

22nd Annual Demographic Workshop

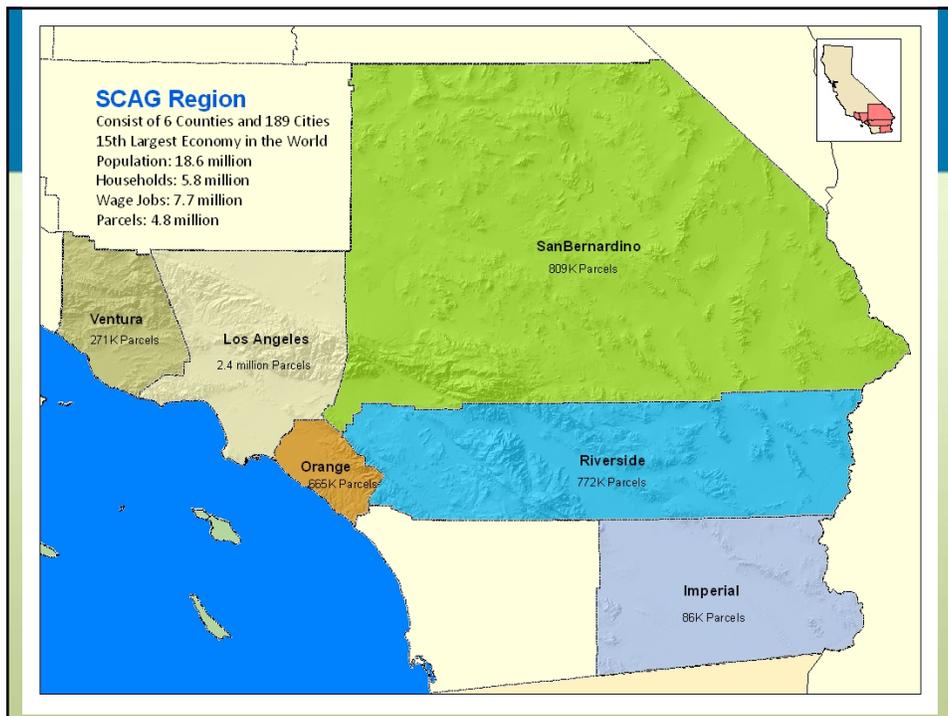
May 24, 2010

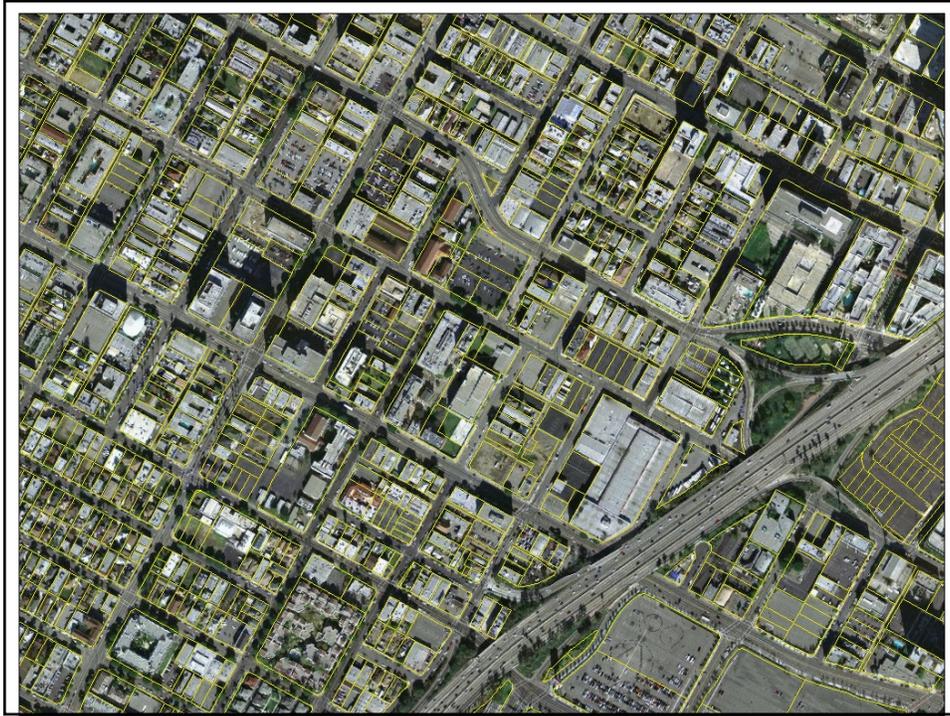


SOUTHERN CALIFORNIA  
ASSOCIATION of GOVERNMENTS

## Using Parcel Data / GIS for Planning Analysis / Practice

Frank Wen, Ping Wang, Sungbin Cho,  
Hsi-hwa Hu, Cheol-Ho Lee, Jung A Uhm





## Why Parcel Data in Planning

- Parcel data: Information about individual plots of land
- New research directions in demography, land use change, transportation, public health, real estate, economics, and ecology: accuracy in population and employment projections
- Advanced GIS techniques enable fine-scaled analysis with digital parcel data
- Planning requirements from SB 375

## Why Parcel Data in Planning

- Increasingly important to addressing a variety of planning research and policy concerns: supporting high-resolution analysis
  - Accuracy in developing database on land use and condition
  - Assessment of the developability / re-developability of land
