Introduction

The Tyndall Cities, ARCADIA and SCALE Projects

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The Projects

1. The Tyndall Cities Project

Funded by the Tyndall Centre for Climate Change, building and integrated assessment model for Greater London and Thames Gateway

The integrated assessment starts with predicting long term spatial activities to 2050 and 2100, the date consistent with climate change predictions in particular noticeable sea level rise, using input-output, land use transport, detailed urban development (GIS) models, and then flooding models

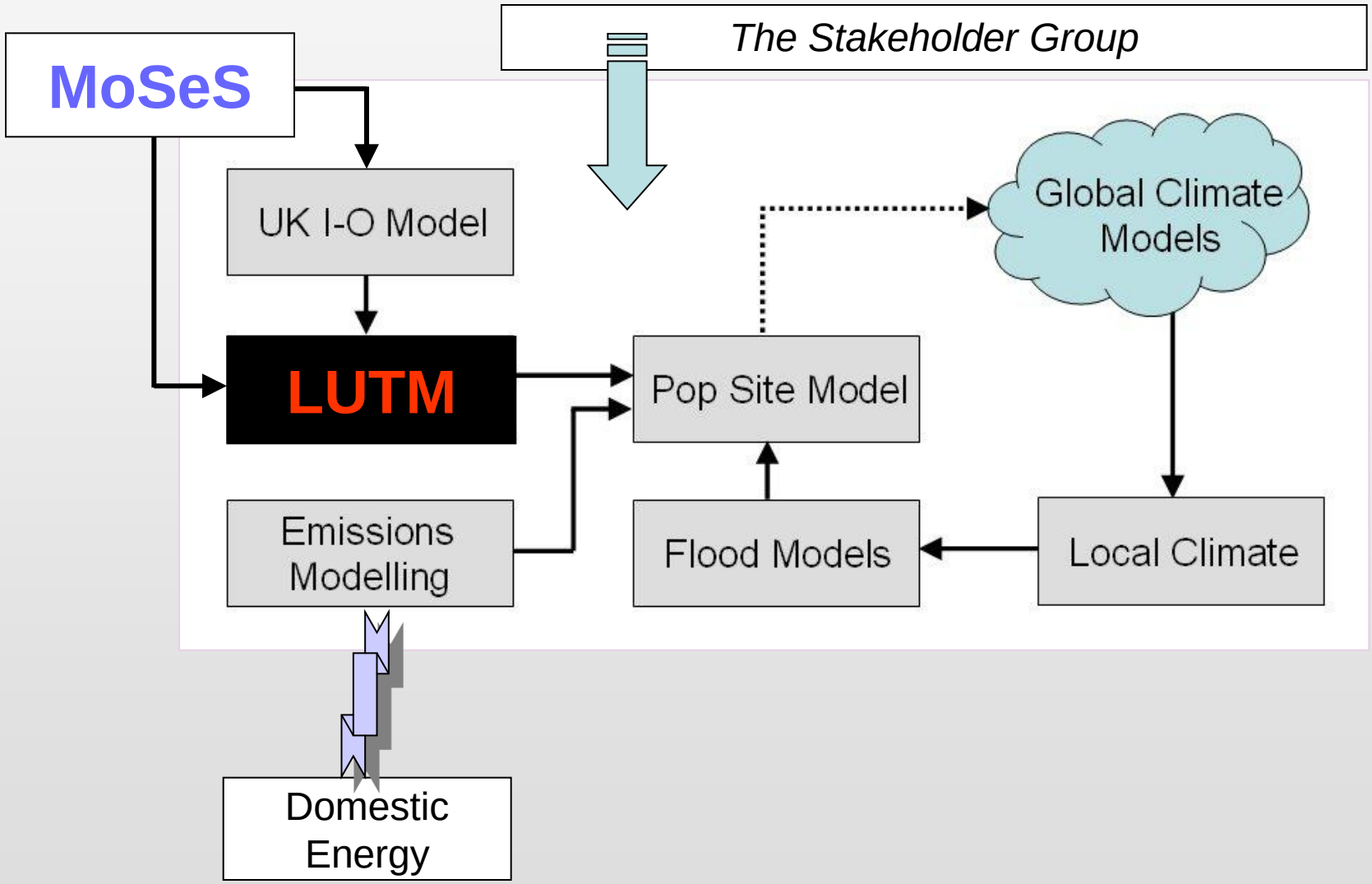
It is supported independently by work on air pollution for the Greater London Area and also future car forecasting

