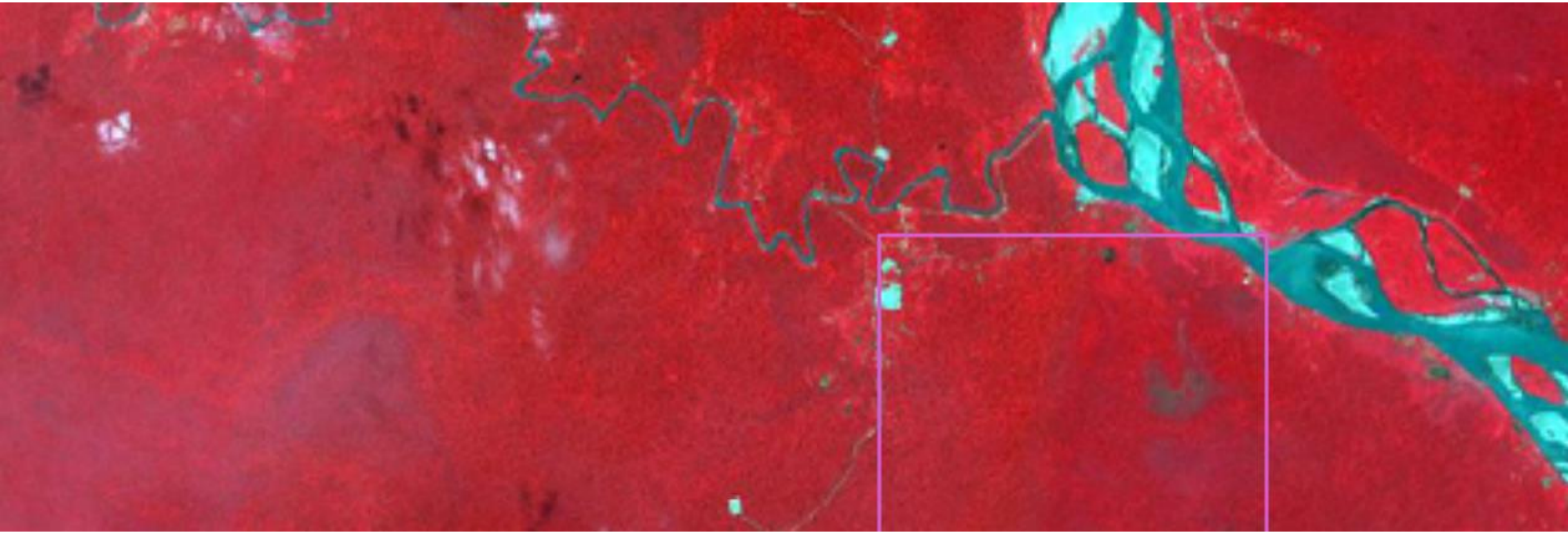
Informazione geografica da sistema a scienza - parte 1



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GIScience e Digital Earth per l'interpretazione del paesaggio

Dalla cartografia alle nuove tecnologie dell'informazione geografica

Combinazione di geoinformazione e geomedia

- I desktop GIS
- Navigatori satellitari (GPS)
- La terra digitale
- Il web GIS e il CMS geografico (Content Management Systems)
- Smartphone
- Droni

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Cos'è un GIS (un desktop GIS)

GIS: Geograghic Information System

- GIS: Geographic Information Science
- GIS: Geospatial Information Science
- GIS: Geospatial Information Studies

Non è solo un PC e un software

- Tra le varie definizioni, quella che mi piace di più è "Mappa di un ordine superiore" di J. Star e J. Estes (1990), *Geographic Information Systems: An Introduction*. Prentice-Hall

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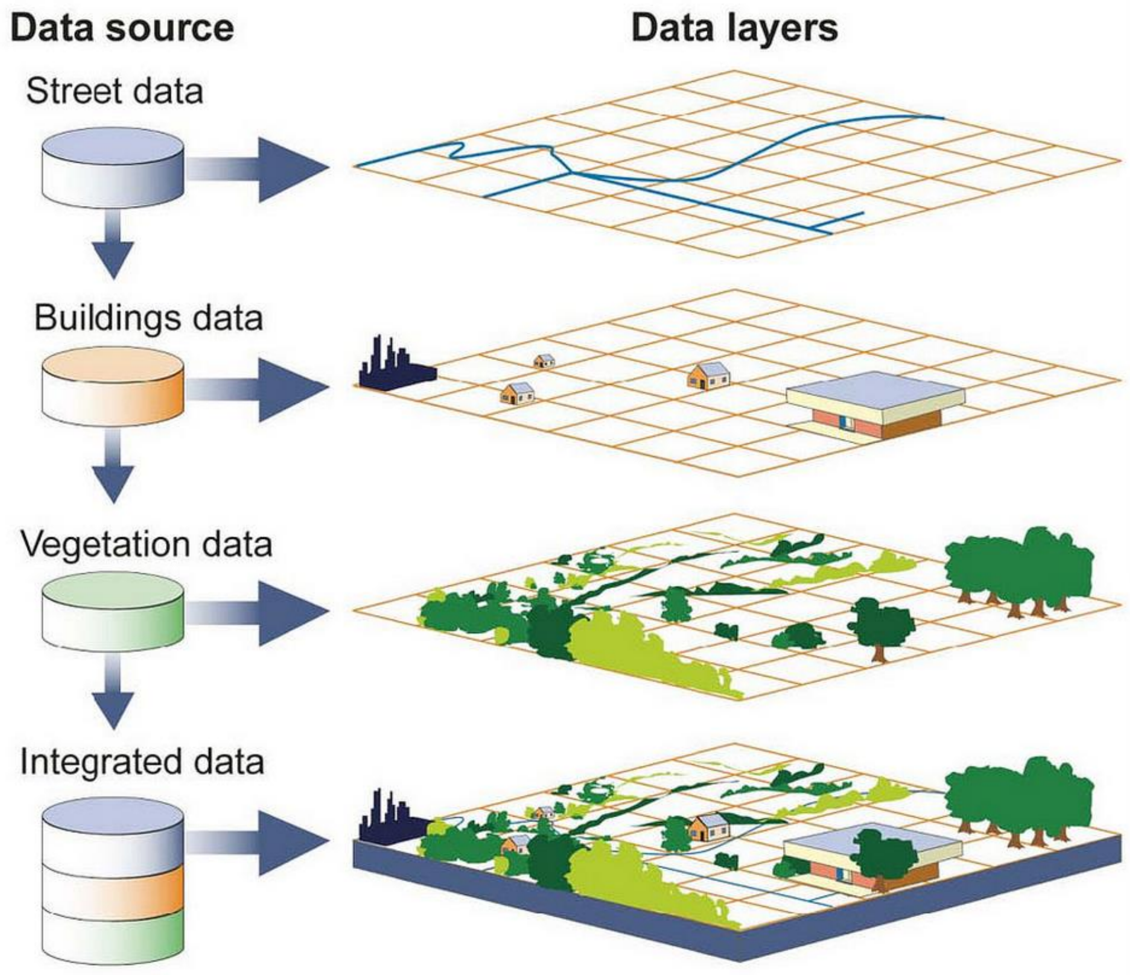
Mappa di ordine superiore: livelli (lajers) e database