  - Monitoring 'pipeline development' by tracking new projects through the approval and development process

## What is Parcel Database

- Parcel data: Information about individual plots of land
- A Parcel database includes:
  - Information of built environment
  - Information of natural environment
  - Information on people

## Parcel Database

- Information of built environment
  - Location / size (lot and floor) / story
  - Accessibility: transportation network, park, etc.
  - Value: transaction, assessed value, tax, or market price
  - Land use: general plan, zoning, density and existing land use
  - Structure: Year built / units

## Parcel Database

- Information of natural environment
  - Elevation / Slope
  - Shorelines
  - Rivers / wetlands
  - Flood area
  - Fault zone
  - Natural area

## Parcel Database

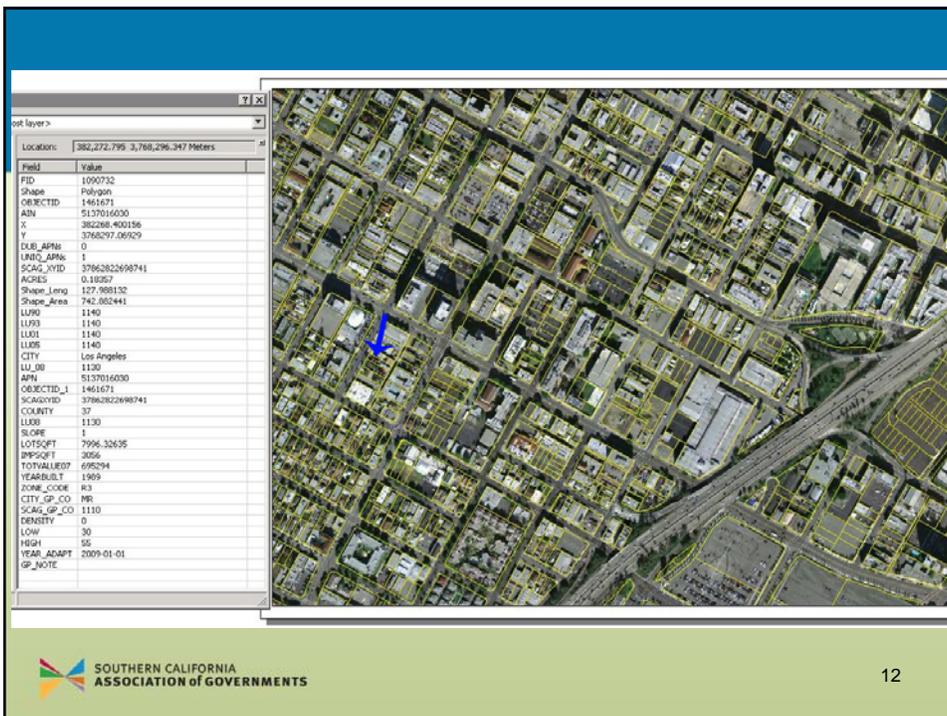
- Information on People
  - Ownership
  - Demographic characteristics
  - Socio-economic data for population and household
  - Employment