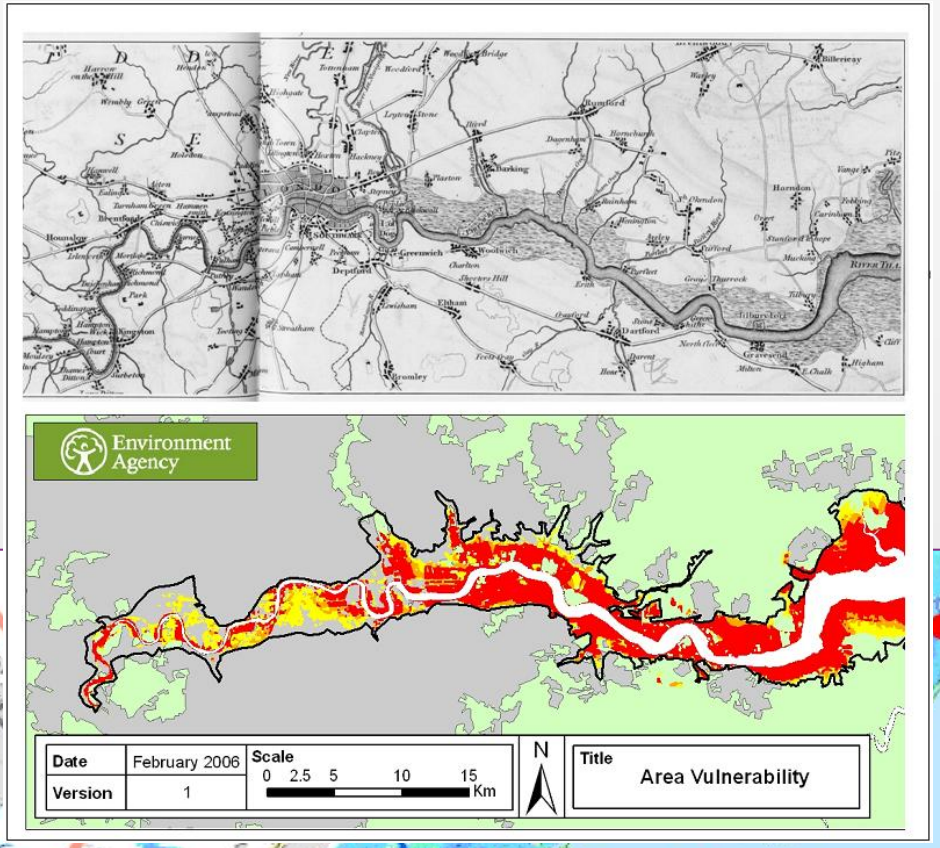
Cambridge Econometrics do the I-O modelling, we here at CASA do the LUTI modelling, Newcastle do the GIS modelling (and also do the transport network inputs to the LUTI model, and Newcastle also do the flooding models.

