Demonstrating Local Population Projection Portal

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Overview of SCAG
Quick Facts about SCAG

- Nation’s largest Metropolitan Planning Organization (MPO)
- 6 counties and 191 cities
- 15 sub-regions
- 18.7 million people (1.2015)
- 38,000 square miles
- 16th largest economy in the world (GRP: $924 Billion in 2013)
Research Background

- SCAG develops the long-term population and household growth forecast for the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) at different levels of geography.
- Local jurisdictions in the SCAG region provide SCAG with the city-level population and household growth forecast with Transportation Analysis Zone (TAZ) level allocations.
- Traditional approach focuses on total population size and household numbers for local jurisdictions.
Research Purpose

- SCAG developed the useful GIS-based tool for local planners working on their local population and household projections.
- The GIS-based tool will easily generate different population growth paths containing demographic characteristics (i.e. age and gender) and components of growth, with housing growth scenarios.
- The local population projections by demographic characteristics will help local jurisdictions to better prepare for diverse community service needs (e.g. school, housing, energy use, hospital, police, transportation, etc.)
Research Purpose

This research demonstrates the Local Population Projection Portal, which allows local planners to:

1. Develop their own housing growth scenario
2. Produce the population projections with key demographic characteristics, components of population growth, share of the county growth, demographic rates.
Local Population Projection Portal

- **Modeling framework** (*Choi, Projecting Small Area Population Size and Components, Presented for Western Regional Science Association (WRSA) Annual Meeting, 2013)*:
  - Housing unit method
  - Cohort-component method
  - Local household forecast (demand vs. supply/land use method)
- **Data optimization**:
  - Developed in Microsoft Excel and Visual Basic for Applications
- **Web-based GIS integration and editable web map**:
  - Esri ArcGIS Add-Ins
  - Esri ArcGIS Online
Modeling Framework: Strengths

1. Provides detailed demographic characteristics of projected populations
2. Is technically sound and easy to understand
3. Is easy to learn and apply
4. Is consistent with the metropolitan (county) demographic assumptions (fertility rate, survival rate)
Estimating City-Level Birth & Death

- Birth and death data at Zip Codes from 1989 to 2012 are obtained from California Department of Public Health.
- The city level birth and death data are estimated by applying residential area-weighted interpolation method to Zip code data.
Residential Area-Weighted Interpolation

City-level birth and death estimates based on ratio of residential area in Zip Code to residential area in entire City.

\[
P_{t2012}^{Zip1 \text{in City1}} = P_{t2012}^{Zip1} X (RA_{t2012}^{Zip1 \text{in City1}} / RA_{t2012}^{Zip1})
\]

where:

- \(P_{t2012}^{Zip1 \text{in City1}}\) = Births and deaths of Zip Code 1 included in City 1
- \(P_{t2012}^{Zip1}\) = Births and deaths in Zip Code 1
- \(RA_{t2012}^{Zip1 \text{in City1}}\) = total residential area of Zip Code 1 in City 1
- \(RA_{t2012}^{Zip1}\) = total residential area in Zip Code 1
Local Household Forecast: Method Options

- Demand Method
- Supply & Land Use Capacity Methods
  - General Plan
  - Envision
Demand Method

- Benefits
  - Easy-to-use interface
  - No GIS knowledge required
  - Uses recent (2000 & 2010) data as baseline
Supply & Land Use Capacity Methods (GIS)

- Possibilities
  - Target specific areas of expected intense increases in housing stock
    - e.g. Transit-Oriented Developments
    - e.g. Areas of adaptive reuse
  - Focus on areas of infill development
Supply & Land Use Capacity

Methods

TAZ 60092100
(2012 Households = 915)
Supply & Land Use Capacity

Methods

Existing Land Use
(Year 2012)
Supply & Land Use Capacity
Methods

Vacant Parcels
(21.0 acres)
Supply & Land Use Capacity Methods

General Plan Land Use Designations
Supply & Land Use Capacity

Methods

Future Development on Vacant Parcels

- Residential Medium (15.1 acres)
- Public/Semi-Public (5.9 acres)
Supply & Land Use Capacity

Methods

Potential New Residential Development
= 181~271 units
(Density: 12 ~ 18 units per acre)

Residential Medium
(15.1 acres)
Modeling Process - Calibration

1. Prepare local demographic and household data (2000, 2010 Census) with County’s projected population and households with demographic rates.

2. Determine the household growth (2010-2040) using method options (demand vs. supply).

3. Local household figures for intermediate years (2015-2035) are determined using the multi-period share of growth method (Choi, Maintaining Spatial and Temporal Consistency of Small Area Population Forecasts Using the Multi-Period Share of Growth Method, Presented for Association of Collegiate School of Planning (ACSP) Conference, 2002).