Combinazione di localizzazione e informazione

Fonte: Forestry Map of Alaska

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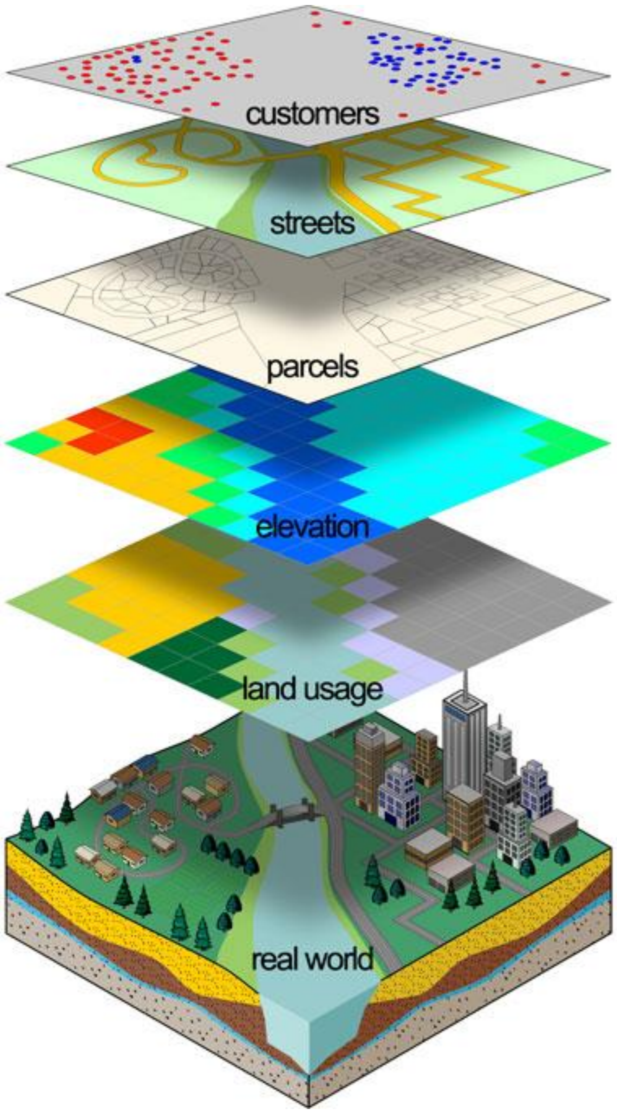
Il GIS ha più di 50 anni

Il GIS ha più di 50 anni di storia

- Roger Tomlinson (1962), Canada Geographic Information System
- “Electronic data processing in geographical research”, *Professional Geographer* 14: 1–4
- Michael Dacey e Duane Marble sembrano usare il termine "sistema di informazione geografica" la prima volta nel 1965 alla Northwestern University
- Uno dei primi GIS non era basato su computer: Layers trasparenti di McHarg's (1969, *Design With Nature*) (Cimmery, 2010)