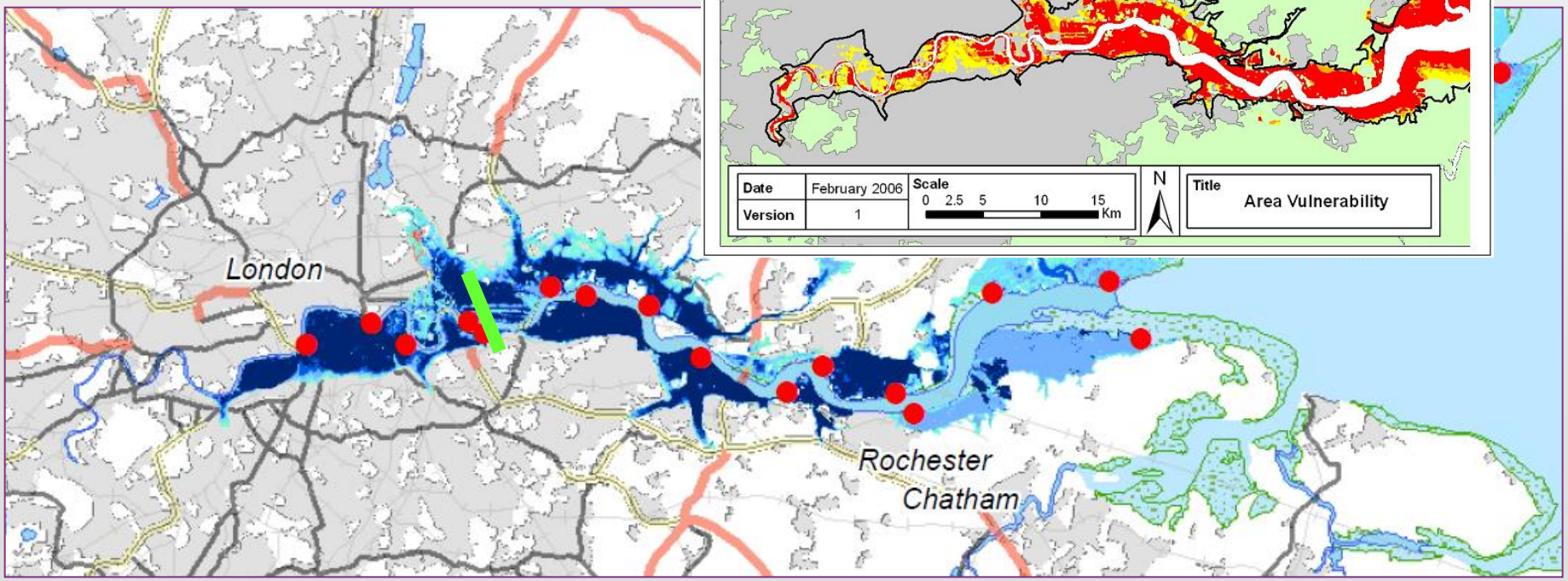
The pollution work is done by ITS at Leeds and Loughborough. Manchester have also been involved in peripheral studies of the domestic energy market but this work is non spatial

The integrated assessment is best seen in the following block diagram

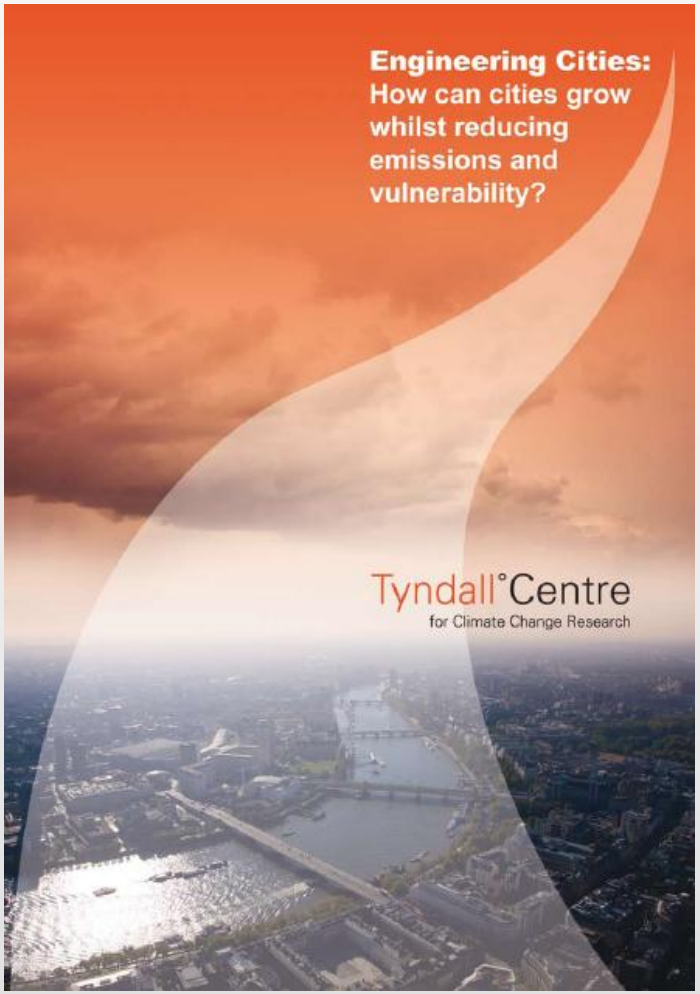
Our LUTI models sits at the core of taking non or spatial projection of economic activity and translating these to zonal level (wards) which is turn are then disaggregated to 50 m square level by the GIS model

