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Miklos A. Gratzer



Land Use Inventory for Open Space Planning in Eastern Connecticut¹

By Miklos A. Gratzer²

THE NORTH ATLANTIC SEABOARD from Boston, Mass., to Norfolk, Va., is an almost continuous stretch of urban and suburban areas. No other section of the United States has such a high density of population over such a large area. Eastern Connecticut stands out as an oasis of green in this belt, since only a small percentage of its 890,000 acres is in urban use. To maintain the character and quality of this subregion, a large scale, foresighted and dynamic open space planning program is necessary. An essential first step of any planning is an inventory.

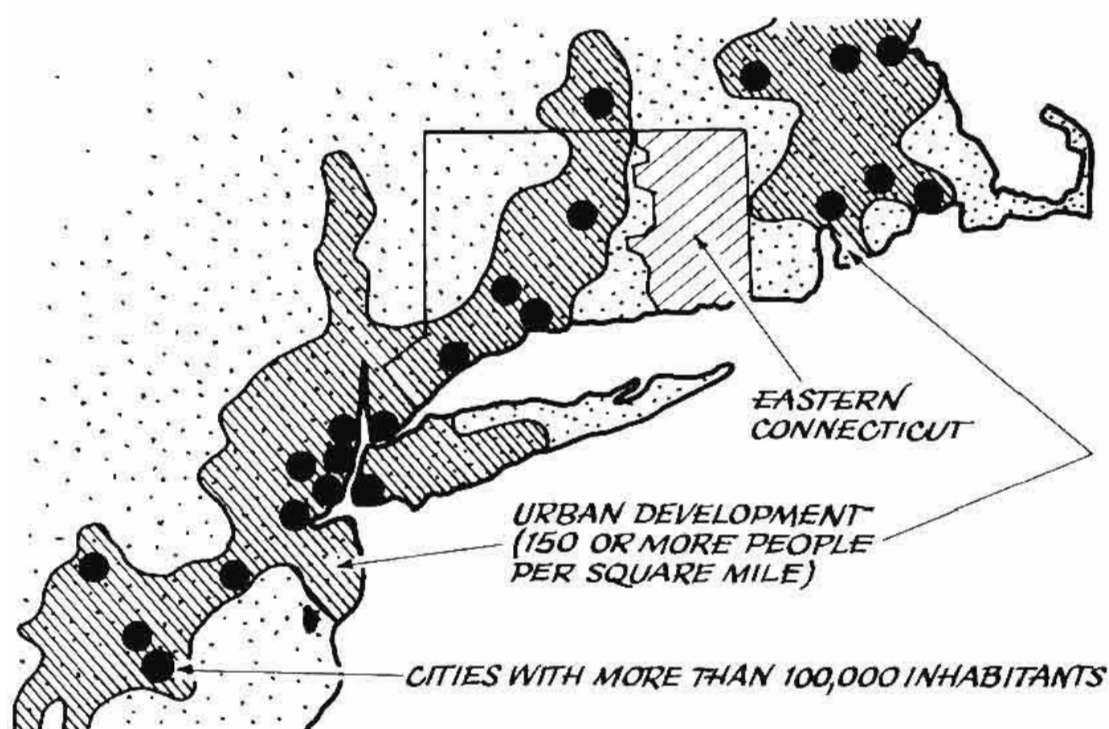


Figure 1. Northeastern Megalopolis.

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The objective of this study was to determine the extent, distribution, and ownership of various land use classes. The resulting quantitative parameters would help to establish planning and research priorities, document changes in land use patterns, and measure the effects of urbanization.

Eastern Connecticut is comprised of approximately forty townships. The Town of Mansfield was selected as a study area, because it is nearly-centrally located, and because its physical characteristics are quite typical for the subregion. Even more important, Mansfield has some of the best land use records and aerial photo composites among local governments. Two large state institutions, The University of Connecticut, and The Mansfield Training School are located here. (In this respect only, it is not a typical town.)