4. Local household size for 2015-2040 is determined using the County’s household size change ratio for 2015-40.
Modeling Process - Calibration

5. Local residential population is derived multiplying household figures by household size for 2015-40.

6. Local group quarters population for 2015-40 is determined using the County’s group quarters population change ratio for 2015-40.

7. Local total population for 2015-40 is derived by adding group quarters population to residential population.

8. Calibrate local demographic rates for 2000-2040 by
   1) adjusting County’s age specific fertility rate
   2) adjusting County’s age-sex specific survival rate
   3) Deriving local age-sex specific net migration rate (total net migration is derived as a residual)
User Interface Demonstration

Local Population Projection Portal
July 2015

Launch Demo
Initial State

Local Population Projection Portal

Inputs

County:
Select a county

City:
County must be selected first

Calibrate

Projection Method:

Demand Method
Select the 2010 - 2040 household growth as a percentage of the 2000 - 2010 growths:
- Low (150%)
- Moderate (300%)
- High (450%)
- Or enter the number of expected new households between 2010 and 2040:

Supply and Land Use Capacity Methods
Select one of the following methods:
- General Plan
- Envision

Pop. & Household growth
Annual Avg. Growth Rate
Household Size
City Share of County
Age Comp

Click on a tab to view the corresponding aspects of the projected population growth. Click the arrows on the right to view more options.
Selecting a County

Local Population Projection Portal

Inputs

County: Select a county
- Imperial
- Los Angeles
- Orange
- Riverside
- San Bernardino
- Ventura

City:

Projection Method:

Demand Method
Select the 2010 - 2040 household growth as a percentage of the 2000 - 2010 growths:
- Low (150%)
- Moderate (300%)
- High (450%)
- Or enter the number of expected new households between 2010 and 2040:

Supply and Land Use Capacity Methods
Select one of the following methods:
- General Plan
- Envision

and enter the number of expected new households between 2010 and 2040:

Outputs

Pop. & Household growth | Annual Avg. Growth Rate | Household Size | City Share of County | Age Comp.

Click on a tab to view the corresponding aspects of the projected population growth. Click the arrows on the right to view more options.

Run | Reset | Close
Selecting a City

Local Population Projection Portal

Inputs

County: 
Ventura

City: 
Now select a city
- Fillmore
- Moorpark
- Ojai
- Port Hueneme
- San Buenaventura
- Santa Paula

Projection Method:
Select the 2010-2040 household growth as a percentage of the 2000-2010 growths:
- Low (150%)
- Moderate (300%)
- High (450%)
- Or enter the number of expected new households between 2010 and 2040:

Supply and Land Use Capacity Methods
Select one of the following methods:
- General Plan
- Envision
and enter the number of expected new households between 2010 and 2040:

Outputs

Selecting either the "General Plan" or "Envision" option will redirect you to SCAig's editable socioeconomic data webmap.

Once on the webmap, manually update the household growth by Transit Analysis Zone (TAZ). Then copy the city’s total 2010-2040 household growth from the online summary into this text box.

Click on a tab to view the corresponding aspects of the projected population growth. Click the arrows on the right to view more options.
Calibrating Local Demographic Rates

Local Population Projection Portal

Inputs

County: Ventura
City: Oxnard

Outputs

Projection Method:

Demand Method
Select the 2010 - 2040 household growth as a percentage of the 2000 - 2010 growths:
- Low (150%)
- Moderate (300%)
- High (450%)
- Or enter the number of expected new households between 2010 and 2040:

Supply and Land Use Capacity Methods
Select one of the following methods:
- General Plan
- Envision

Microsoft Excel
The application will now begin calibrating.

Once on the webmap, manually update the household growth by Transit Analysis Zone (TAZ), then copy the city's total 2010 - 2040 household growth from the online summary into this text box.

Pop. & Household growth
Annual Avg. Growth Rate
Household Size
City Share of County
Age Comp

Click on a tab to view the corresponding aspects of the projected population growth. Click the arrows on the right to view more options.

Run	Reset	Close
Calibrating Local Demographic Rates

Inputs
- County: Ventura
- City: Oxnard

Projection Method:
- Demand Method
  - Select the 2010 - 2040 household growth as a percentage of the 2000 - 2010 growths:
    - Low (150%)
    - Moderate (300%)
    - High (450%)
  - Or enter the number of expected new households between 2010 and 2040:

- Supply and Land Use Capacity Methods
  - Select one of the following methods:
    - General Plan
    - Envision
    - And enter the number of expected new households between 2010 and 2040:

Outputs

Selecting either the "General Plan" or "Envision" option will redirect you to SCAQG's editable socioeconomic data webmap.

Once on the webmap, manually update the household growth by Transit Analysis Zone (TAZ). Then copy the city's total 2010 - 2040 household growth from the online summary into this text box.

Run
Reset
Close

Click on a tab to view the corresponding aspects of the projected population growth. Click the arrows on the right to view more options.