## Status of Parcel Database

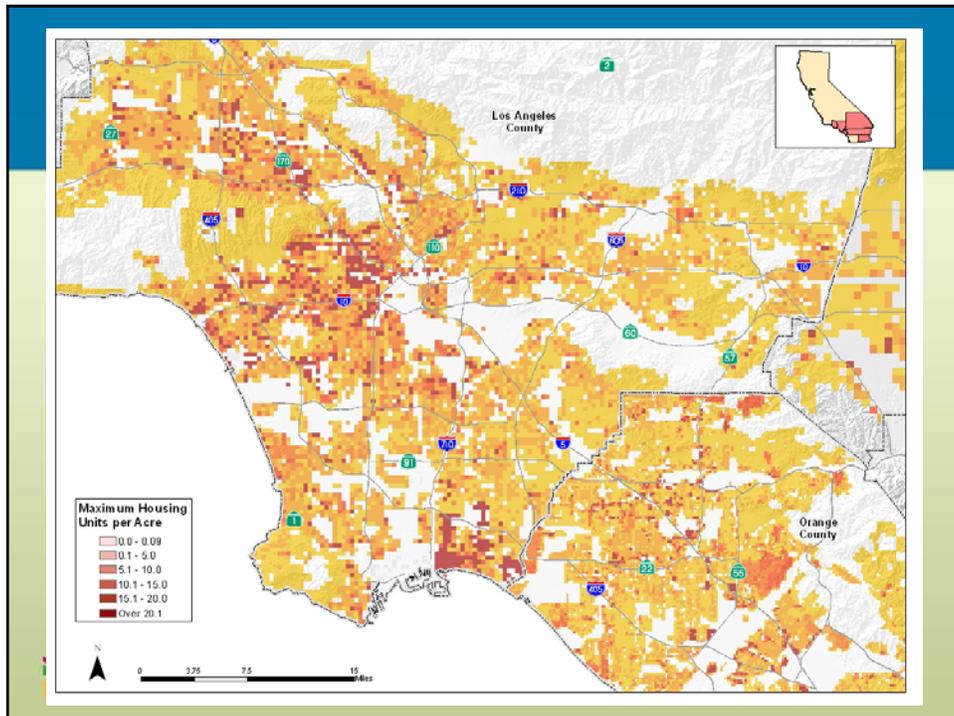
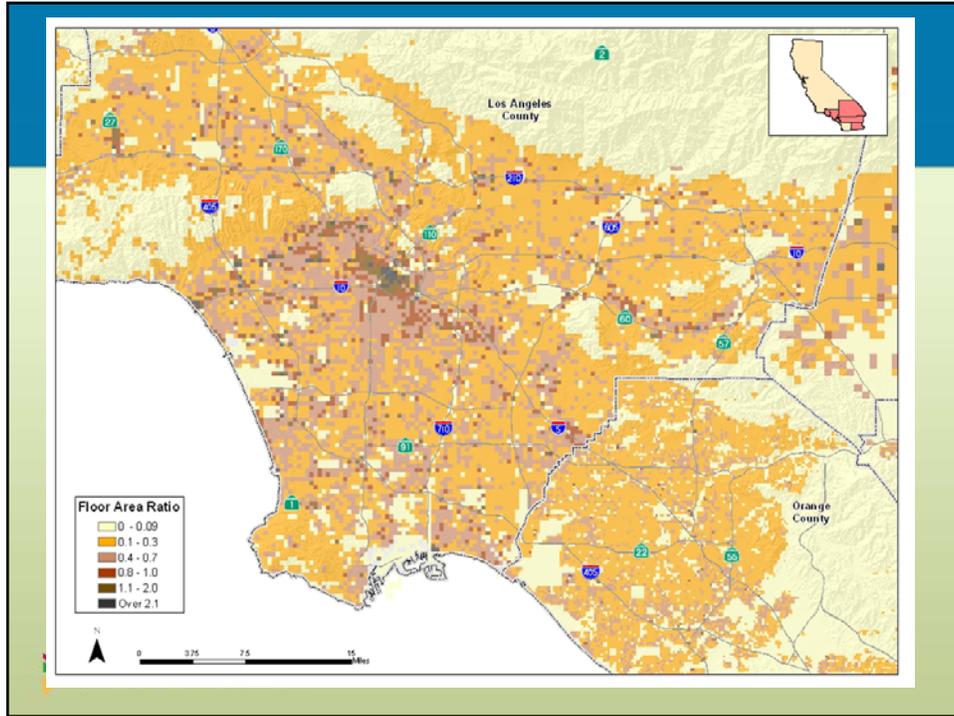
- 2008 Parcel boundary with attributes
  - Source: County assessor's offices / 3<sup>rd</sup> party vendor (Orange County)
  - Common Variables: Location, shape of lot, Identification APN/ID, Use (land use type, improvement floor space), Value (lot, improve, total ; evaluated), evaluated year, Structural characters
  - Adjusted with other data such as DOF, Census PUMS, AHS, and building inventory data

