

2. A Gallery of Applications

Geographic Information Systems and Science

SECOND EDITION

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Outline

- One day in life with GIS
- Science, geography and applications
- Applied problem solving
- Key example applications
 - ❑ Government
 - ❑ Business and service planning
 - ❑ Logistics
 - ❑ Environment



A Day of Life with GIS

Activity	GIS Application
Alarm goes off	Electricity asset management
Shower	Hydraulic model predicts water usage
Mail	Target consumer marketing
Partner's Work	Teach GIS
School transport	School bus route optimization



A Day of Life with GIS (2)

Activity	GIS Application
Train to work	Real time traffic monitoring
Read newspaper	Sustainable forestry
Work	City GIS Manager
Lunch	Precision agriculture
Shopping	Target consumer marketing
Public participation	On-line collaboration



The screenshot displays a GIS application interface for managing utility data. The main map area shows a network of transformer banks (represented by yellow polygons) and their connections (represented by black lines). Key features include:

- Editor Toolbar:** Located at the top, it includes a 'Task' dropdown set to 'Create New Feature' and a 'Target' dropdown set to 'Transformer Banks : xfb_point'.
- Versioning Panel:** Located on the left side, it provides options for managing different versions of the data.
- Tools Panel:** Located on the left side, it contains various navigation and editing tools such as pan, zoom, and select.
- Map Labels:** Numerous transformer banks are labeled with alphanumeric codes, including MM51294, MM51302, MM51303, MM51298, MM51297, MM51274, MM51275, MM51273, MM51272, MM51288, MM51282, MM51281, MM51271, MM51270, MM51269, MM51268, MM51265, MM51308, MM51310, MM51309, MM51317, MM51322, MM51323, MM51324, MM51348, MM51349, MM51850, MM51279, MM51334, and MM51388.
- Network Labels:** Specific network points are labeled with voltage and phase information, such as '25 A', '112.5 ABC', and '50 A'.
- Inset Image:** A photograph of a physical transformer bank is shown in the bottom right corner of the map area.



ECWA_141r3.mxd - Arc Map

File Edit View Insert Tools Window Help

Editor Create New Feature

Data

- WaterWorks WaterWorks_Junc
- WaterWorks tees
- WaterWorks services
- WaterWorks hydrants
- WaterWorks valves
- WaterWorks caps
- WaterWorks blowoff
- services
- WaterWorks reducers
- WaterWorks pipes
- LandBase centers
- LandBase pavement
- LandBase builds
- LandBase parcels

8" Ductile Iron Pipe

NT_ID	HHYD	KFEAT	
10386	J08H30	511	
9568	J08G26	511	
9599	J08G28	511	
9737	J08F30	511	
9824	J08F28	511	
9716	J08F32	511	
10640	K08E30	511	
18171	J08G35	511	
10643	K08E25	511	
9747	J08F37	511	
184	3117	10098 J08G39	511
185	3114	10410 J08H32	511
186	3123	10042 J08G36	511
187	3122	10031 J08G38	511
188	3119	10656 K08E40	511
189	3126	10408 J08H38	511
190	3127	10392 J08H37	511
191	3133	9840 J08F36	511
192	3129	10320 J08H36	511
193	3134	9846 J08F38	511
194	3130	10646 K08E33	511
195	3132	10307 J08H34	511