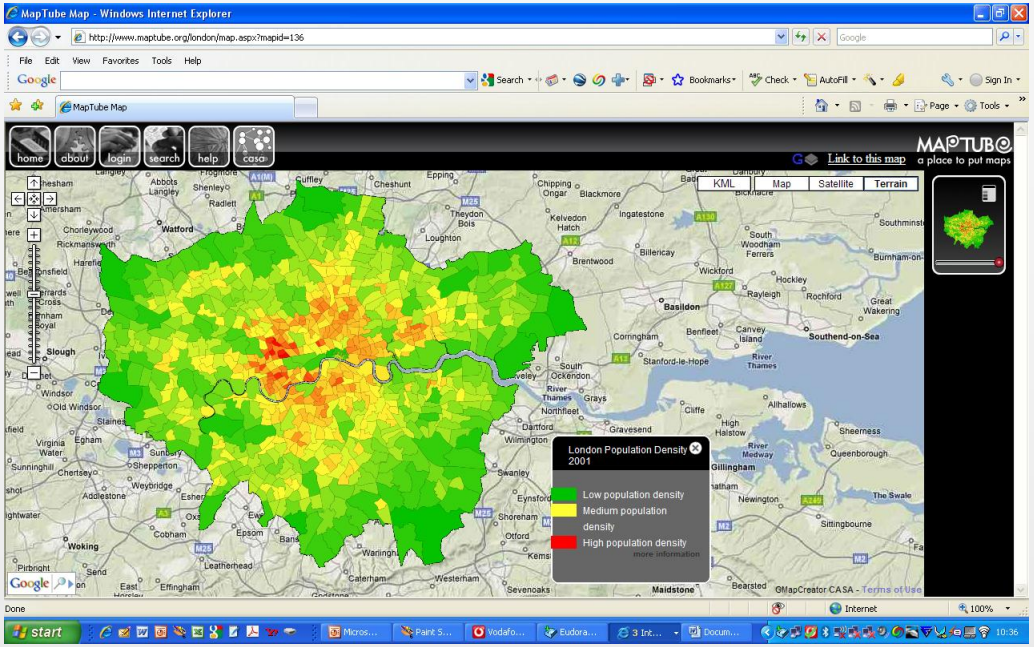

MoSeS
The Stakeholder Group
UK I-O Model
Global Climate Models
LUTM
Pop Site Model
Emissions Modelling
Flood Models
Local Climate
Domestic Energy

