innovate or combine** methods when appropriate
- The **usefulness** of tools depends in large part on what initial **research questions and processes** are guiding them, and on **how time- and resource-efficient** they might be

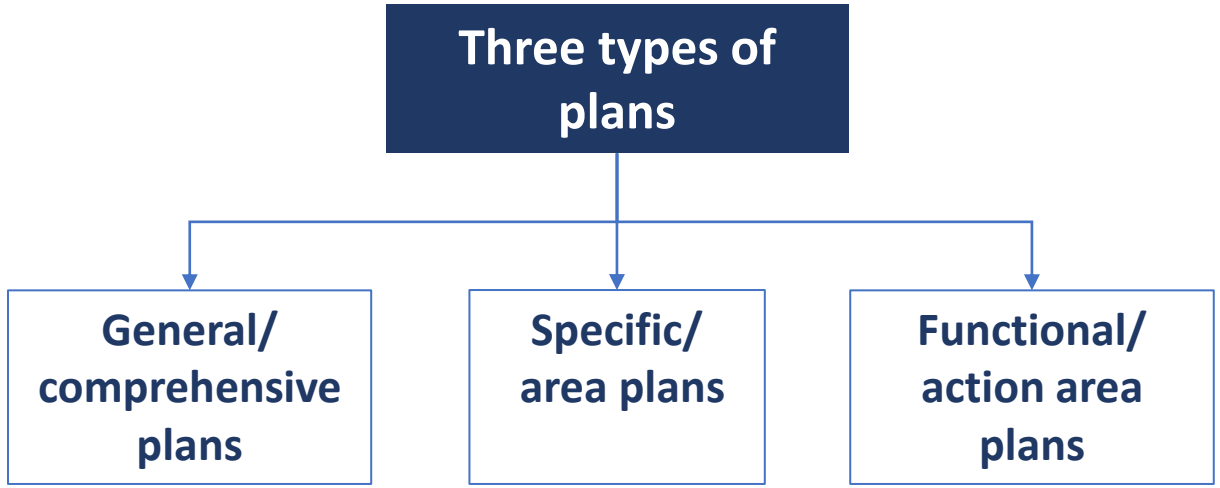
Planning Process

Planning Process

Plan Making

Often seen to include four steps:

1. defining **goals**
2. identifying **obstacles** to them
3. identifying **alternative solutions**
4. **comparing** their merits



Planning Process (cont.)

I. General/comprehensive plans

- Establish an **overall vision and policy framework for a municipality**
- **Often specify key elements** that must be covered, such as **land use, circulation** (transportation), housing, **conservation**, open space, noise, and safety
- **May cover other elements** as well, for example economic development, **environmental protection**, and resource use
- Though **most of the plan consists of written goals, policies**, and analysis of existing conditions, **general plans usually contain a land use map** for the city specifying areas for different land uses and densities – forms the basis for zoning regulations

But **potentially general** plans can serve a **powerful role** in developing consensus around sustainable development

Limitations

Continuing **debate** in academic planning circles about the **usefulness of general plans**

General plans **vary** widely in **quality** and **effectiveness**

Planning Process (cont.)

II. Specific/area plans

- Develop a planning vision for a particular area within a city, such as for a downtown, a transit station area, an older industrial district, or a neighbourhood

- Specific plans **may include a detailed land use vision** at a parcel-by parcel scale, and **recommended zoning changes and urban design guidelines** to help bring about desired forms of development

- **Within a sustainability planning framework, specific plans provide a crucial mechanism**

- Although specific plans may cover broad areas within the city, increasingly cities are **using much more narrowly focused versions to help guide revitalization and development of smaller areas**, such as around transit stations or along key commercial corridors which can be **retrofitted as more pedestrian-friendly, mixed-use areas**

Planning Process (cont.)

III. Functional Plans

- Develop a planning vision **for a particular issue** or topic area within a
- city, offering an opportunity for the city to **explore sustainability planning directions in depth**
- Some of these policy documents may eventually be **incorporated into general plans**, **or may amplify** elements of existing general plans.

- Functional plans may be drawn up in a **wide range of issue** areas such as bicycle planning, **transportation** demand management, **energy** policy, urban design, recycling, economic development, or **parks and green spaces**.

- **Many** local jurisdictions worldwide have now prepared **climate action plans**, **detailing steps to reduce greenhouse gas** emissions and adapt to a changing climate

Planning Process (cont.)