# Status of Parcel Database

- Land Use
  - Source: Local jurisdictions / Aerial Image
  - Existing Land Use: Year 1990, 1993, 2000, 2005, and 2008
  - General Plan including density : Year 2002, 2004, 2006, and 2008
  - Zoning: Year 2008 with local codes

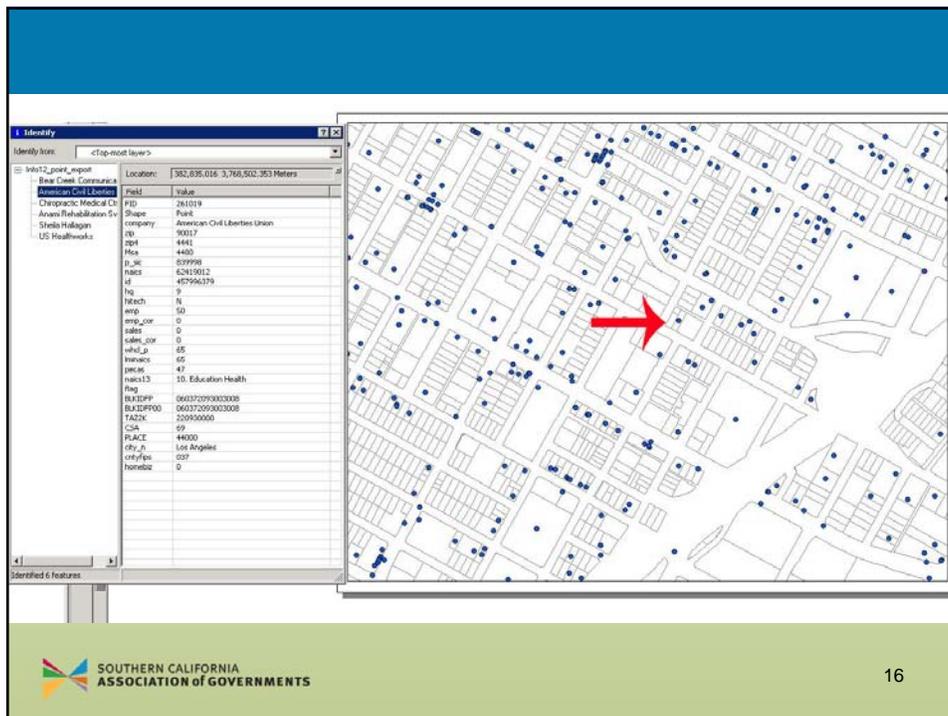


Field	Value
FID	1090732
Shape	Polygon
OBJECTID	1461671
APN	5137016000
X	382268.400156
Y	3766297.06929
LU01	0
UNIQ_APN	1
UNIQ_APN	1
SCAG_XYID	37962822696741
ACRES	0.18257
Shape_Leng	127.988132
Shape_Area	742.882441
LU90	1140
LU93	1140
LU05	1140
LU06	1140
CITY	Los Angeles
LU_08	1130
APN	5137016000
OBJECTID_1	1461671
SCAGXYID	37962822696741
COUNTY	37
LU00	1130
SLOPE	1
LOTSQFT	7996.32635
IMPQFT	3656
TOTVALUE07	695294
YEARBUILT	1969
ZONE_CODE	R3
CITY_GP_CO	WR
SCAG_GP_CO	1110
DENSITY	0
LOW	30
HIGH	55
YEAR_ADAPT	2009-01-01
GP_NOTE	