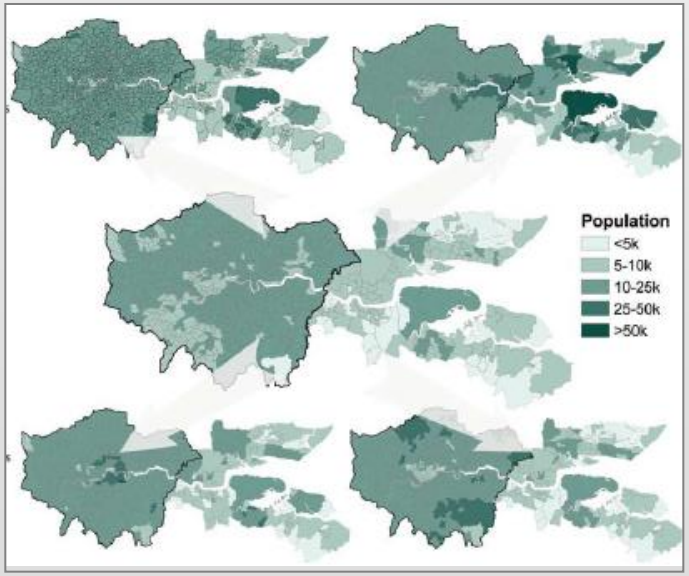

Environment Agency
Date
February 2006
Version
1
Scale
0 2.5 5 10 15
Km
N
Title
Area Vulnerability


London
Rochester
Chatham

The Thames Barrier built 1978 to 1984 in operation, likely to be ineffective by 2040? due to new predictions of sea level rise forecast at 1-2 metres by 2100 – somewhat debatable, but ….







The IPCC forecasts moderated by UKCiP suggest North Sea will rise 2m by 2010, hence serious flooding of Central and East London

2. ARCADIA

Is the successor project, with a reduced team – only Cambridge, UCL and still led by Jim Hall at Newcastle – so not transport and a higher commitment at Newcastle – Duncan Smith will be employed on this here – and there is a much bigger stakeholder effort with the GLA led by Simin Davoudi from Newcastle

It is early days yet for UCL as we have barely started and this seminar is to define the extent of the region

We know that

1) There will be a much better representation of transport and energy on travel and we will bring this in-house here

2) There will be an energy sector in residential location

ARCADIA project is part of a group of EPSRC projects under the acronym arcc which means Adaptation and Resilience in a Changing Climate

http://www.ukcip-arcc.org.uk/

arcc

ARCC ONLINE FORUM

search this site...

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- News & events
- Get involved
- Resources

- Timeline
- Project themes
- ARCADIA
- ARCC-Water
- BIOPICCC
- COPSE
- CREW
- De2RHECC
- DOWNPIPE
- FUTURENET
- LUCID
- Low Carbon future
- PROCLIMATION
- PROMETHEUS
- SCORCHIO
- SNACC

ARCADIA: Adaptation and Resilience in Cities: Analysis and Decision making using Integrated Assessment

Prof. Jim Hall, Newcastle University

AIM: To provide system-scale understanding of the inter-relationships between climate impacts, the urban economy, land use, transport and the built environment and to use this understanding to design cities that are more resilient and adaptable.

Objectives:

- To develop methods for generating of city-scale climate change scenarios that are consistent with UKCP09.
- To develop and demonstrate new methods to analyse the interactions between climate impacts and the regional and urban economy.
- To analyse the relationship between the spatial configuration of cities and their resilience to climate impacts.
- To provide decision support tools for adaptation of urban areas, and to work with stakeholders to demonstrate how these tools can be used to develop strategies for transitions to resilience at a city scale.

Further details: Download pdf

Newsletters: ARCADIA Bulletin 2 (pdf, 230 KB)
ARCADIA Bulletin 1 (pdf, 1.1 MB)

2. SCALE

Is an EPSRC project here at UCL led by CASA which involves transport and computer science. It is part of the energy and complexity area of EPSRC activities

EPSRC Pioneering research and skills

Engineering and Physical Sciences Research Council

GoW Search | Go

Home | GoW Home | Back | Programme | Scheme | Subjects | Topic | Sector | Theme | Region | Organisation | Partners

Details of Grant

EPSRC Reference:	EP/G057737/1				
Title:	SCALE (SMALL CHANGES LEAD TO LARGE EFFECTS): Changing Energy Costs in Transport and Location Policy				
Principal Investigator:	Professor M Batty				
Other Investigators:	Professor BG Heydecker	Dr F Medda	Professor P Steadman		
	Professor Sir A Wilson	Dr S Zhou			
Researcher Co-investigators:					
Project Partners:	Greater London Authority	Local Futures	RMJM Consulting		
	Transport for London	Volterra Consulting			
Department:	Centre for Advanced Spatial Analysis				
Organisation:	University College London				
Scheme:	Standard Research				
Starts:	28 September 2009	Ends:	27 September 2012	Value (£):	793,908
EPSRC Research Topic Classifications:	Complexity science: Complexity Science	Energy: Energy Efficiency			
	Management and business studies: Transportation Operations and Management				
EPSRC Industrial Sector Classifications:	Energy	Transport Systems and Vehicles			
Related Grants:					