Record: 1 of 309

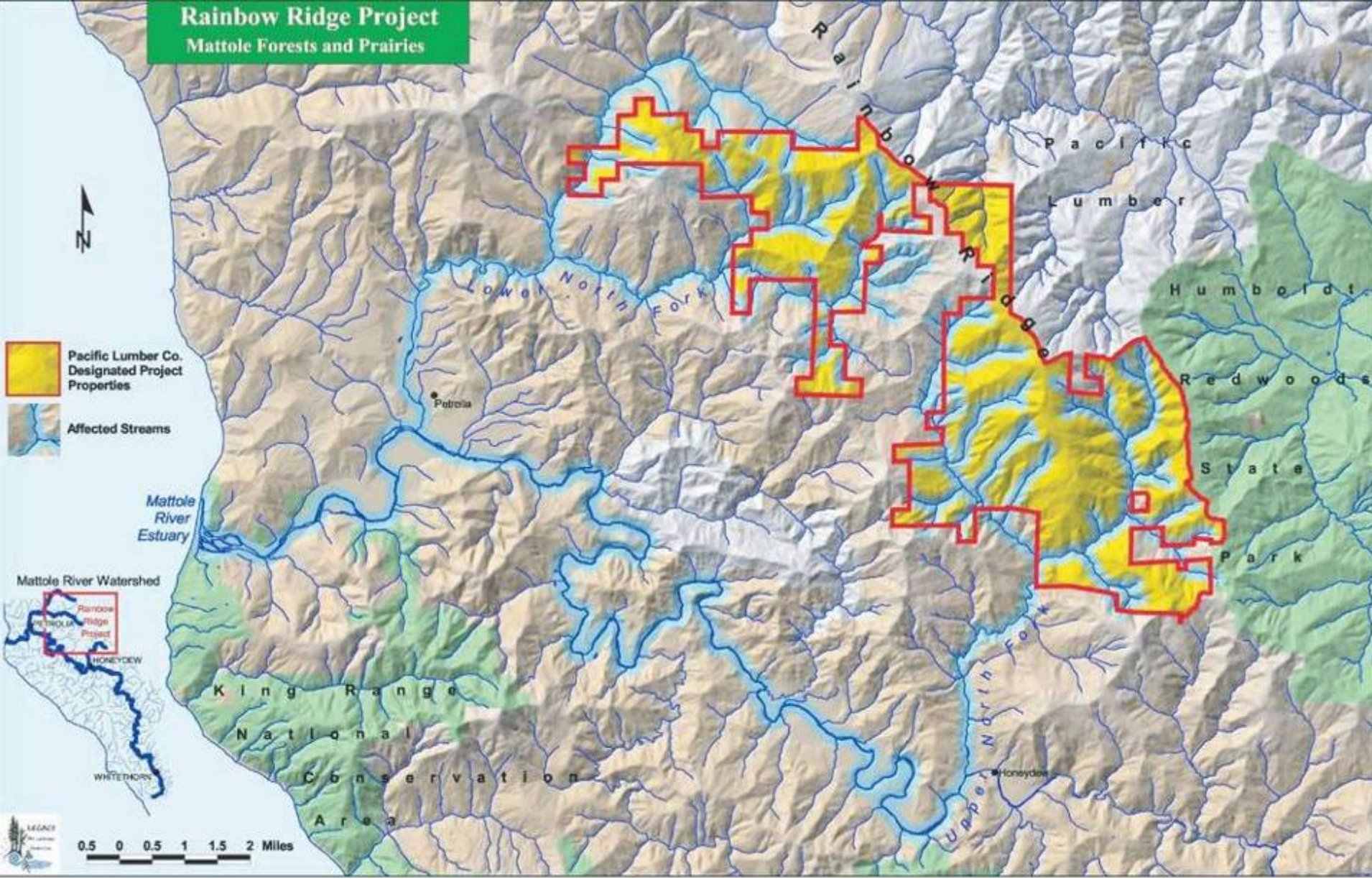
Display Source

Drawing Arial (Baltic) 9.75

© Draw time: 0.02 seconds. 1101086.71, 1074510.90 Meter



Rainbow Ridge Project Mattole Forests and Prairies



-  Pacific Lumber Co. Designated Project Properties
-  Affected Streams





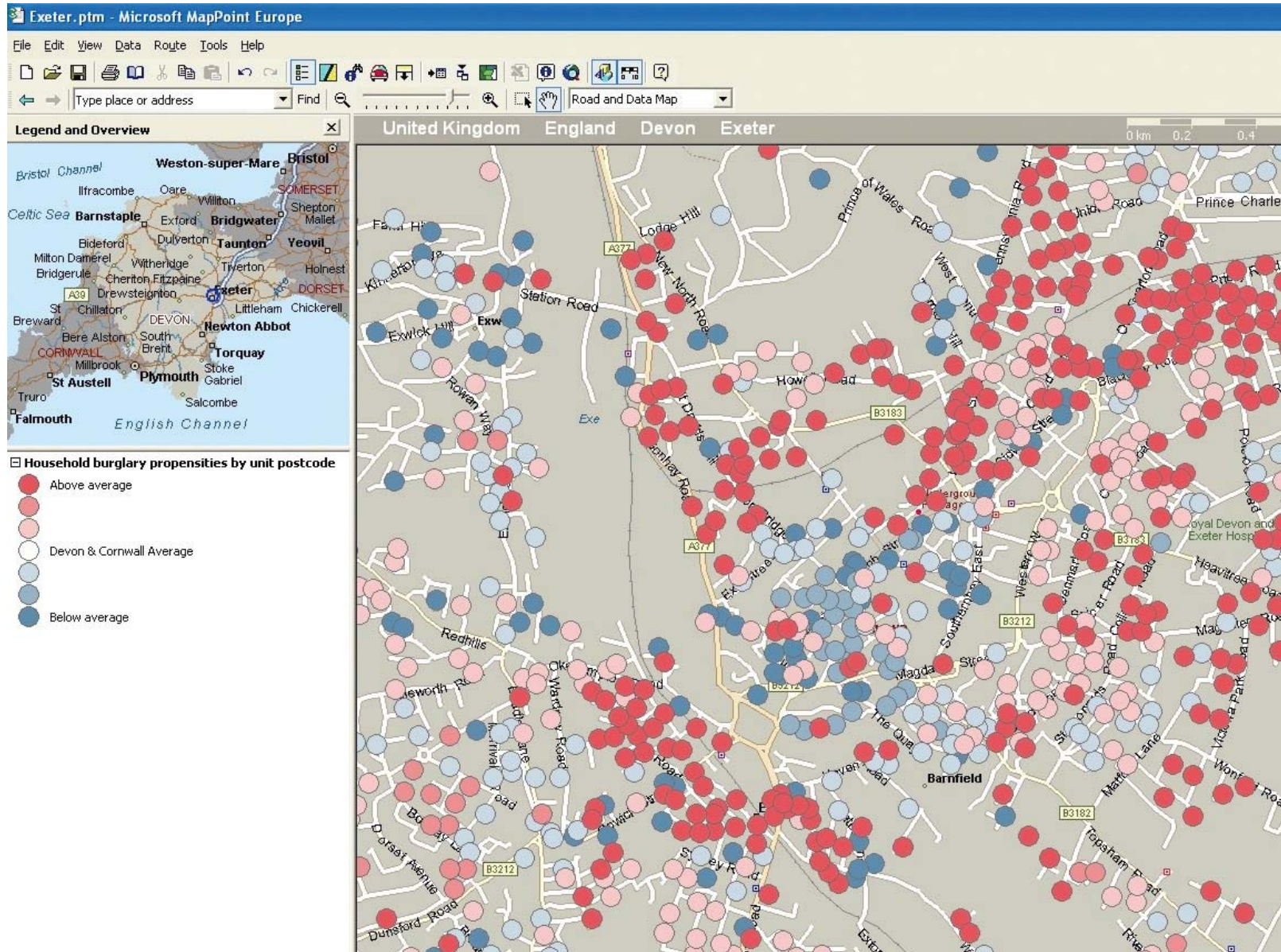
GIS Interest is Rising

- Applications via Internet
- Price reductions
- Greater awareness
- Improved ease of use
- Better technology
- Proliferation of data
- Commercial software packages
- Real applications
- Proven cost:benefit cases



Applied Problem Solving Goals

- Rational resource allocation
- Monitoring spatial distributions
- Understanding the importance of place
- Understanding processes
- Prescription of strategies for maintenance and conservation





Five Ms of Applied GIS

- 📍 Mapping
- 📍 Measuring
- 📍 Monitoring
- 📍 Modeling
- 📍 Managing



Roger's Diffusion Model

- Innovators – risk takers
- Early Adopters – opinion formers
- Early Majority – peers followers
- Late Majority – mass market trend followers
- Laggards – oriented to the past



Local Government

- Major user of GIS
 - ▣ 70-80% of local government tasks are geographically-related
- Many applications, e.g.
 - ▣ Asset inventories
 - ▣ Transportation planning
 - ▣ Land management
 - ▣ Economic development
 - ▣ Elections
 - ▣ Public health delivery



Tax Assessment

- Raising revenue from property taxes
 - ❑ Maintain property register
 - ❑ Evaluate land/property value fairly
 - ❑ Deal with public enquiries and complaints
- Assign value to property based on
 - ❑ Cost of replacement
 - ❑ Income if rented
 - ❑ Market comparison with recent sales



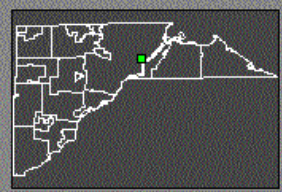
Lucas County GIS, Larry A. Kaczala

Lucas County Auditor, Larry A. Kaczala



PRINT

Locator Map



Map Layers

- TURN PARCELS OFF
- TURN MUNICIPALITIES OFF
- TURN STREETS OFF
- TURN AERIAL PHOTOS OFF
- MORE MAP LAYERS ...