# Status of Parcel Database

- Employment (firm base)
  - Source: InfoUSA 2008
  - Variables: point base location, number of employees, industry, sales volume, and so on
  - Problems of Raw Data: rounding-up, HQ reporting, missing geo information, missing employment information
  - Adjustment: Corrected geo information (1/3 of the records), reclassified industry, and corrected employment information with other sources such as local input and ES-202

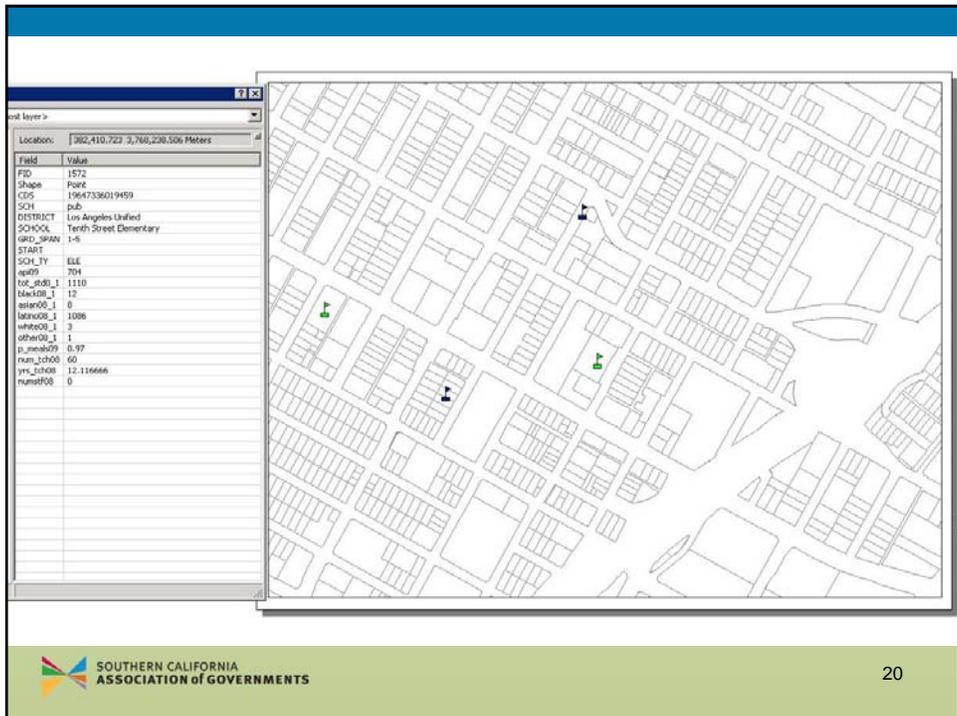
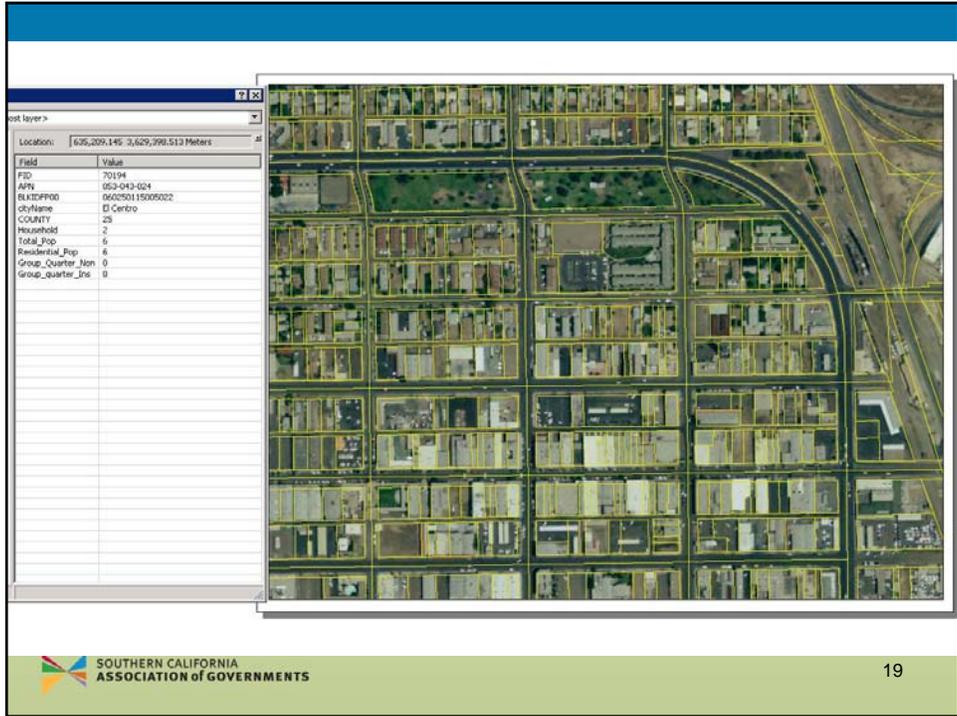