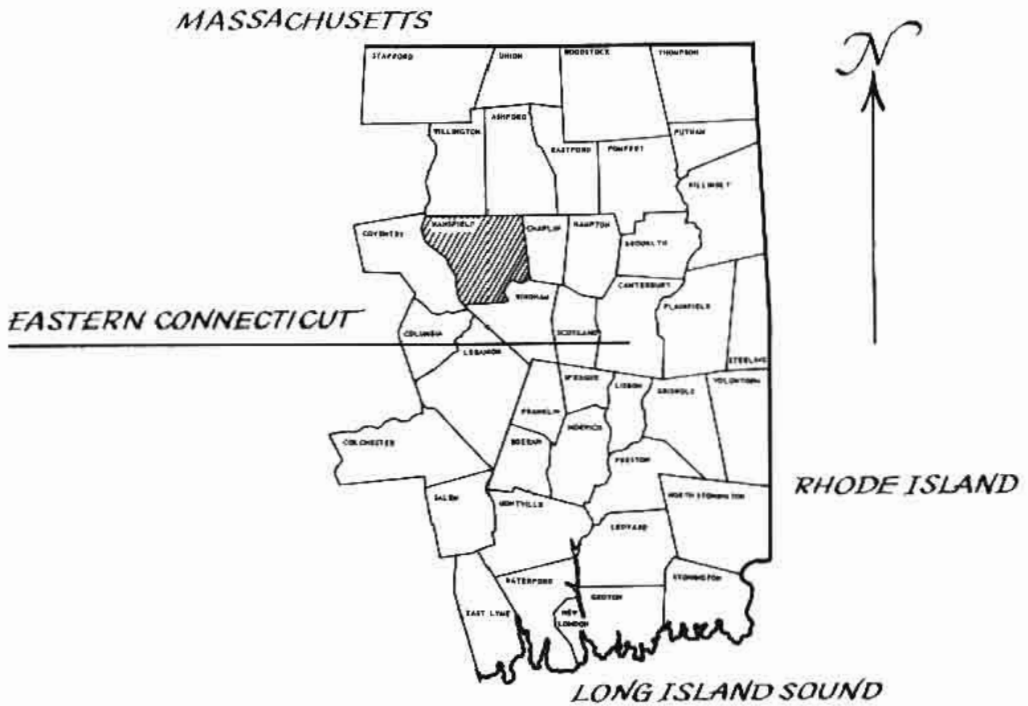


Figure 2. Location of Mansfield, Connecticut.

MATERIALS AND METHODS

The major source of data was the tax assessor's cards on file in the town office. Aerial photos and aerial photo composites were also utilized. The aerial photos were taken in 1950, and the boundaries of individual parcels had been superimposed on them. These markings are constantly updated, a considerable work, in view of many recent subdivisions. The accuracy of

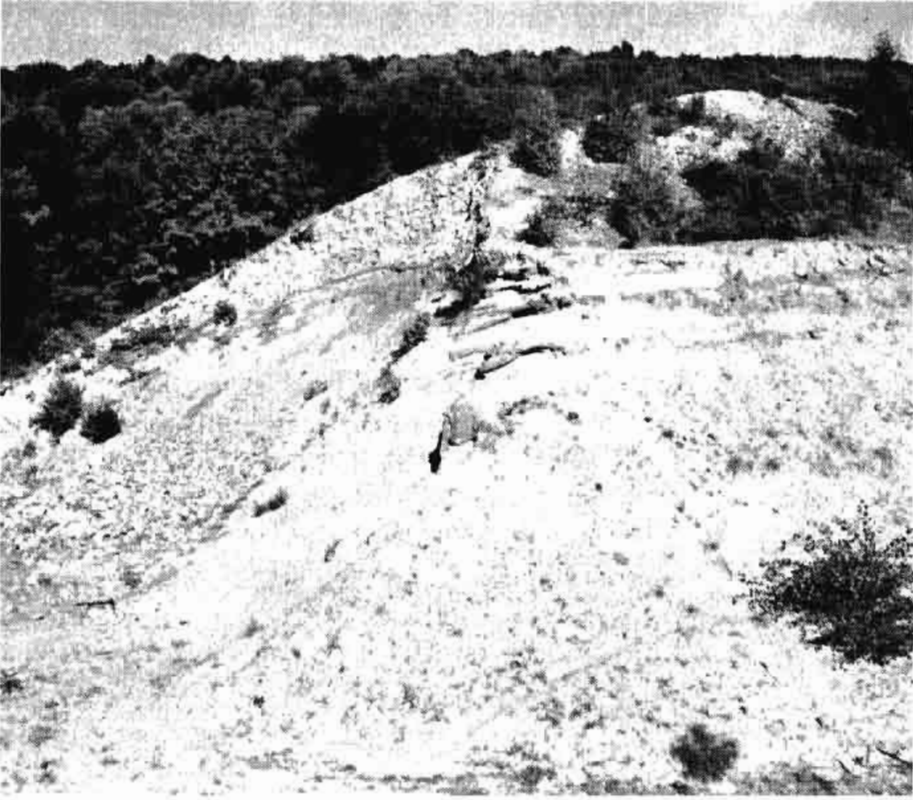


Figure 3. Waste land. Gravel and sand deposit.