Panel History:	Panel Date	Panel Name	Outcome
	03 Mar 2009	Energy Challenges for Complexity Science	Announced

It is in three parts

1. Examining the effects of energy cost changes in residential location and in transport using conventional land use transport modelling which involve locational shift and mode shift. The motivation for this was the switch that occurred in LA when oil reached $145 dollars per barrel in 2008
2. Looking at how networks can represent such shifts
3. Looking at how nonlinear dynamics BLV models can represent such shifts

For this we need good modal split modelling, hence our transport network stuff with Joan and we need to represent walking and biking (Note Ollie's project)

TIMESONLINE

NEWS | COMMENT | BUSINESS | MONEY | SPORT | LIFE & STYLE | TRAVEL | DRIVING | A

JEREMY CLARKSON | NEW CAR REVIEWS | USED CAR REVIEWS | NEWS | FEATURES | VIDEOS |

Where am I? › Home › Driving › News

From The Times

July 28, 2008

Pedal power challenges car culture as cyclists seize Los Angeles freeways

Chris Ayres in Los Angeles

✔ RECOMMEND?

Los Angeles, meet the bicycle.

ARCHIVE

Previous reviews

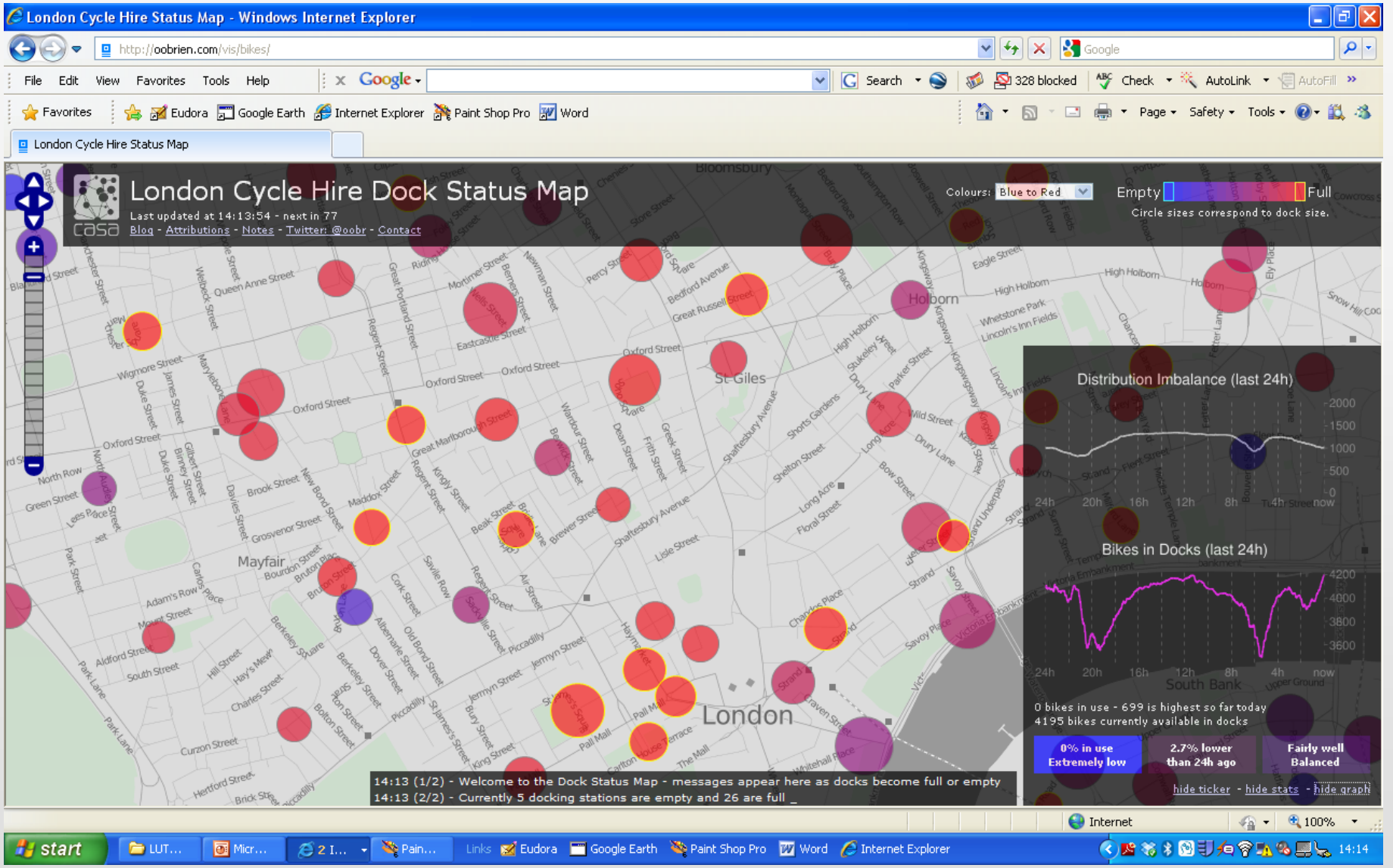
Clarkson's reviews

New car reviews

Used car reviews

DRIVING ››

“ Fun-suckers from


London Cycle Hire Status Map - Windows Internet Explorer
http://oobrien.com/vis/bikes/
London Cycle Hire Status Map
London Cycle Hire Dock Status Map
Last updated at 14:13:54 - next in 77
Blog - Attributions - Notes - Twitter: @oobr - Contact
Colours: Blue to Red
Empty Full
Circle sizes correspond to dock size.
Distribution Imbalance (last 24h)
Bikes in Docks (last 24h)
0 bikes in use - 699 is highest so far today
4195 bikes currently available in docks
0% in use
Extremely low
2.7% lower
than 24h ago
Fairly well
Balanced
hide ticker - hide stats - hide graph
14:13 (1/2) - Welcome to the Dock Status Map - messages appear here as docks become full or empty