## Status of Parcel Database

- Environment Condition
  - Elevation / Slope: Digital Elevation Model
  - Shorelines: ESRI
  - Rivers / wetlands: ESRI
  - Flood area: FEMA
  - Fault zone: USGS
  - Natural area: general plan
  - Brownfield: US Department of Toxic Substances Control
  - Airport Noise: Noise Contour Maps

## Status of Parcel Database

- Demographic Data / Socio-Economic Data
  - Source: Census data (decennial/ACS) and local input
  - Allocated over 100 variables
  - Process:
    - Broken down Block (SF1) and Block Group (SF3 and CTPP) into minimum planning units (MPU: parcel/block) with city/county control
    - Correspondence table developed through the first process applied to 2008 SCAG socio-economic data at TAZ



## Use of Parcel Database - PECAS

- PECAS (Production, Exchange, and Consumption Allocation System): a recently-designed generalized approach for simulating spatial economic systems
- Activities by location with attributes
  - 6.8 million households by household characteristics
  - 684,000 businesses, 7.8 million jobs by industry
  - On 4.8 million parcels with land use / floor space characteristics
  - Socio-economic characteristic to space use behavior
  - Spatial distribution of actors vs. spatial variation of space use / value of space

## Use of Parcel Database - PECAS

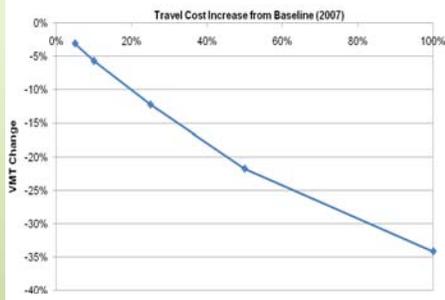
- Input parameter development
  - Space requirement per employee, households (employment density)
- Land use change estimation
  - PECAS estimates change of land use by parcels
    - Development type (addition, demolition, renovation, derelict)
    - Land use change (type change)
    - Floor space change

## Scenario Test Example using PECAS

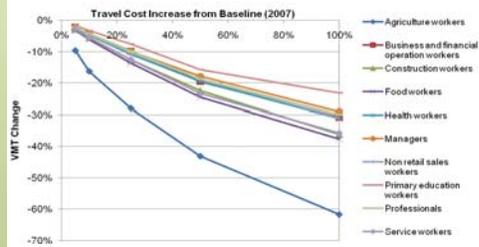
- Travel cost increases due to...
  - Gas price change
  - VMT Fee
  - Or other system-wide pricing policy
- Travel time changes due to...
  - Transportation system management, investment