Implementation

- **Too often** excellent plans are prepared but sit for years **without being implemented** or acknowledged within decision-making processes

- **Plan preparation is only part of the battle; the most important work** is often to get the goals envisioned in the **plan brought into reality**

- **Plans' implementation depends on** many things:
  - whether **funding** is available
  - whether **staff time** exists to work on the desired changes
  - whether different departments within city government or other agencies will **cooperate** with each other to get things done
  - whether elected **leaders** will pay attention or follow through
  - whether **public interest** can be sustained and opposition defused
  - whether **planners can keep the goals** and commitments represented by the plan in front of everyone's eyes

- **Some** of these things are **beyond the control** of local sustainability planners and advocates. **But others are open to influence**

Planning Process (cont.)

Implementation

- Many **steps taken during the plan-making process** itself can help ensure that **plans achieve their intended results:**
  - Taking **existing resources** into account
  - Building **consensus**, that gets decision-makers and the public **excited about future possibilities**
  - Including specific **budgeting** or **legally binding changes in city zoning code** or laws
- **Active efforts** in such areas by planners, decision-makers, and members of the public will be necessary to ensure that sustainability-oriented plans achieve their desired result

Planning Process (cont.)

Visioning

- **Well-structured visions with clear principles and visual illustration**s can inspire others, inject new ideas into political discussions, educate the public, and spur planning reform. They can also help develop consensus on shared planning goals and how to implement them

- **General plans usually start with a vision statement** for a particular city or town, although this is typically quite general and **often does not mention objectives such as ecological sustainability or social equity**. **Much stronger, more visual, and more specific visions** will probably be required to inspire people with new ideas and motivate them to work for change.

Characteristics of good visions

- Contain elements that **respond to current problems** and are broadly appealing
- Make **clear the linkages between visionary goals and practical implementation**, so that readers or viewers can see how such dreams might actually come about in practice
- They should be **written or presented in a way that is accessible to a broad audience**

- **Good visions are needed when presenting planning alternatives while carrying out environmental impact reviews**

Planning Process (cont.)

Review of proposals and alternatives

- Once courses of action are identified within planning processes, it is vital to **review them and compare them with other alternatives –** example environmental reviews
- **Environmental reviews** (alternative terms) - strategic environmental appraisal, environmental impact statement, environmental impact reports, environmental assessments
- **The heart** of such documents is generally the **comparison of a project's impacts** with various **alternatives,** including a "no project" alternative
- **Includes analysis of land use, air quality, water quality, and hazardous materials they may contain sections on traffic impacts, archaeological resources, noise, cultural resources, and employment**
- Reviews of alternatives often **focus on cost-benefit analysis** (economic aspect) and **ignore environmental and social impact**
- A **promising strategy for alternatives review** is to develop a **comprehensive sustainability appr**aisal of any proposed action that takes social, environmental, and economic impacts all into account

Planning Process (cont.)

Best practices

- **One way to make visions real** for people—and to **prove that they are feasible** and can actually be carried out in practice—is to **publicize existing "best practices"** within particular areas of planning

- **International efforts to develop** databases, websites, guidebooks, and exhibits containing examples of **best practices** of urban and suburban development, often mixed with sample guidelines or linked to **annual awards programs – they show a wide range of design and policy ideas connected with urban sustainability.**

- **Examples**
  - The 1996 Istanbul Conference organized by The United Nations Centre for Human Settlements (UN-HABITAT)
  - **The New Urban Agenda was adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III)**
  - Dubai International Award for Best Practices in Improving the Living Environment
  - Local Government Commission
  - The Congress for the New Urbanism
  - The Sustainable Communities Network
  - The Resource Renewal Institute

……

(It is highly recommended to visit the websites of the mentioned examples)

Sustainability Indicators

Sustainability Indicators

The **development of indicators that track progress towards sustainable development** is a widespread initiative within sustainability planning

Many cities have developed sustainability indicators' frameworks

The use of indicators within planning is not new, but **sustainability indicators** tend to be **more inclusive** than many previous sets of performance measures, and **focus more directly** on trends concerning crucial **environmental and social** problems

The **best-known prototype** for sustainability indicators is the **Sustainable Seattle** process begun in the early 1990s

- Has local and international influence
- Eventually has 40 indicators in several main categories
- **Eliminated indicators that are beyond planning control** and **refocused** its work on **neighbourhood-scale sustainability projects**

Sustainability Indicators (cont.)

Advantages of sustainability indicators

- **Indicators potentially have great power** to demonstrate problems, motivate action, educate the public, and show the **positive effect of sustainability policies**
- Indicators can be helpful in **monitoring program effectiveness** and in guiding revisions to policy over time
- Some indicators such as **levels of air or water pollutants** have **direct public health implications** and are **tied to state or national policy –** example - the federal Clean Air Act mandates regular measurement of air pollutants
- Other indicators are good reflections of the **health of particular species or ecosystems** and are routinely monitored by environmental agencies under the Endangered Species Act or other legislation

Sustainability Indicators (cont.)