Active Layer

Parcels

Text Labels

- Assessor Numbers
- Lot Dimensions
- Parcel Acreage
- Address Numbers
- Street Names

MORE TEXT LABELS ...



Search Results

Record Count: 1

SUMMARY

SEARCH

01085005 1548072 OHIO BUILDING AUTHORITY 525 N HURON ST E-03



Business and Service Planning

- Application of GIS to retail market decision making
- GIS has been applied at all scales
 - **Operational** – processing day-to-day transactions (e.g. delivery vehicle routing)
 - **Tactical** – allocation of resources to short-term (weekly) problems (e.g. target marketing promotional campaigns)
 - **Strategic** – longer term goals and missions (e.g. store location planning)



E29 City Adventurers (1.27%HH) 28 29 30 31 32 33 34

- A 1-7
- B 8-14
- C 15-20
- D 21-27
- E 28-34
- F 35-40
- G 41-43
- H 44-47
- I 48-50
- J 51-56
- K 57-61

The Observer
Sainsbury's
American Express
ABS ADVANTIA
The Guardian
Odeon
Fitness First
PLAY





GE Smallworld Core Spatial Technology

System View Select Edit Query Apps Model

Style: detail Select No current selection

Express Menu

Express Store Details

Ready

Site Number: Model:

Site Name: Competition:

Traffic Flow:

Households 0-1km:

Adj Households:

Included Stores:

ID	Operator	Status	Area	PFS?	Location	Distancekm	
00354E	SOMERFIELD	G	E	1	6047	unset	KINSON
09021E	SOMERFIELD	L	E	1	7000	unset	BOURNEMOUTH
11126I	ICELAND	I	1	5800	unset	unset	BOURNEMOUTH
14863Y	SAFEWAY/BP	Y	1	3000	unset	unset	BOURNEMOUTH
14175Q	LIDL	Q	1	9000	unset	unset	BOURNEMOUTH
00700C	PIONEER	C	1	9725	unset	unset	BOURNEMOUTH

Swap In Swap Out Refresh Edit Store Area

Excluded Stores:

ID	Operator	Status	Area	PFS?	Location	Distancekm	
10929Q	LIDL	Q	1	8000	unset	POOLE	2.9
12398D	ALDI	D	1	unset	unset	BOURNEMOUTH	2.8

Run Model Interrupt Export Data Quit



Logistics

- Many applications of GIS in transportation and logistics, e.g.
 - ▣ Infrastructure maintenance
 - ▣ Travel planning
 - ▣ Routing
 - ▣ Vehicle tracking
- Two components
 - ▣ Static – infrastructure
 - ▣ Dynamic - vehicles



Planning for Emergency Evacuation

- Major natural and human-induced events may necessitate area evacuations
- GIS can be used to create effective evacuation vulnerability maps based on
 - ▣ Distribution of population
 - ▣ Street map
- Model demand and impact of bottlenecks on speed of evacuation using standard GIS network tools
 - ▣ Adjacency, connectivity, shortest path network calculation