## If Travel Costs Increase, PECAS says...

Working Trip VMT Change due to Travel Cost Increase

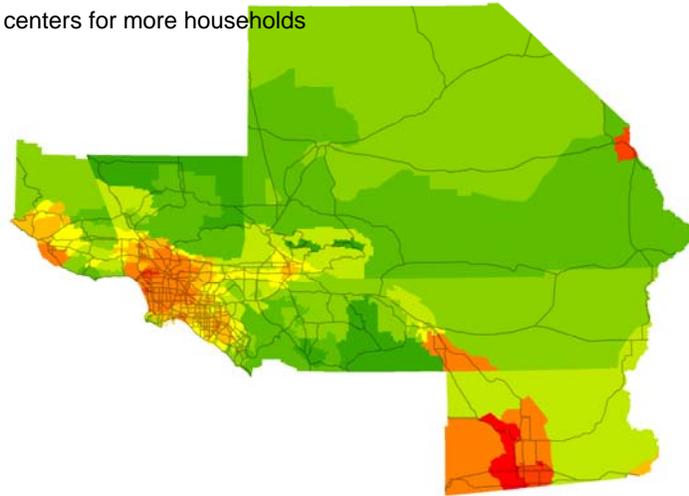


Working Trip VMT Change due to Travel Cost Increase



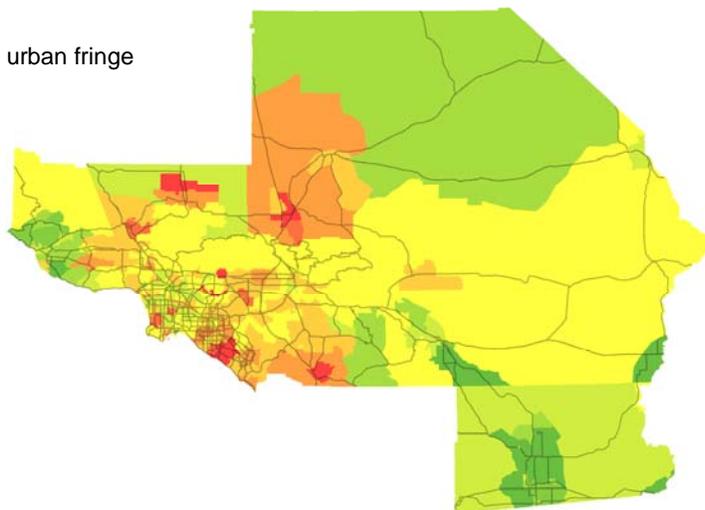
## If Travel Costs Increase, PECAS says...

Higher rent near urban centers for more households

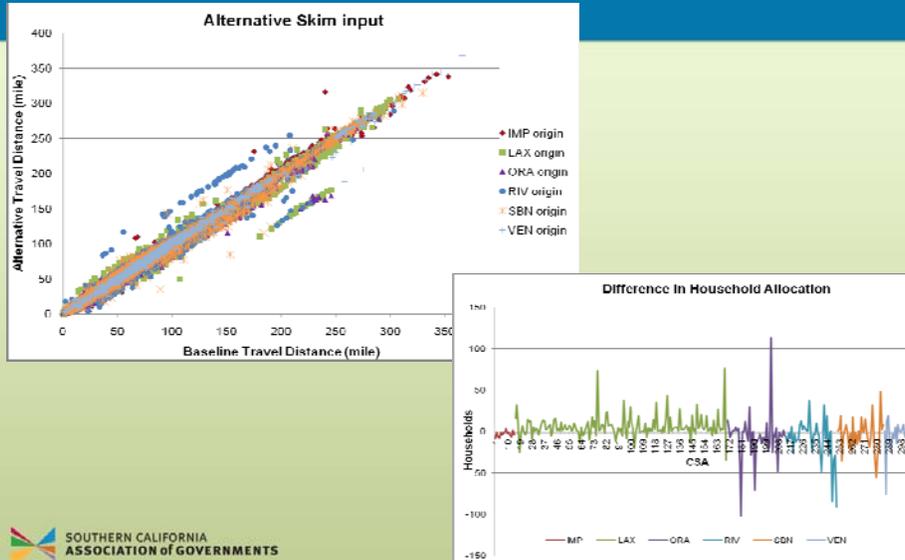


## If Travel Costs Increase, PECAS says...

More jobs at the urban fringe



## If Travel Costs Increase, PECAS says...



## Use of Parcel Database – Activity Based Travel Demand Model

- **SimAGENT:**
  - **S**imulator of **A**ctivities, **G**reenhouse **E**missions, **N**etworks, and **T**ravel
- A new generation of travel demand model.
  - Based on sound travel behavior theory
  - Sensitive to policy issues and planning applications of interest
  - Optimal use of available data, including parcel