Fonte: ds.cs.ut.ee

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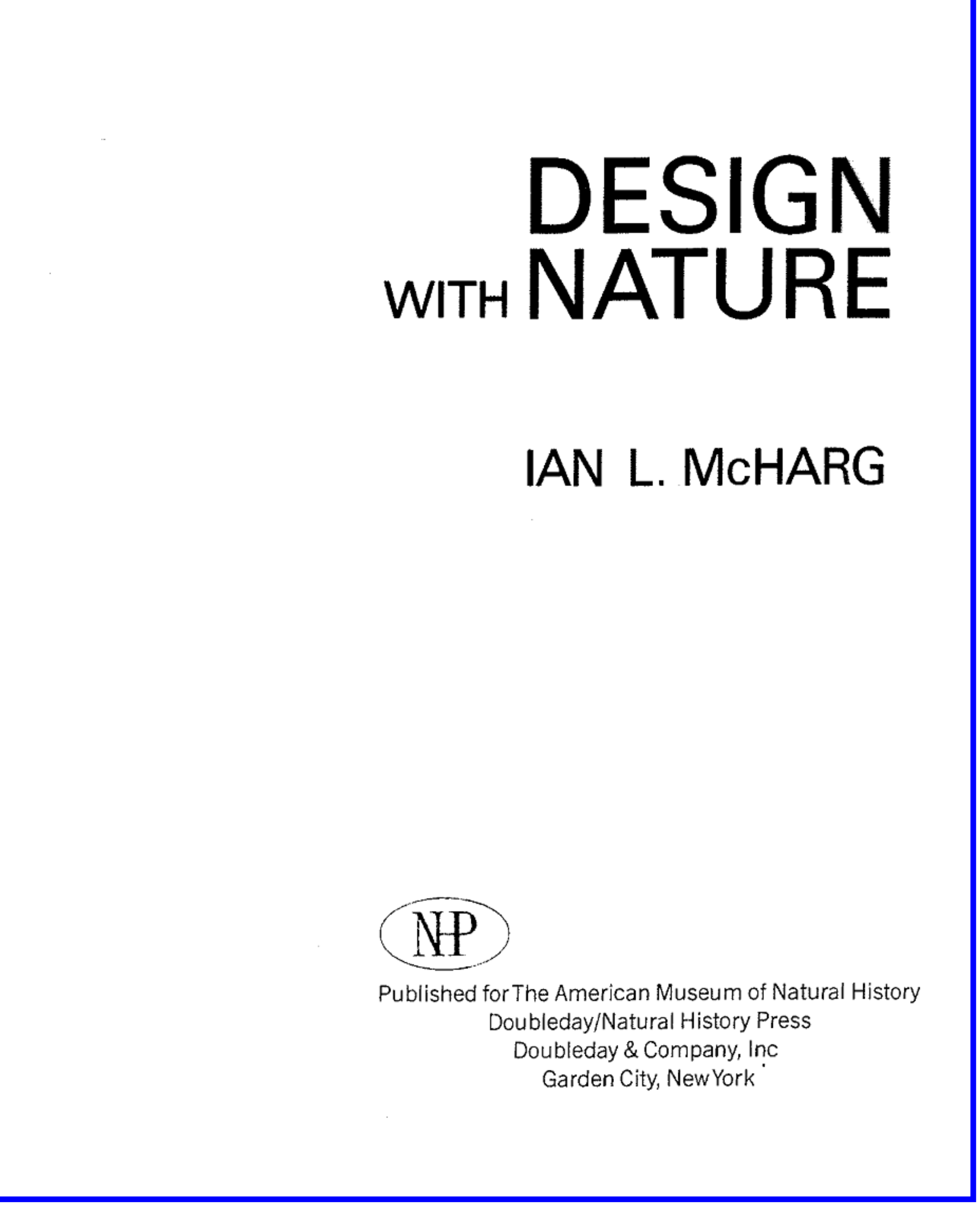

DESIGN WITH NATURE

IAN L. McHARG

NHP

Published for The American Museum of Natural History
Doubleday/Natural History Press
Doubleday & Company, Inc
Garden City, New York

Design with nature (1969)

- Land suitability analysis
- Chapter 4: A step forward
- Richmond Parkway
- Integrazione di progettazione con valutazione di impatto ambientale

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Chapter 4: A step forward

- **p. 33, Suggested criteria for State Highway route selection**

BENEFITS AND SAVINGS

Price Benefits

Reduced time distance
Reduced gasoline costs
Reduced oil costs
Reduced tire costs
Reduced vehicle depreciation
Increased traffic volume

Increase in Value (Land & Bldgs.):
Industrial values
Commercial values
Residential values
Recreational values
Institutional values
Agricultural land values

Non-price Benefits

Increased convenience
Increased safety
Increased pleasure

Price Savings

Non-limiting topography
Adequate foundation conditions present
Adequate drainage conditions present
Available sands, gravels, etc.
Minimum bridge crossings, culverts, and other structures required

Non-price Savings

Community values maintained
Institutional values maintained
Residential quality maintained
Scenic quality maintained
Historic values maintained
Recreational values maintained
Surface water system unimpaired
Groundwater resources unimpaired
Forest sources maintained
Wildlife resources maintained

COSTS

Price Costs

Survey
Engineering
Land and building acquisition
Construction costs
Financing costs
Administrative costs, Operation and maintenance costs
Reduction in Value (Land & Bldgs.):
Industrial values
Commercial values
Residential values
Recreational values
Institutional values
Agricultural land values

Non-price Costs

Reduced convenience to adjacent properties
Reduced safety to adjacent populations
Reduced pleasure to adjacent populations
Health hazard and nuisance from toxic fumes, noise, glare, dust

Price Costs

Difficult topography
Poor foundations
Poor drainage
Absence of construction materials
Abundant structures required

Non-price Costs

Community values lost
Institutional values lost
Residential values lost
Scenic values lost
Historic values lost
Recreational values lost
Surface water resources impaired
Groundwater resources impaired
Forest resources impaired
Wildlife resources impaired