Limitations of sustainability indicators

Indicator efforts must be approached with **caution**

- Indicators must be linked to agencies or levels of government with the **power** to actually address the problems they measure. Preferably these groups should actually be **involved in the creation of the indicators**, so as to develop institutional commitment to them. If an indicator effort is **not linked to implementation mechanisms and political power**, it may serve little function

- **Creating** a set of indicators for a region can be **difficult, expensive, and time-consuming –** but some indicators are much easier to quantify and maintain than others

- Indicators must be **maintained** over time and **updated regularly**. **If** the staff and resources are **not** available to do this, indicators may quickly **fall into disuse** and undermine the entire effort.

- Citizens may develop **unrealistic expectations** that sustainability indicators will show great improvement in response to changed policies – example disappointment from reductions in a measure such as “per capita vehicle miles travelled” as a short-term result of Smart Growth policies

Standards, Benchmarks, and Green Rating Systems

Standards, Benchmarks, and Green Rating Systems

- These are measures that **establish standards for building or planning** many elements of cities and towns

- **Historically**, building codes, road design standards, zoning frameworks, and **other guidelines** have **often** shaped urban development **in directions that are unsustainable**. In many cases these **old standards must** now be **reviewed and changed to become consistent with the goals of sustainable development –**

  Example - those standards resulting in a model of low-density, automobile-oriented suburban development that is now considered unsustainable – large areas of minimum lot size need to be reduced

- Also, **new standards** have been developed in the last decade or two **to promote sustainability**

  The US federal Energy Star guidelines, for example, set standards for energy efficient appliances

  The LEED (Leadership in Energy and Environmental Design) standards for green buildings and energy conscious architecture

Standards, Benchmarks, and Green Rating Systems

Limitations/disadvantages of standards

- Standards can often be too **rigid, and have difficulty keeping up with changing technology** and innovation - initially they may prevent innovation, until codes are changed to accommodate new techniques

- **Firmly established** standards may **reduce creativity**, in that **design** or development becomes a **process of meeting established benchmarks** rather than “pushing the envelope”

- **Extensive formalized standards** can also **add cumbersome bureaucracy** and paperwork if not developed carefully

Standards, Benchmarks, and Green Rating Systems

Example of unrigid standards
1. Performance zoning/standards

- **Performance standards**/zoning are codes under which building or **development must simply meet certain overall criteria while opening the door to creative new approaches (controls impact rather than controlling use)**

- Under performance zoning, municipalities **replace conventional zoning districts with performance criteria to guide development**. The result can be an increase in the range of uses that may be permitted and additional control over the effects of the land use - keeping **energy use below a certain level** or **maintaining a certain species diversity** in an ecosystem

- **A municipality must determine the criteria to be used for performance zoning** including which natural resources are to be protected. For instance, wetlands, floodplains and steep slopes are typically protected from development. Woodlands, prime agricultural soils and moderate slopes may also be deemed worthy of preservation.

- **After these areas are mapped** and then deducted from a site's development potential, the remaining areas may be developed at a density permitted by the zoning ordinance. Regulations should also be included for **maximum impervious surfaces and minimum open space areas**.

Standards, Benchmarks, and Green Rating Systems

Example of unrigid standards
1. Performance zoning/standards

Advantages

- **Conserves energy** by limiting inappropriate site disturbance and reducing environmental disturbance
- Ensures that a proposed use is **appropriate for the specific character of a site**, and can balance the level of development that the site can accommodate with **minimizing negative impacts on the environment**
- **Promotes natural resource protection** and can limit adverse impacts on neighbouring properties

Disadvantages/Limitations

- **Eliminates zoning districts** and replaces them with performance standards. Such a significant change can be **challenging for a municipality**
- Requires additional **technical expertise and cost to evaluate and monitor** than required under conventional zoning

Standards, Benchmarks, and Green Rating Systems

Example of unrigid standards
1. Performance zoning/standards

Example

http://spartanburgcountyapp.org/wp-content/uploads/2019/09/Spartanburg-County-Performance-Zoning-Ordinance-adopted-September-16-2019-09-19-2019.pdf

Standards, Benchmarks, and Green Rating Systems

Example of unrigid standards
2. Form-based codes

- **Form-based codes** are **simple, graphic codes** that **illustrate desirable building form, street design, and neighbourhood layout**. They **provide a simpler, easier-to understand, and more native** approach to urban design than complicated written zoning codes and street standards