## Use of Parcel Database – Activity Based Travel Demand Model

### Parcel Data will be Used in the Future

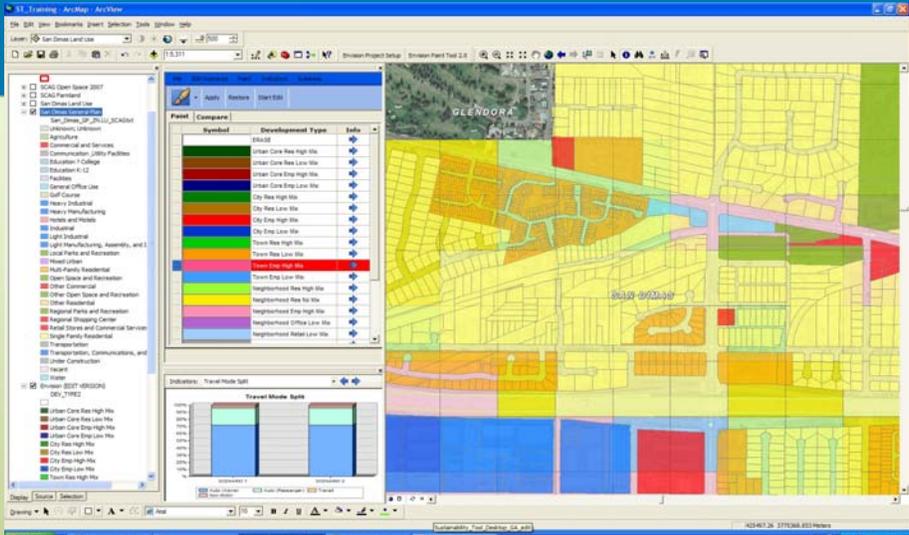
- Household Evolution/Allocation Model
  - Allocate Synthetic Household to Parcel
- Parcel Land Use together with Parcel Demographic & Socio-economic will be input to Model Analysis
- Policy Analysis
  - Analyze impact of land use policies on travel demand, vehicle use, energy consumption, and air pollution (greenhouse gas emission)

## Use of Parcel Database – Sustainability Tool

- A sketch planning tool that local jurisdictions can use to analyze the impact of different land use scenarios on vehicle ownership, vehicle miles traveled (VMT), mode use, and their associated effects on GHG emissions
- A communication tool that enables local planners and decision makers to quantify and visualize the outcomes of their different development options and choices

## Use of Parcel Database – Sustainability Tool

- Parcel data used as reference for the tool
- ArcGIS based application integrated with Excel spreadsheet program
- ‘Instant feedback’ on results of scenarios
- Sensitive to key land use strategies
- Geographically scalable
- Understandable to non-technical audiences
- Easy to customize



The screenshot displays the Sustainability Tool software interface. The main window shows a map of Glendora, California, with various land use zones color-coded. A legend on the left side of the map lists various land use types, including:

- Urban Core Res High Mix
- Urban Core Res Low Mix
- Urban Core Emp High Mix
- Urban Core Emp Low Mix
- City Res High Mix
- City Res Low Mix
- City Emp High Mix
- City Emp Low Mix
- Town Res High Mix
- Town Res Low Mix
- Town Emp High Mix
- Town Emp Low Mix
- Neighborhood Res High Mix
- Neighborhood Res Low Mix
- Neighborhood Emp High Mix
- Neighborhood Emp Low Mix
- Neighborhood Retail Low Mix

The interface also includes a 'Layers' panel on the left, a 'Tools' panel at the top, and a 'Status Bar' at the bottom. The map shows a grid of parcels, with different colors representing different land use scenarios. The text 'GLENDDORA' is visible on the map.

## Further Work

- Update Parcel Database with new information
- Adjustment: Clean-up and quality control
- Model and Applications Improvement
- Collaboration with various planning agencies
- Web-based application