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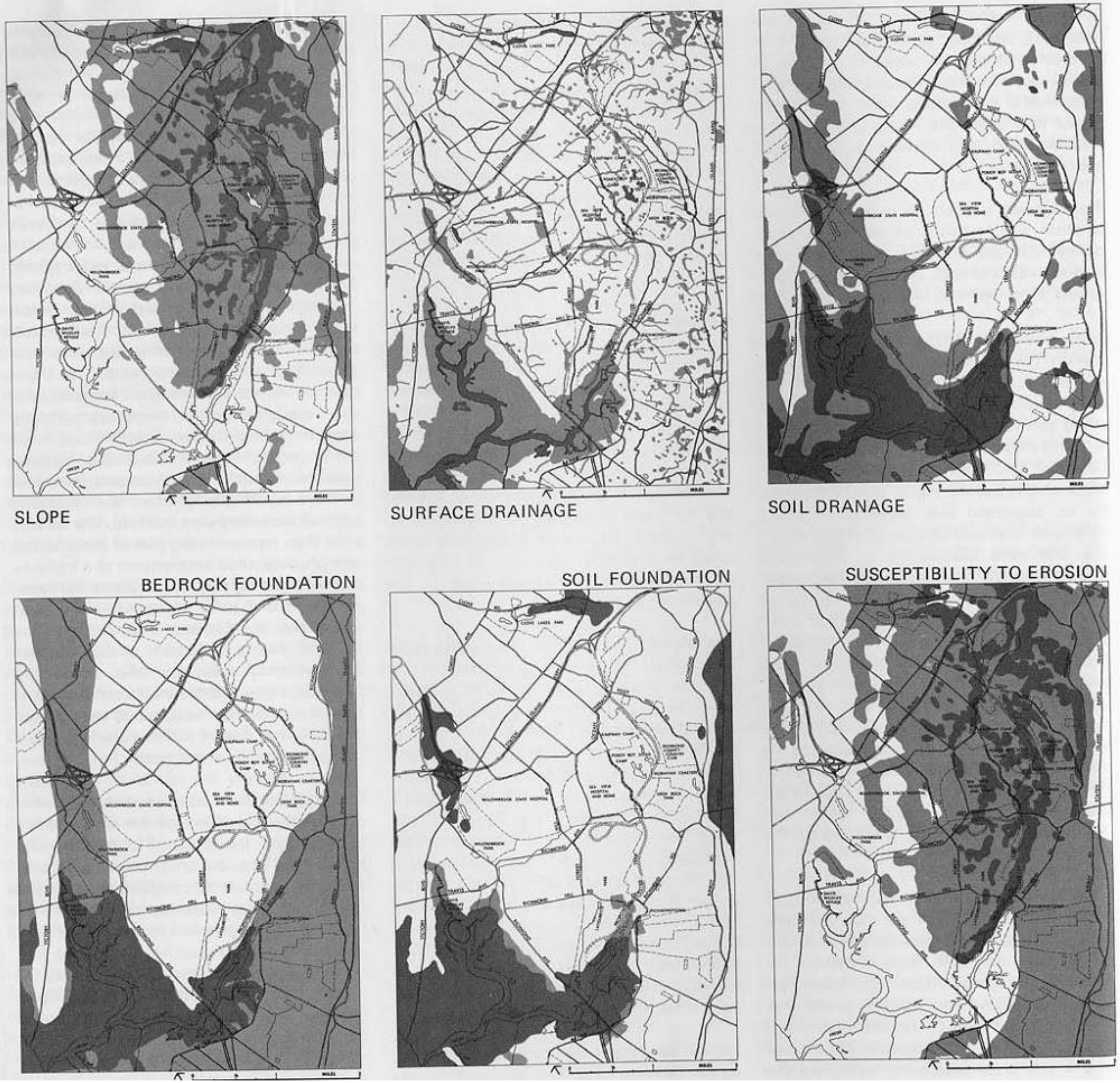
First group layers
Richmond Parkway



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Composite physiographic obstruction

SLOPE

ZONE 1 Areas with slopes in excess of 10%.
ZONE 2 Areas with slopes less than 10% but in excess of 2½%.
ZONE 3 Areas with slopes less than 2½%.

SURFACE DRAINAGE

ZONE 1 Surface-water features—streams, lakes and ponds.
ZONE 2 Natural drainage channels and areas of constricted drainage.
ZONE 3 Absence of surface water or pronounced drainage channels.

SOIL DRAINAGE

ZONE 1 Salt marshes, brackish marshes, swamps, and other low-lying areas with poor drainage.
ZONE 2 Areas with high water table.
ZONE 3 Areas with good internal drainage.

BEDROCK FOUNDATION

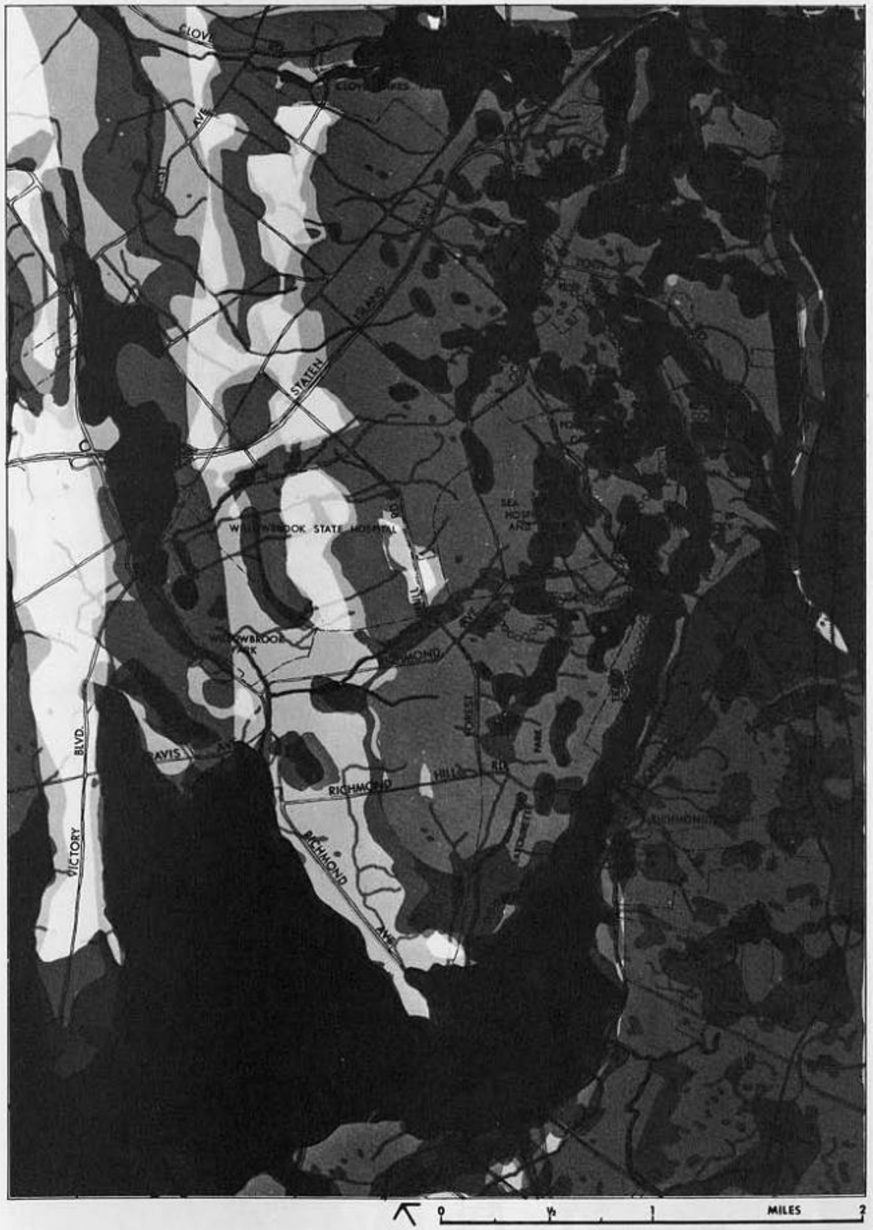
ZONE 1 Areas identified as marshlands are the most obstructive to the highway; they have an extremely low compressive strength.
ZONE 2 The Cretaceous sediments: sands, clays, gravels; and shale.
ZONE 3 The most suitable foundation conditions are available on crystalline rocks: serpentine and diabase.