- A form-based code **regulates the design and appearance** of buildings **more than the land use**. A form-based code **emphasizes the importance of the public realm** in terms of the building height and bulk, building facades, orientation to the street and parking requirements

- Local governments can implement a form-based code by **adopting a regulating plan** for a **part** of the city or even for the **entire city**
- The regulating plan includes a combination of street and building standards. It is far easier to create mixed-use buildings and developments with a form-based code than the traditional zoning ordinance. Thus a form-based code may prove to be **more effective in producing walkable mixed-use areas with sufficient density to make mass transit service feasible**

- Some local governments have **incorporated elements of form based codes into their traditional** zoning ordinances to create what is known as **a parallel code**

Standards, Benchmarks, and Green Rating Systems

Example of unrigid standards
3. Overlay Zoning

- **Overlay Zoning** creates a **special zoning district, placed over** an existing base zone, which identifies **special provisions** in addition to those in the underlying base zone

- Planners employ **overlay zones to protect the public health, safety, and welfare in sensitive environmental areas**. For instance, overlay zones include **floodplain overlays**, **aquifer overlays**, and **steep slope** overlays, among others

Can be applied in the Palestinian context

Standards, Benchmarks, and Green Rating Systems

Example of unrigid standards
3. Overlay Zoning

Example

Floodplain Conservation Overlay District - NEWLIN TOWNSHIP CHESTER COUNTY, PENNSYLVANIA

b. If any proposed construction or development is located entirely or partially within any Identified Floodplain Area, applicants for Permits shall provide all the necessary information in sufficient detail and clarity to enable the Floodplain Administrator to determine that:

1) all such proposals are consistent with the need to minimize flood damage and conform with the requirements of this and all other applicable codes and ordinances;

2) all utilities and facilities, such as sewer, gas, electrical and water systems are located and constructed to minimize or eliminate flood damage;

3) adequate drainage is provided so as to reduce exposure to flood hazards;

4) structures will be anchored to prevent floatation, collapse, or lateral movement;

5) building materials are flood-resistant;

6) appropriate practices that minimize flood damage have been used; and

7) electrical, heating, ventilation, plumbing, air conditioning equipment, and other service facilities have been designed and located to prevent water entry or accumulation.

Ecological Footprint Analysis

Ecological Footprint Analysis

- The **ecological footprint model** is one of the methods that **quantify the environmental impact** of human communities

- The ecological footprint model **seeks to turn various aspects of human resource consumption into equivalent amounts of land that would be required to produce such resources**. Each individual or community is therefore assigned a “footprint” in terms of acres or hectares that represents their ecological impact on the planet

- At a **simple** level, the ecological footprint model is used to **dramatize the impacts of resource consumption or changes in materials use** over time.

- Can be calculated for individual citizens, urban regions or entire countries

Ecological Footprint Analysis

Limitations

- The usefulness of this model is **questionable – limited to education** about excessive resources consumption rather than specific policy making

- The model involves many **assumptions** about how various forms of resource use or pollution translate into land area, and can become tremendously **complex exercises**

- إن فائدة هذا النموذج مشكوك فيها - فهي تقتصر على التعليم حول الاستهلاك المفرط للموارد بدلاً من صنع سياسة محددة

Carbon Calculator

Carbon Calculator

- A **more specific and applied type of calculation** is increasingly used to **estimate greenhouse gas emissions** from cities, industries, institutions, and individual households

- **At their most general**, “carbon calculators” are **simple, online tools to help individuals figure out their approximate contribution to global warming**, and compare this to that of other people in the same or different locations

- On a **larger scale**, **climate change policy** in many places now **requires local governments, businesses, and institutions** to complete much **more elaborate greenhouse gas emissions inventories** as a way of establishing and **monitoring** progress **towards greenhouse gas reductions**

Carbon Calculator

Limitations

- Take **large amounts of staff time** to prepare

- Involve a range of sometimes **controversial assumptions**-
  example, should a local government consider itself responsible for the emissions from motor vehicles on a freeway passing through its territory? From an airport within its borders?