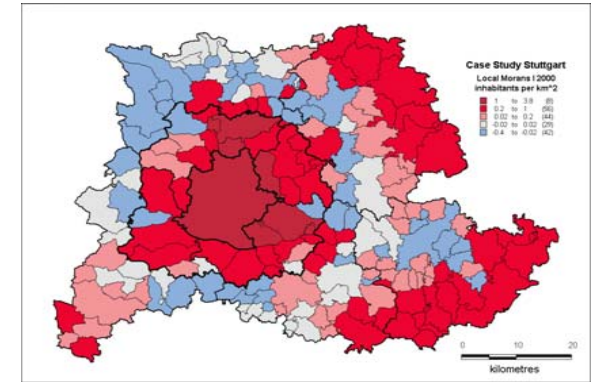
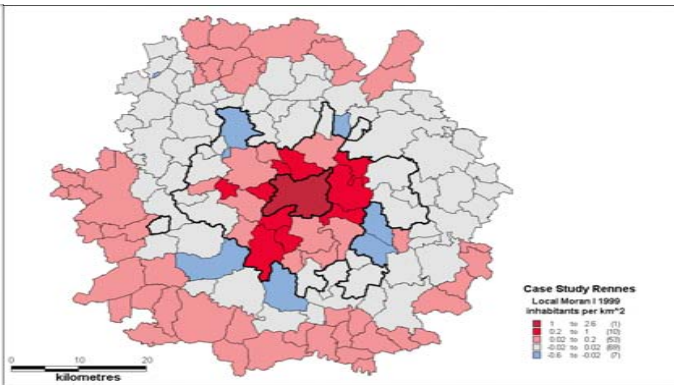
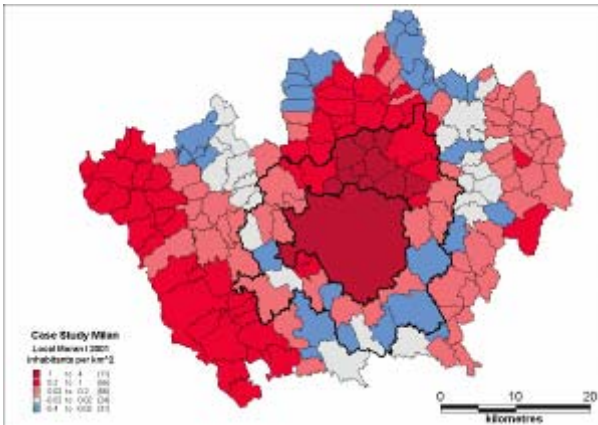
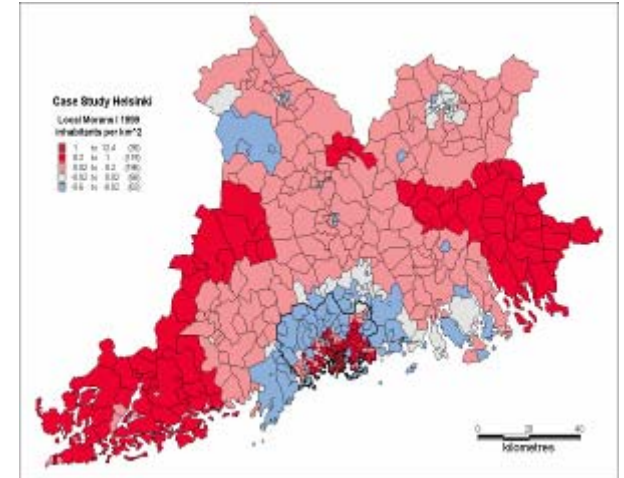
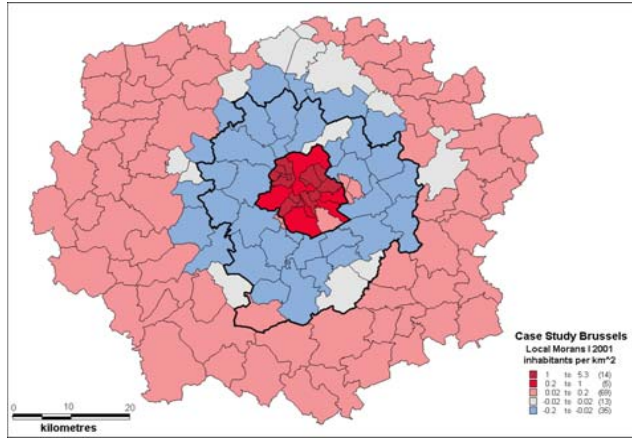
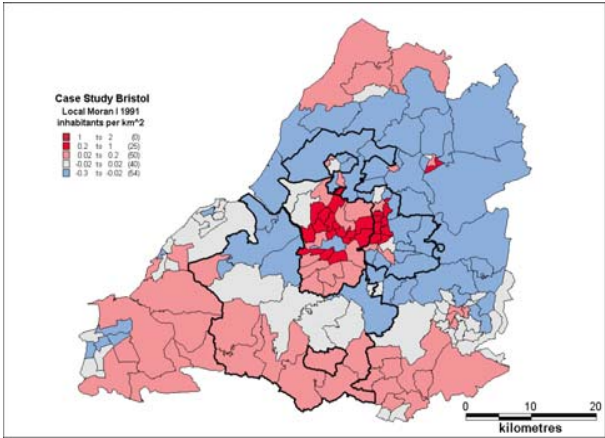