SOIL FOUNDATION

ZONE 1 Silts and clays are a major obstruction to the highway; they have poor stability and low compressive strength.
ZONE 2 Sandy loams and gravelly sandy to fine sandy loams.
ZONE 3 Gravelly sand or silt loams and gravelly to stony sandy loams.

SUSCEPTIBILITY TO EROSION

ZONE 1 All slopes in excess of 10% and gravelly sandy to fine sandy loam soils.
ZONE 2 Gravelly sand or silt loam soils and areas with slopes in excess of 2½% on gravelly to stony sandy loams.
ZONE 3 Other soils with finer texture and flat topography.



COMPOSITE: PHYSIOGRAPHIC OBSTRUCTIONS

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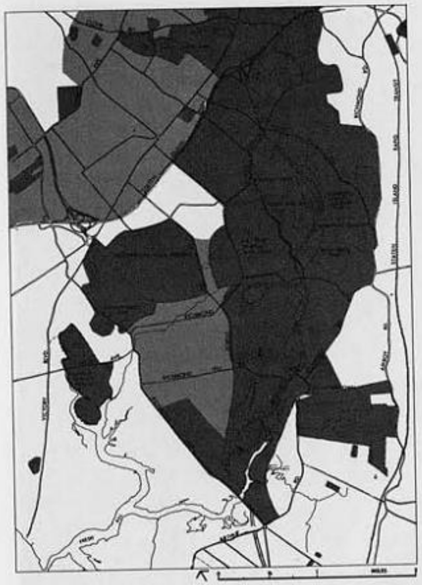
Second group of layers (1)



LAND VALUES

TIDAL INUNDATION

LAND VALUES
ZONE 1 $3.50 a square foot and over.
ZONE 2 $2.50-$3.50 a square foot.
ZONE 3 Less than $2.50 a square foot.

TIDAL INUNDATION
ZONE 1 Inundation during 1962 hurricane.
ZONE 2 Area of hurricane surge.
ZONE 3 Areas above flood line.

HISTORIC VALUES
ZONE 1 Richmondtown Historic Area.
ZONE 2 Historic landmarks.
ZONE 3 Absence of historic sites.

SCENIC VALUES
ZONE 1 Scenic elements.
ZONE 2 Open areas of high scenic value.
ZONE 3 Urbanized areas with low scenic value.

RECREATION VALUES
ZONE 1 Public open space and institutions.
ZONE 2 Non-urbanized areas with high potential.
ZONE 3 Area with low recreation potential.

WATER VALUES
ZONE 1 Lakes, ponds, streams and marshes.
ZONE 2 Major aquifer and watersheds of important streams.
ZONE 3 Secondary aquifers and urbanized streams.

FOREST VALUES
ZONE 1 Forests and marshes of high quality.
ZONE 2 All other existing forests and marshes.
ZONE 3 Unforested lands.

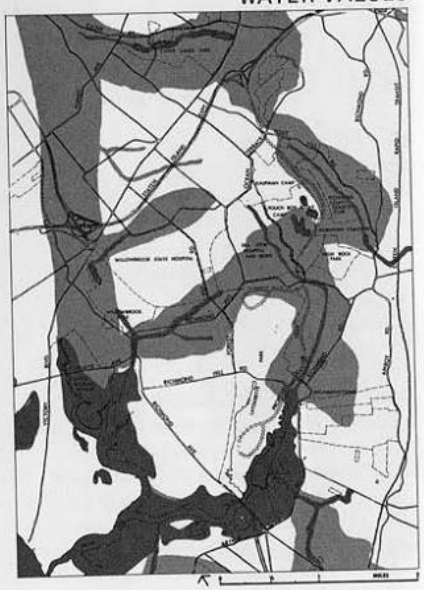
WILDLIFE VALUES
ZONE 1 Best quality habitats.
ZONE 2 Second quality habitats.
ZONE 3 Poor habitat areas.

RESIDENTIAL VALUES
ZONE 1 Market value over $50,000.
ZONE 2 Market value $25,000-$50,000.
ZONE 3 Market value less than $25,000.

INSTITUTIONAL VALUES
ZONE 1 Highest value.
ZONE 2 Intermediate value.
ZONE 3 Least value.