- **Are at best an approximation of actual emissions**, useful mainly to **direct and motivate behavior**, and to establish emission trend lines that can be updated year after year

GIS and Mapping

GIS and Mapping

- These computer-based applications **provide a sophisticated ability to map and analyse many different spatial layers**—land use, topology, roads, rail lines, census data, hydrology, soils, slopes, fragile habitats, endangered species, and so on—across urban or rural regions

- Such mapping can be used for many types of analysis to **support** growth management planning, **environmental protection efforts, environmental justice analysis, and many other sustainability-oriented actions**

- **GIS systems and computer modeling based on them** have, for example, been **used to support growth management planning.** Planners and citizens have been **able to study the implications of different metropolitan growth scenarios in terms of** open space consumption, urban densities, population near transit, air quality, traffic generation, greenhouse gas emissions, and other variables

GIS and Mapping

Examples

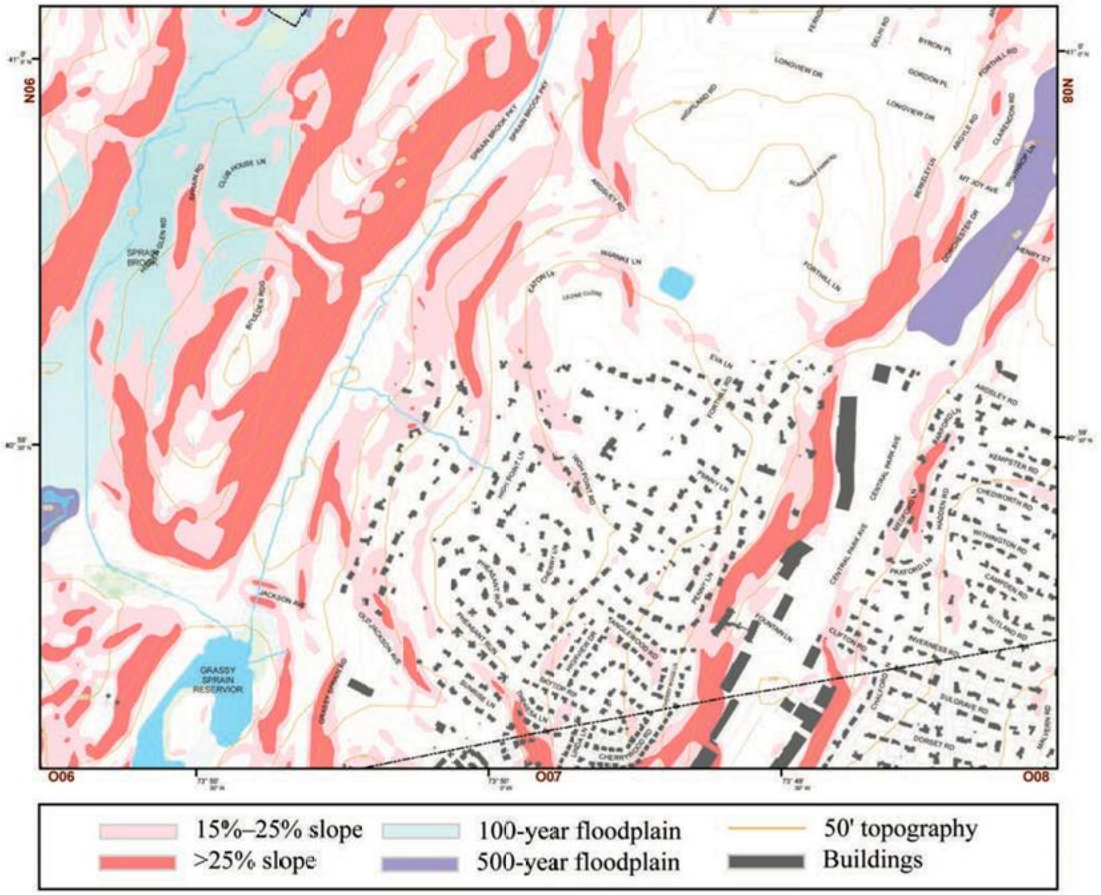


Figure 1.4. Map Identifying Steep Slopes for the Natural Resources Inventory, Yonkers, New York.

Source: Westchester County, NY, GIS Department.

