

Departmental Meeting on 02/03/1999 by M. Umezaki.

Title: Integration of Landsat Thematic Mapper and Census Data for Quality of Life Assessment.

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## 1. Introduction

QOL: Quality of Life

“a collective attribute that adheres to groups of people, not to individual”.

“.....comprises both objective (ex. per capita income) and subjective (ex. how satisfied people are about their incomes) elements”.

“.....includes the psychological and sociological dimensions of adequate housing; the enjoyment of cultural, recreational and leisure time activities; satisfying interpersonal relationships and health family functionings; the knowledge and resources to adapt to our changing times and an equal opportunity to influence the direction and speed of the change”

“.....was based on economic, political, environmental, health, education and social factors”

Therefore: some commonly agreed-on objective indicators (such as income, housing, and education) have been used to measure QOL.

地域集団の QOL 評価 社会経済指標によるものがほとんど  
自然環境の指標を取り入れた QOL 評価が望ましい

## 2. The Study Area

Athens-Clarke County in the state of Georgia, USA

31376 ha, 87594 people in 1990.

52 の block groups, 中心の町は Athens (人口 45734)

## 3. Data

>Landsat TM (July 16, 1990)

>Black-and-white panchromatic aerial photographs (1: 18000, January 10, 1990)

>1990 census and housing data from the US Bureau of the Census (actual population, per capita income, median household income, median home value, educational level)

>1:24000 US Geological Survey topographic map sheets

## 4. Integrating Landsat TM Data with Census Data

### 4-a. Registration of spatial databases

### 4-b. Extraction of biophysical and land-cover data

Using Landsat TM:

--“% URBAN USE classes” (commercial + industrial + transportation)

--NDVI (the normalized difference vegetation index): highly correlated with vegetation parameters such as green-leaf biomass and green-leaf area

--Surface temperatures:  $T(K)=209.831 + 0.834DC - 0.00133DC^2$

T(K): absolute temperature in kelvins

DC: the digital counts of Landsat-5 TM band 6 (0 - 255)

### 4-c. Extraction of socioeconomic variables from census data

Population density/per capita income/ median home value/ percentage of college graduates, by block groups:

### 4-d. Integration approaches

**Principal components analysis** (PCA) was applied to the seven layers of image data:

(1) percentage of urban use, (2) NDVI, (3) surface temperature, (4) population density, (5) per capita income, (6) median home values, and (7) percentage of college graduates.

**GIS Overlay** Each data layer (n=7) was equally divided into 10 classes and aggregated for each block group. The score may range from 7 to 70. The direction of each variable was judged subjectively; whether it is desirable or not.

## 5. Conclusion

NDVI shows a negative correlation with land surface temperature, percentage of urban cover; a positive correlation with per capita income, median home value, and educational attainment.

PCA revealed an environmental data cluster (population density, percentage of urban use, and surface temperature) and socioeconomic data cluster (per capita income, median home value, percentage of college graduates and NDVI).

Is the concept of “greenness” and hence “NDVI” a measure of QOL?.