HISTORIC VALUES

WATER VALUES



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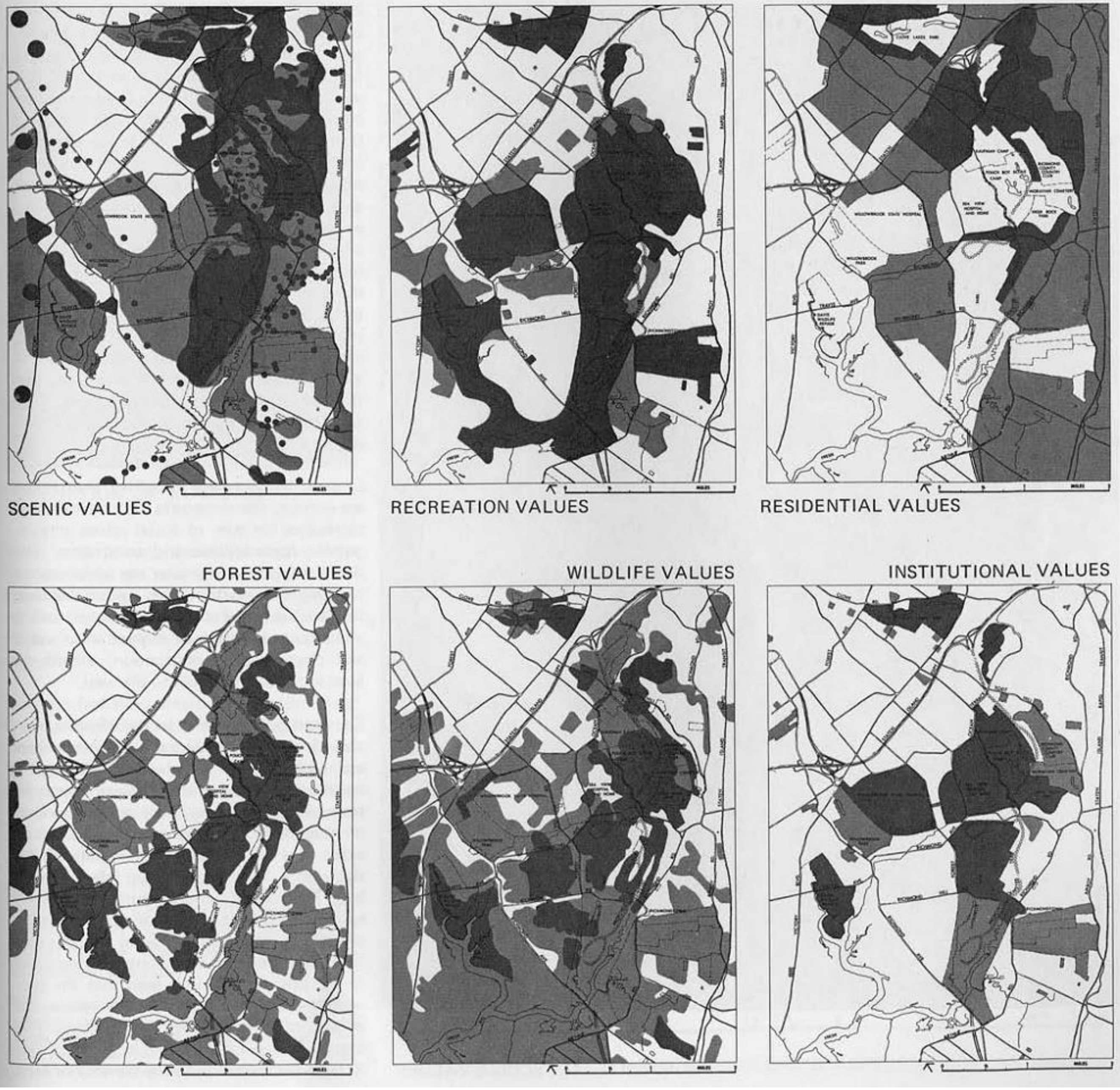
Second group of layers (2)



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COMPOSITE: ALL SOCIAL VALUES

Each of the social values has now been superimposed. The first group of physiographic corridors is apparent. When the next factor of tidal inundation is examined it is seen to set western limits to the western corridor. Land values are highest in the Greenbelt but relatively low to the west save for the exception of a commercial area. Each subsequent superimposition of social values gives primacy to the Greenbelt until the final summation shows the highest concentration of social values and physiographic obstruction concentrated in the eastern sector. If the area of highest social value is clear, so too is that of the lowest value reflected in a broad band in the western physiographic corridor. The western limits of the zone of lowest social value are established by the Wildlife Refuge, the physiographic constraints offered by the sanitary landfill and marshes.

In sum, if the values identified and ranked are correct, the composite map on this page represents the sum of social values, physiographic opportunities and constraints. The darker the tone the greater the social cost of highway construction, the lighter the tone the less the social cost. The Greenbelt looms as the concentration of highest social value and physiographic obstruction; a path of least social cost is visible to the west.

The method is explicit in the identification and ranking of physiographic opportunities and limitations to a highway corridor. It is equally explicit as to social values. As can be seen clearly, the maximum concurrence of physiographic limitations and social values exists as a solid mass in the middle of the study area. This is the Staten Island Greenbelt. The presence and concurrence of these values is seen as a resistance to highway transection, their paucity as an opportunity. When the proposed alignments are examined from right to left, it is seen that the first would violate the highest social values and would incur the highest social costs. The second is as culpable, whereas the next two in large part conform to the corridor of least

Composite all social values

archi@gmail.com

EVALUATION OF ALIGNMENTS

social cost. A propitious alignment can be found within the area defined by the two westward routes in their lower section, but to the north the least-social-cost corridor follows in a band to the west of the shared alignments.

The area free from tone on the adjacent map is the area of least social cost within which is revealed the least-social-cost corridor. Existing structures are superimposed on the map and the location of the two alternative minimum-social-cost alignments can be seen as a response to these local social values.