Figure 4. Waste land. Excessive surface boulders with marginal vegetation.

these boundary lines is considered good by various state agencies. Numerous field checks and on-site evaluation also were part of our data collection process.

The land classification system used by the town was not adaptable to our purpose without modification.

The following descriptions and definitions of land use categories were adopted:

(1) WASTE LAND

This classification was borrowed from the town with reservation. The term is unfortunate, as it suggests a value (judgment). As an economic term it may be suitable for taxation purpose, but it is not very valid for an open space planner. A large rock formation could be classified as waste land, with little or no tax revenue potential; it, nevertheless, may be a valuable landscape with strong aesthetic asset appeal.

Waste land is described herein as an area not capable of supporting significant vegetation. Ledges, rock outcrops, gravel banks, and, in some instances, bogs are included in this category.

(2) RESIDENTIAL LAND

This classification indicated that the original vegetative cover was removed, or drastically changed, to facilitate development. In many instances, "built-up" would be the more appropriate term; since black-topped parking lots, shops, school buildings, sidewalks, greenhouses, and service stations were included. The town (with basic concern for tax revenue) determines the minimum size of residential area by effective road frontage. Entries in the town records for residential areas vary from 0.2 acres to 6.2 acres. We found that actual residential areas are much smaller. In most instances only the minimum area was cleared for construction with the remainder of the building lot remaining in the forest category. These small fractions represent a nearly-continuous green belt which adds up to a large acreage.

For example, one house lot may be recorded in the tax list as 3.7 acres. Our inventory, reflecting the actual conditions, may record the very same parcel as 0.4 acres of residential land, 1.5 acres of brush land, 1.3 acres of forest land, and 0.5 acres of waste land.

(3) TILLABLE LAND

Our definition did not differ greatly from that of the town's. The sole difference lies in the consideration of swamps, ponds, and small lakes. The tax assessor's office classifies the land beneath the water as tillable land,

currently not being utilized for agricultural purposes. Since we made a separate category for water surfaces, we excluded this acreage from our tillable land classification.

(4) BRUSH AND SPROUT LAND

The term is more applicable to hardwoods, because sprouting is not characteristic of the conifers of this area, with the exception of pitch pine. Young stands (up to eight inches diameter at breast height), cut-over areas with dispersed wolf trees, and abandoned fields with brush growth older than 16 years are included in this category.



Figure 5. Tillable land.

Figure 6. Brush and sprout growth on abandoned field.



(5) FOREST LAND

We included areas with full canopy cover where the estimated average diameter of trees at breast height was eight inches or more. Besides the native mixed hardwood forest types, this category also included most of the pine plantations. The various forest types have been further sampled and described to determine the growth rates, health conditions, stand compositions, and other stand characteristics; but no breakdown of acreages were tabulated separately for the various types.

(6) WATER

All open and permanent water surfaces were included in this category. During inventory we set up two subgroups: (a) ponds—surface area less than 2 acres, (b) lakes and reservoirs—surface area larger than 2 acres. In the discussion we combine the two subgroups. None of the brooks or rivers are large enough to show visible continuous water surface on the aerial photographs. Since precipitation causes the flow in these watercourses to fluctuate very greatly, an estimation of the surface areas would not have increased the accuracy of the inventory. Many of the larger brooks also serve as town boundaries, thus could not be ascribed to any one town. Low lying areas, inundated by water only at times, were excluded.

The study area was covered, road by road, in alphabetical order. All area measurements were recorded to the nearest 1/10th of an acre. Each parcel of land was listed separately. The total inventory consists of the description of over 3000 parcels on 273 pages. The format (Figure 9) will permit follow-up studies to determine land use changes for each individual parcel, for a town road, or for the whole study area.



Figure 7. Forest land. Forty year old red pine plantation.

Figure 8. Small man-made pond.



RESULTS AND DISCUSSION

Data in Table 1 clearly indicate that the town is heavily forested. Forest covers more than half of the land area; and if grouped together with brush and sprout land, nearly three-quarters (73.9 per cent) of Mansfield is under some forest growth. This may come as a surprise to a casual observer. Driving on local highways one has the impression that the chain of houses, small cluster villages, the large state institutions, shopping centers, service areas, and other land clearings have greatly reduced the forest coverage. Most of the land classified as "brush and sprout" shows a very vigorous growth rate, and will change into "forest" in a relatively short time. It seems justifiable to combine this category with forest for any planning more than ten years in the future.