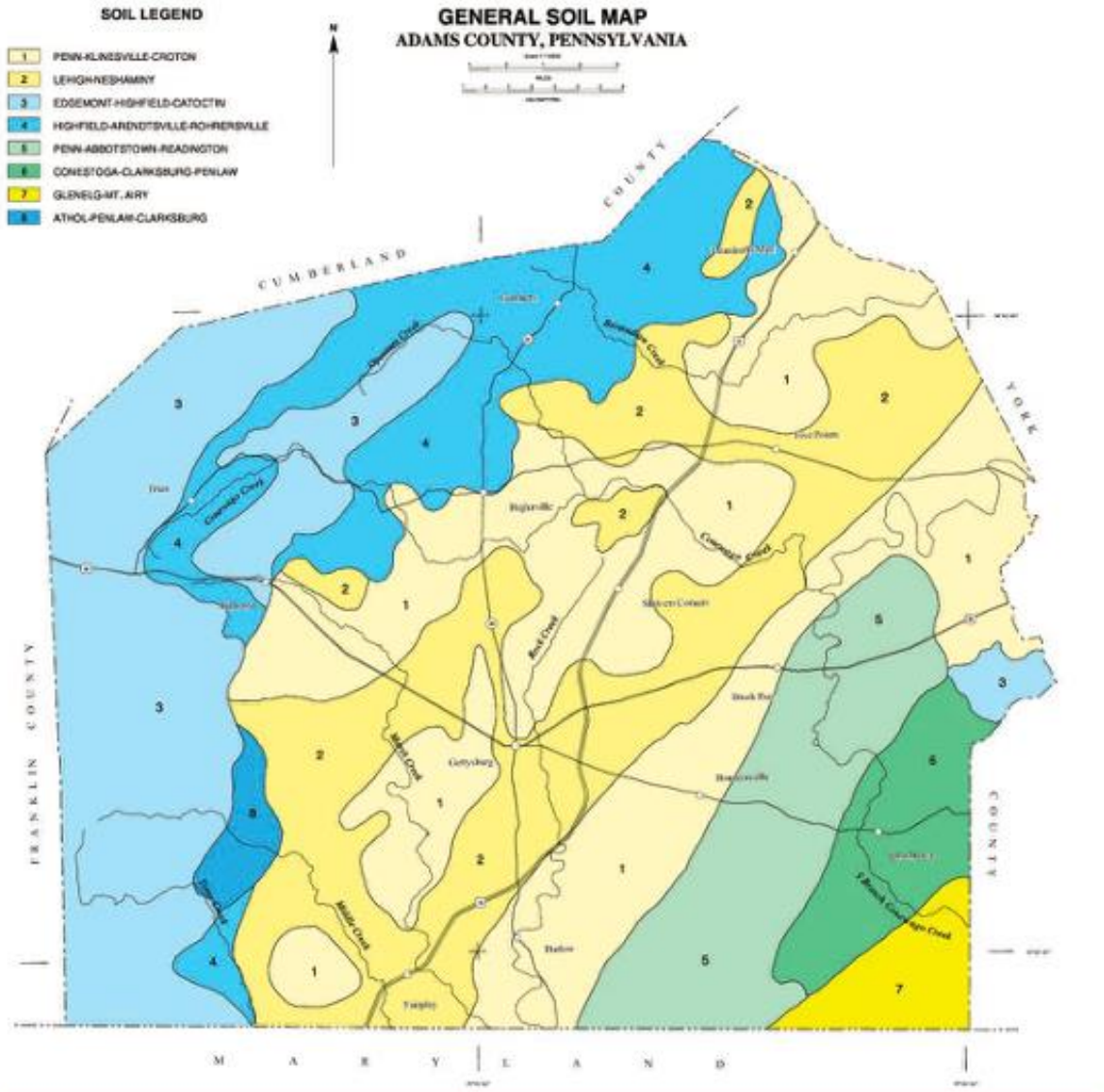


Figure 1.3. Map of Soil Types from the Adams County, Pennsylvania, Soil Survey.

Source: Natural Resources Conservation Service (NRCS).