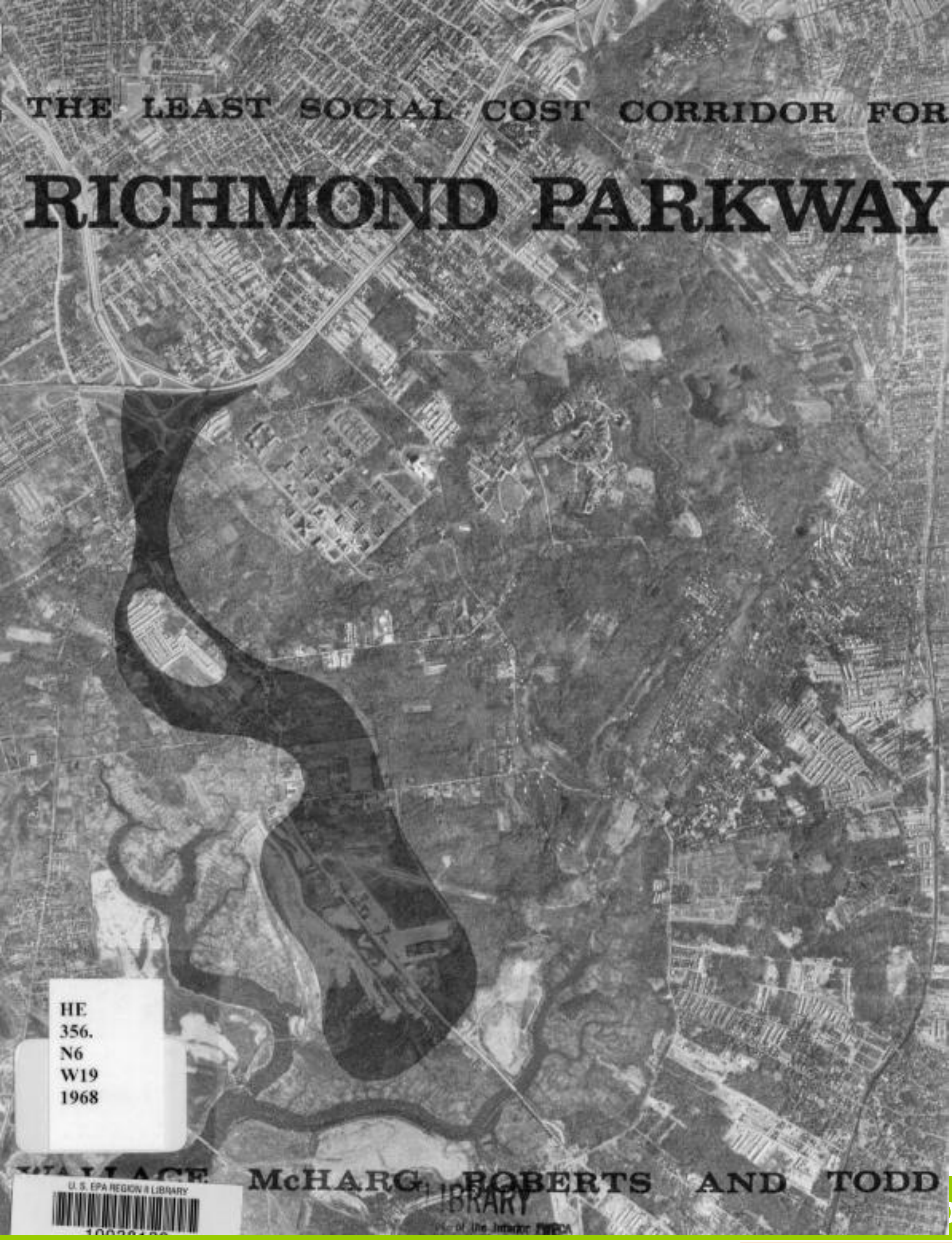
The Tri-State Transportation Commission reversed its decision to transect the Greenbelt with the Richmond Parkway and accepted the least-social-cost alignment developed in this study.

The Richmond Parkway Study was undertaken for the New York City Department of Parks by Wallace, McHarg, Roberts and Todd. The author was responsible for the project which was supervised by Mr. Narendra Juneja, assisted by Mr. Derik Sutphin and Mr. Charles Meyers.

RECOMMENDED MINIMUM-SOCIAL-COST ALIGNMENT

Recommended minimum social cost alignment

chi@gmail.com



1969

paesaggio

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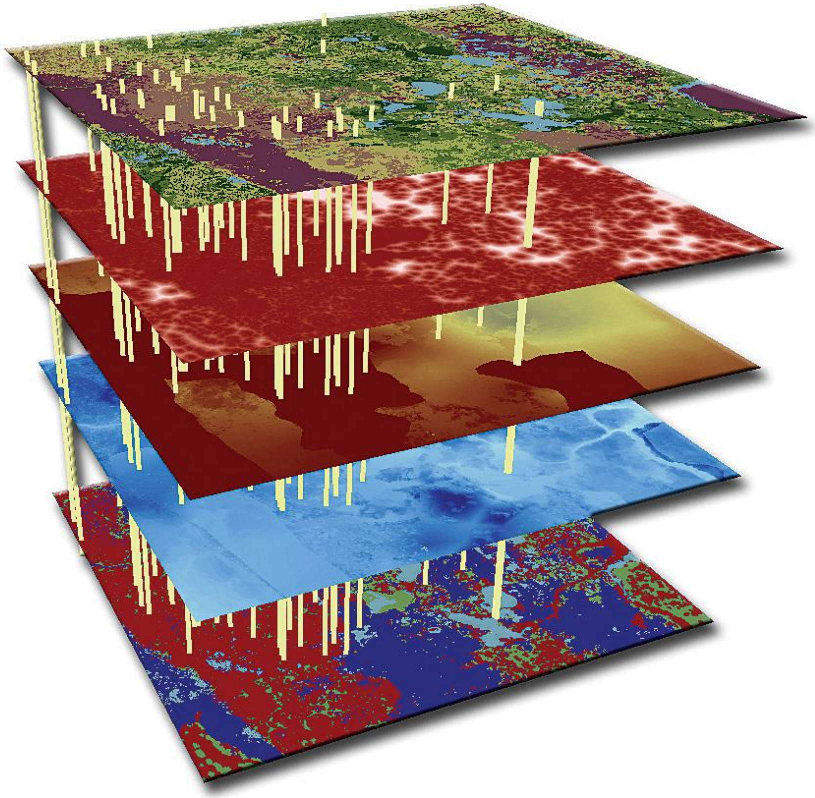
GIS: integrazioni 2D e 3D