Most brush and sprout land is the result of abandoned cultivation of agricultural land. Nevertheless, the study area is considered by many as "rural" or "agricultural." This is more myth and tradition than fact. Currently only 1570 acres, which is less than six per cent of the total area, are tillable. Indications are that this acreage will decrease in the future. An

Table 1. Summary of Acreage.

Land	Acreage	Per cent of Total
Waste	150.7	0.5
Residential	4033.0	14.6
Tillable	1570.8	5.7
Brush and Sprout	5382.5	19.5
Forest	15285.7	54.4
Water	513.1	1.9
Roads and Railroads ³	659.4	2.4
Total	27595.2	100.0

³ Roads and railroads were not included in the original classification. However, they are important indices in measuring urbanization. No comprehensive data were found on the acreage of these utilities, therefore, the width of various roads was measured and the acreage calculated. The length of state highways was 34.5 miles, and the average width (cleared width, which does not correspond with rights-of-way in most instances) is 44', thus the acreage is 184.0 acres. Town roads showed a very broad range in width from 20' to 66'; mileage being 92.04, thus the area is 423.3 acres. The branchline of the Central Vermont Railroad covers another 52.1 acres in Mansfield. Source: Correspondence with Kingsbury Dyke, Engineer of Road Inventory and Records, State Highway Dept., Hartford, Conn.

area almost three times larger than that currently tillable is covered by blacktop, buildings, shopping centers, driveways, and other structures. This clearly indicates that the major use has shifted from agriculture to residential. Thus, if the primary use is residential and the basic physical setting is forest, it can be stated that a new land use pattern has emerged which should be described as "residential forest." Residential forest differs from residential areas with green belts to a large extent. Residential concentration is spatially dispersed and a certain acreage of forest, even if it is very small, is an essential part of each residential unit. The projected population growth of the area, plus the recent boom in real estate development, indicates that residential acreage will substantially increase in the near future. It is more than likely that the expansion will take place at the expense of the forest area.

An increase in road acreage is also foreseeable. The current road system in some locations is already inadequate to carry the traffic. Road density is usually measured by the ratio of motorable miles of roads (excluding city streets) per hundred square miles of land area. The road density index for the United States is 95, for France is 190, for United Kingdom is 214, and for the Soviet Union is 12.⁴ Our study area consists of about 43 square miles, with 126.54 miles of road, thus the index is about 300. The study area has enough roads to be arranged in a convenient East-West, North-South grid pattern, with roads paralleling each other about 1170 yards apart. If this were done, no land point anywhere would be farther than 585 yards from the nearest public road.

Water surface compromises only a small acreage. Only one of the bodies of water is really large; the others are small, dispersed lakes and ponds. Due to this distribution, the accrued actual shore line is relatively long—an important feature and a very valuable recreational and aesthetic asset.

The acreage of waste land is also very small. Ledge outcrops and barren spots are more common than the totals indicate, but many of them are too small to be recorded (less than 1/10th of an acre).

The pattern shown in Table 2 is atypical for Eastern Connecticut where public ownership is usually very low. The inclusion of the Federal Government among owners is a new development, resulting from the Mansfield Hollow Reservoir Project (the large body of water referred to previously) of the U. S. Army Corps of Engineers. The State of Connecticut owns and operates two large state institutions—The University of Connecticut and The Mansfield Training School, both with extensive acreages. The local government holdings are very small.

Each level of government shows a different composition corresponding to the purpose of their operation. State institutions utilize a proportionally large area for residential use. Despite this, the university also owns a good

⁴ Goode, *World Atlas*, ed. by E. Espenshade, 12th edition, Rand McNally Co., Chicago, 1965, pp. 42-43.

Table 2. Land Tenure Distribution (excluding roads).

Ownership Class	Size (acres)	Per Cent of Total Area
Federal Government	1687.5	6.3
State Government	3563.5	13.2
Town Government	369.0	1.4
	<hr/>	<hr/>
Total Public	5620.0	20.9
Private	21315.8	79.1
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Totals	26935.8	100.0

Table 3. Composition of Public Ownership.