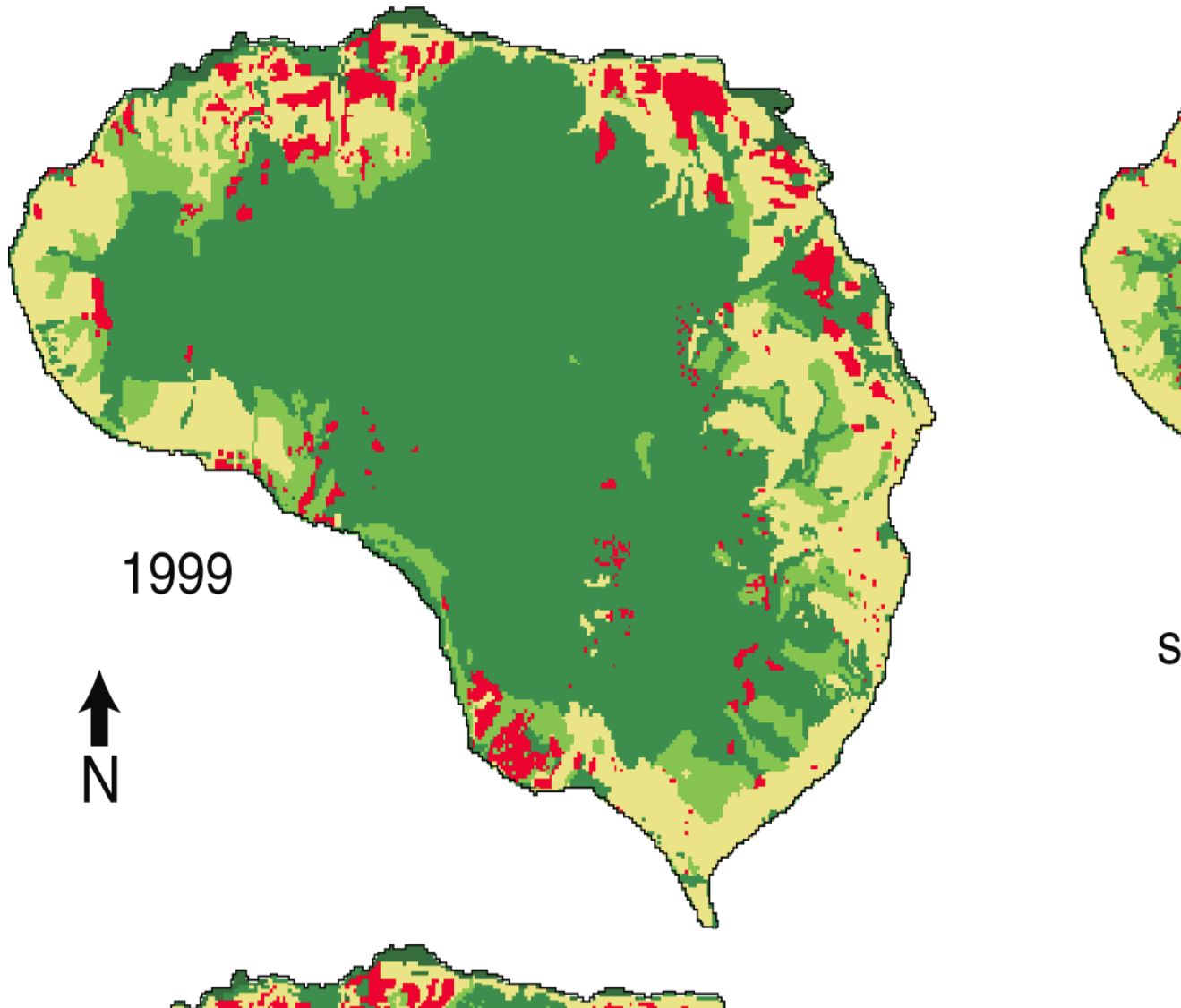
Environment

- Many environmental applications of GIS
 - ❑ Natural resource inventory
 - ❑ Environmental remediation
 - ❑ Sustainable development
 - ❑ Precision agriculture
 - ❑ Natural hazard mitigation
 - ❑ Environmental impact analysis











Summary

- GIS is fundamentally a problem-solving science
- Many application of GIS across a very wide range of areas
- Understanding the science behind applications will help
 - ▣ Interpretation of results
 - ▣ Understanding the weight that results carry