Un quartiere urbano



Un acquifero

Fonte: www.esri.com

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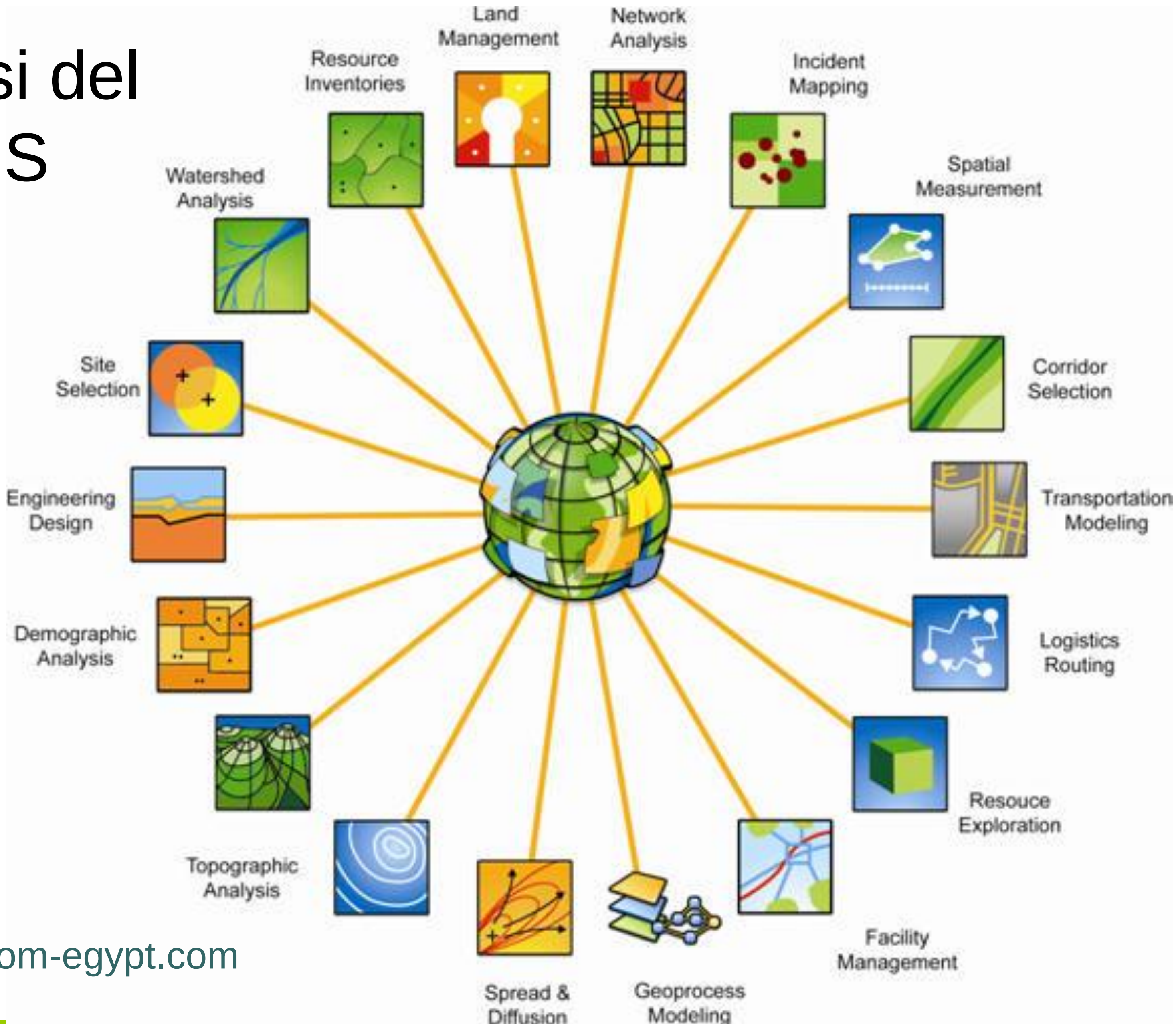
Usi del GIS



Fonte: www.alnozom-egypt.com

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Da Sistemi a Scienza: prassi e ricerca

- 1985 University of Edimburgh Coppock y Healey aprono il primo MSc in GIS
- Longley P.A., Goodchild M.F., Maguire D.J., Rhind D.W. (1991), *Geographic Information Systems*, First Edition, Wiley (Big Book 1 – 2 vol. 1000 p.)
- Goodchild M. F. (1992), "Geographical information science" *International Journal of Geo-graphical Information Systems* 6, 1 (1992), 31–45.
- Longley P.A., Goodchild M.F., Maguire D.J., Rhind D.W. (1999), *Geographical Information Systems: Principles, Techniques, Management and Applications*, Wiley (Big book 2 – 2 vol. 1700 p. http://www.geos.ed.ac.uk/~gisteac/gis_book_abridged/)
- Longley P.A., Goodchild M.F., Maguire D.J., Rhind D.W. (2001), *Geographic Information Systems and Science* (first edition), Wiley (Second edition 2005, 3rd edition 2010)
- Longley P.A., Goodchild M.F., Maguire D.J., Rhind D.W. (2015), *Geographic Information Science and Systems* (p. 517)

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5 generazioni del GIS

- pionieri degli anni 1960
- spinto dallo stato dagli anni '70
- spinto dalle imprese, anni '80
- spinto da utenti e università (GIScience) degli anni '90 del XX secolo
- spinto dai social network e dal web dopo gli anni 2000, ma soprattutto da coloro che si definiscono *produsers* o nella dicotomia consumatore / cittadino Sagoff

- neogeografi
- Saranno i cittadini o i consumatori a guidare il futuro dei GIS?

- Sta a noi accettare questa sfida: ognuno di noi è mosso dalla curiosità (ricerca scientifica), mosso dal lavoro (lavoratori, dobbiamo vivere), mosso dalla cittadinanza (responsabilità)

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