GIS and Mapping

Examples

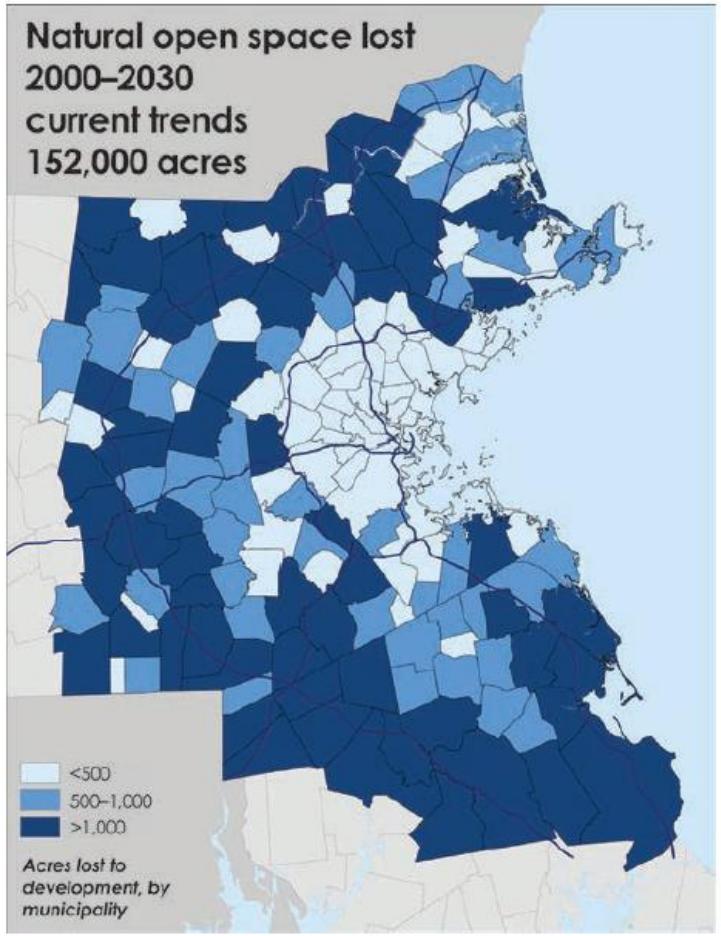


Figure 1.7a. Scenario A: Expected Loss of Open Space in Greater Boston, 2000–2030, if Current Development Trends Continue (152,000 Acres)

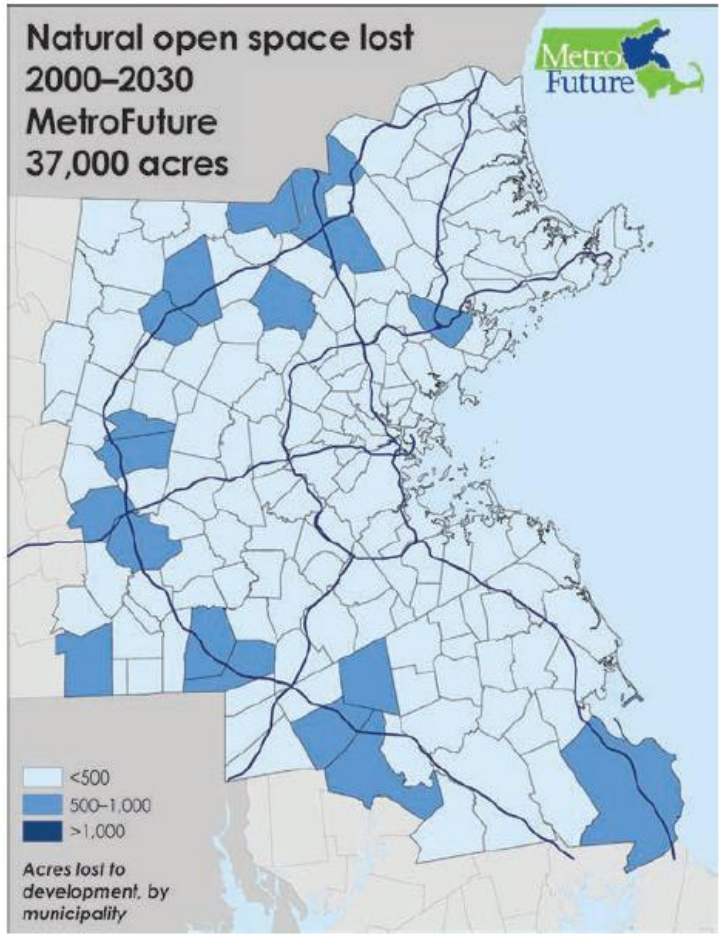


Figure 1.7b. Scenario B: Expected Loss Under the MetroFuture Plan (37,000 Acres)

Source: Metropolitan Area Planning Council, *MetroFuture Plan*, 2008, p. 21.

GIS and Mapping

Limitations

- GIS systems, though a useful tool for sustainability planning, **are by no means a remedy**
- They **can provide important information** for planners and highly educational material for the public, **but** it can be **time-consuming and expensive** to set up such computer databases, and the **data must be of high** quality and **well-maintained** to be useful over time

- **Some** types of **problem** also **do not lend themselves to quantitative spatial analysis**, but require on-the-ground observation and work with local communities instead.

Environmental Assessment and Reporting

Environmental Assessment and Reporting

- Is a **science-based discipline** that has emerged since the early 1980s in **response to the passage of regulation regarding** air quality, water quality, toxic chemicals, and other environmental threats

- The **focus** is usually on **assessing conditions and risks** for particular facilities, industries, or watersheds. This assessment then **becomes the basis for documents such** as **Environmental Impact Reports** and for **environmental management policies** designed to reduce risk

- Has evolved from measuring the **effects of particular chemical pollutants on a single** species to a **more broad-based assessment** of the impacts of multiple stressors on ecosystems

- **Relies** on an increasingly **standardized set of methods** for **assessing threats to ecological health**

Environmental Assessment and Reporting

- Planners can use the checklist in the following table as a guide for reviewing the impacts of proposed developments on the natural environment at a specific location. The answers to the questions in the checklist will help the planning commission in making findings of fact to support its recommendations about a proposed development.