Save Scenario As...
Save PDF Summary As...
Selecting a Preset Scenario
[Demand Method]

Local Population Projection Portal

Inputs

County: Ventura
City: Oxnard

Projection Method:

Demand Method
Select the 2010 - 2040 household growth as a percentage of the 2000 - 2010 growths:
- Low (150%)
- Moderate (300%)
- High (450%)
- Or enter the number of expected new households between 2010 and 2040:

Supply and Land Use Capacity Methods
Select one of the following methods:
- General Plan
- Envision

Once on the webmap, manually update the household growth by Transit Analysis Zone (TAZ). Then copy the city's total 2010 - 2040 household growth from the online summary into this text box.

Outputs

Pop. & Household growth
Annual Avg. Growth Rate
Household Size
City Share of County
Age Comp

Click on a tab to view the corresponding aspects of the projected population growth. Click the arrows on the right to view more options.

Run
Reset
Close
Save Scenario As...
Save PDF Summary As...
Entering a Custom Scenario [Demand Method]

Local Population Projection Portal

**Inputs**
- County: Ventura
- City: Oxnard

**Projection Method:**
- Demand Method: Select the 2010 - 2040 household growth as a percentage of the 2000 - 2010 growths:
  - Low (150%)
  - Moderate (300%)
  - High (450%)
  - Or enter the number of expected new households between 2010 and 2040:
    - 5000

**Supply and Land Use Capacity Methods:**
- Select one of the following methods:
  - General Plan
  - Envision
  - and enter the number of expected new households between 2010 and 2040:
    - [Text box]

**Outputs**
- [Output area]

*Selecting either the "General Plan" or "Envision" option will redirect you to SCAWG's editable socioeconomic data webmap.*

*Once on the webmap, manually update the household growth by Transit Analysis Zone (TAZ). Then copy the city's total 2010 - 2040 household growth from the online summary into this text box.*

[Buttons: Run, Reset, Close]
Entering a Custom Scenario
[Supply & Land Use Methods]

Local Population Projection Portal

Counties:
- Ventura

Cities:
- Oxnard

Projection Method:
- Demand Method
  - Select the 2010 - 2040 household growth as a percentage of the 2000 - 2010 growths
  - Low (150%)
  - Moderate (300%)
  - High (450%)
  - Or enter the number of expected new households between 2010 and 2040:

Supply and Land Use Capacity Methods
- Select one of the following methods:
  - General Plan
  - Envision

Now redirecting to SCAG's socioeconomic data webmap

Click on a tab to view the corresponding aspects of the projected population growth. Click the arrows on the right to view more options.
Entering a Custom Scenario
[Supply & Land Use Methods]
Entering a Custom Scenario

[Supply & Land Use Methods]
Entering a Custom Scenario

[Supply & Land Use Methods]
Entering a Custom Scenario

[Supply & Land Use Methods]
Entering a Custom Scenario

[Supply & Land Use Methods]
Recalibrating the Data Based on Scenario

Local Population Projection Portal

Inputs
- County: Ventura
- City: Oxnard

Projection Method:
- Demand Method:
  - Select the 2010 - 2040 household growth as a percentage of the 2000 - 2010 growth:
    - Low (150%)
    - Moderate (200%)
    - High (450%)
    - Or enter the number of expected new households between 2010 and 2040

Outputs
- Microsoft Excel:
  - The migration rate will recalibrate based on your selections.

Supply and Land Use Capacity Methods
- Select one of the following methods:
  - General Plan
  - Envision

Pop. & Household Growth
- Annual Avg. Growth Rate
- Household Size
- City Share of County
- Age Comp

Click on a tab to view the corresponding aspects of the projected population growth. Click the arrows on the right to view more options.

Run | Reset | Close | Save Scenario As... | Save PDF Summary As...
Viewing Outputs [In Application]

Local Population Projection Portal

Inputs

County: Ventura
City: Oxnard

Projection Method:

Demand Method
Select the 2010 - 2040 household growth as a percentage of the 2000 - 2010 growths:
- Low (150%)
- Moderate (300%)
- High (450%)
- Or enter the number of expected new households between 2010 and 2040:

Supply and Land Use Capacity Methods
Select one of the following methods:
- General Plan
- Envision

Outputs

City of Oxnard

Population and Household Growth, 2000-2040

Click on a tab to view the corresponding aspects of the projected population growth. Click the arrows on the right to view more options.
Viewing Outputs [As PDF]
Viewing Outputs [As PDF]
Viewing Outputs [As PDF]
Saving the Data as a New Workbook
Future Improvements

- A web-based version of the demand method application
- Complete integration with ArcGIS Online
- Parcel-level household growth editing
The newly developed modeling framework for local population projections can be a useful scenario testing tool for urban and regional planners.

The housing unit method offers urban and regional planners the opportunity to seriously discuss the different scenarios of housing development and population size together with their implication on the components and demographic characteristics of local population growth.
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