Inventory Class	Federal		State		Local	
	Acres	%	Acres	%	Acres	%
Waste	0.0	0.0%	11.0	0.3%	4.5	1.2%
Residential	2.8	0.2%	1133.4	31.8%	72.9	19.8%
Tillable	59.3	3.5%	458.2	12.9%	6.0	1.6%
Brush & Sprout	727.6	43.1%	288.9	8.1%	97.6	26.5%
Forest	554.7	32.9%	1651.5	46.3%	152.8	41.4%
Water	343.1	20.3%	20.5	0.6%	35.2	9.5%
Total	<hr/> 1687.5	<hr/> 100.0%	<hr/> 3563.5	<hr/> 100.0%	<hr/> 369.0	<hr/> 100.0%

share of the forest land, and proportionally more tillable land than the private sector. The largest single water body in the study area is a federal holding of 343 acres.

Of the total of 26,000 acres comprising Mansfield over 21,000 acres are in private ownership. It is surprising that the private ownership in the tillable and in the residential categories is proportionally smaller than in the public ownership (21.5% vs. 13.3% and 9.3% vs. 4.9%, respectively). Combined brush and forest land covers nearly 81 per cent of all privately owned land. This brings into sharper focus the reality that no successful attempt could be made to manage, to improve, or to preserve the forest of this subregion without the full cooperation of the private owners. A further breakdown of the private ownership category is necessary in order to fully understand the nature of such fragmented forest ownership.

Table 4. Composition of Private Ownership.

Inventory Class	Acreage	Percentage
Waste	135.2	0.6%
Residential	2823.9	13.3%
Tillable	1047.3	4.9%
Brush and Sprout	4268.4	20.0%
Forest	12926.7	60.7%
Water	114.3	0.5%
Total	21315.8	100.0%

Table 5. Size Class Distribution of Private Ownership.

Size Class (acres)	Total Acreage	Average Parcel (acres)	Number of Parcels	Per cent of Total Acreage
0 — 1.9	1657.2	0.85	1934	7.8
2.0 — 9.9	3092.2	4.39	704	14.5
10.0 — 49.9	8085.1	23.10	350	37.9
50.0 —	8481.3	93.20	91	39.8
Totals	21315.8	6.93	3079	100.0

The number of private owners roughly corresponds to the number of parcels, although one person may own more than one parcel. Considering high property taxes, increasing pressure for land development, and demand for residential property; it is safe to assume that further subdivision will take place in the near future, and that the number of land owners will continue to increase. Even the present number of some 3000 land owners is so high that most of the traditional forestry service programs seem unworkable. Nevertheless the future landscape of this region, and thus, indirectly, the environmental quality, greatly depends on what these owners will do with their forest holdings. Their management intent should be thoroughly investigated. In most areas where ownership fragmentation has reached this point, forest cover has disappeared. Our study area is unique in this respect. The methods we need to maintain this landscape component must also be unique.

It is foreseeable that a new cooperative public-private environmental management system could be developed in Eastern Connecticut. This system would encompass broad areas from ecology to taxation, from aesthetics to real estate development.

SUMMARY AND CONCLUSIONS

1. Forest is the dominant landscape feature, and as such, should be high in priority in open space planning.
2. Residential use of land is second to forest in area, but of primary social importance.
3. Forest and residential use of land are interrelated, and a new land use concept which can be identified as "residential forest" appears.
4. Agricultural use of land is relatively unimportant, contrary to current classification of this area as "rural-agricultural" type.
5. Spatial distribution of the various land uses is dispersed and this pattern is characteristic of the region.
6. The road density index for the study area is very high. Even more road development is expected in the near future.
7. The forest is privately owned to a large extent (12,926 acres of private forest as opposed to 2,359 acres of public forest).
8. The private ownership, consisting of 3000 owners with an average of 6.9 acres of land, is extremely fragmented.
9. The number of owners probably will increase with further subdivision; consequently, the average parcel size will be further reduced in the near future.
10. Without planning over the next twenty years, the following might be expected:
 - (a) An increase in residential and transportation areas, mostly at the expense of forest land.
 - (b) About half of the land currently classified as brush and sprout will advance to a forest status replacing (at least partially) the acreage which becomes residential.
 - (c) A part of the tillable land will support brush and sprout forest growth, while other portions will be developed for residential use.
11. Present mature hardwood stands are vigorous and regenerate naturally to a good extent. Urbanization may present more danger to the forested areas in the subregion than any normal combination of biological factors.

RECOMMENDATIONS

1. The adaptation of cluster design for residential areas would save forest from road development.
2. Heavy concentration of single land use at any location should be avoided in order to preserve environmental quality and traditional cultural values.
3. "Residential forest" should be accepted as the most important land use. All areas of this concept should be fully investigated, especially the methods of planning, zoning, taxation, and landscape management.
4. The management intent of land owners should be studied.
5. New methods of service forestry should be developed and implemented, especially a program of aid and information to small private owners.