Table 1.4. Environmental Impact Checklist for Reviewing Proposed Development Projects	
1.	Is the proposed development consistent with the goals and objectives of the comprehensive plan and the future land-use map?
2.	Is the proposed development consistent with the zoning ordinance or is a rezoning requested?
3.	Is the proposed development consistent with the subdivision and land-development regulations?
4.	Is the proposed development consistent with the CIP?
5.	What use or uses are proposed in the development?
6.	What is the size of the proposed development, including buildings, acreage, and lot coverage (impervious surface) by buildings, roads, driveways, and sidewalks?

Environmental Assessment and Reporting

Table 1.4. *(continued)*	
7.	Can the development be considered a "development of regional impact"?
8.	Could the development have an impact on groundwater supplies or quality?
9.	Could the development have an impact on the water quality of or supply of water in a lake, pond, stream, or wetland?
10.	What will the source of water be? If on-site water is proposed, is there sufficient water to accommodate the use? Is there a possibility the proposed water source could be contaminated from nearby landfills or commercial or industrial uses? Could the on-site use of water adversely affect existing water availability to adjoining properties?
11.	Could the development change stormwater drainage patterns or increase runoff off-site?
12.	Could the development produce significant soil erosion and sedimentation?
13.	How will sewage be disposed of? If on-site sewage disposal is proposed, are soils appropriate and is the lot large enough to provide an adequate absorption field?
14.	How will the development affect air quality?
15.	How will the development affect transportation use and patterns?
16.	How will solid waste, including any toxic substances, from the development be disposed of?
17.	What kind of energy will the development use and where will it come from?

Environmental Assessment and Reporting

Table 1.4. *(continued)*	
18.	Could the development affect any threatened or endangered plant or animal species, sensitive wildlife habitat, or hunting and fishing areas?
19.	Is the development proposed for an area with known natural hazards, especially floodplains and steep slopes?
20.	Would the development affect any scenic views or unique land forms?
21.	Could the development adversely affect nearby agricultural land or forest land operations?
22.	How will the development fit in with the existing built environment in terms of scale, use, and aesthetics?
23.	Will the development spur additional development in the vicinity?
24.	Will the development affect any known archaeological or historic sites or historic buildings?
25.	Will the development generate unreasonable noise, odors, glare, or other off-site impacts that might be considered a nuisance?
26.	What state and federal reviews and permits are needed for approval of the proposed development and have they been obtained?

Components of the Environment

Components of the Environment

The environment in general consists of air, water, and three main land uses:

1. Natural areas are undeveloped lands and waters that provide an array of environmental services, such as water supply, water recharge and filtration, fish and wildlife habitats, air filtration, and recreation. Natural areas also include natural hazards that pose environmental constraints, such as floodplains, wetlands,
and steep slopes.
2. Working landscapes of farms, rangeland, forests, mines, and commercial recreation areas provide food, fiber, lumber, minerals, and energy and contribute to the health of rural and metropolitan economies.

3. Built environments of cities, suburbs, and towns involve the design and siting of buildings, transportation systems, sewer and water facilities, and public spaces and parkland.

How these three land uses interact with one another affect a community's appearance, size, operations, richness of ecosystem services, and overall environmental quality. Deciding how, when, and where these land uses should or should not change is a fundamental challenge of environmental planning.

Issues Considered in Environmental Planning

1. Planning for Sustainable Public Health

- Planning for Sustainable Air Quality
- Planning for Climate Change: Mitigation and Adaptation
- Planning for a Sustainable Water Supply
- Planning for Sustainable Water Quality
- Planning for Solid Waste and Recycling

2. Planning for Natural Areas

- Protecting the Nation's Landscape Treasures
- Planning for Wildlife Habitat
- Planning and Managing Wetlands
- Planning for Coastal Zone Management
- Planning for Natural Hazards and Natural Disasters

Issues Considered in Environmental Planning

3. Planning for Working Landscapes

- Planning for Sustainable Working Landscapes: Farmland and Ranchland
- Planning for Sustainable Working Landscapes: Forestry
- Planning for Mining

4. Planning for the Built Environment

- Planning for Energy
- Transportation Planning and the Environment
- Making Green Cities, Suburbs, and Metro Regions
- Greenfield Development and Site Design