14:13 (2/2) - Currently 5 docking stations are empty and 26 are full _
Mayfair
St Giles
Holborn
Bloomsbury
London
South Bank
start
14:14

3. A Word About the Model so far

4 modes – bus, heavy rail, light rail and tube, car – not walking or cycling

Residential location mode split with modal competition model

Calibrated to 2001 (or so?) data

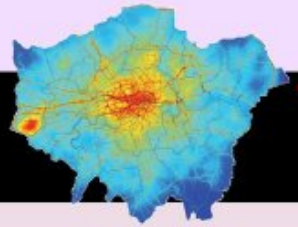
633 wards in London, extension to gateway mooted but never done because of lack of resources

Highly visual – one of the key features

Desktop application – simple but effective visual interface where all data input or generated at any stage is visualized

Link to visualization in Google Earth when running

London and the Thames Gateway Land Use Transportation Model



Cities Research Programme

Tyndall Centre for Climate Change Research

CASA@UCL

Newcastle

This program is a rudimentary land-use transportation model built along classical lines which allocates population and employment to small zones of the urban system. It uses spatial interaction principles which bind the population sector (residential or housing) to employment sector (work or industrial and commercial) through the journey to work (work trips) and the demand from services (which loosely translate into trips made to the retail and commercial sector).

The model is being built for Greater London and the Thames Gateway at ward level - 633 in all - so that it can be used in a wider process of integrated assessment focussed on assessing the impact of climate change on small areas in this metropolitan region. In particular rises in sea level and pollution are key issues, and as such the model sits between aggregate assessments of environmental changes associated with global and regional climate change models and environmental input output models, and much more disaggregate models related to the detailed hydrological implication of long term climate change.

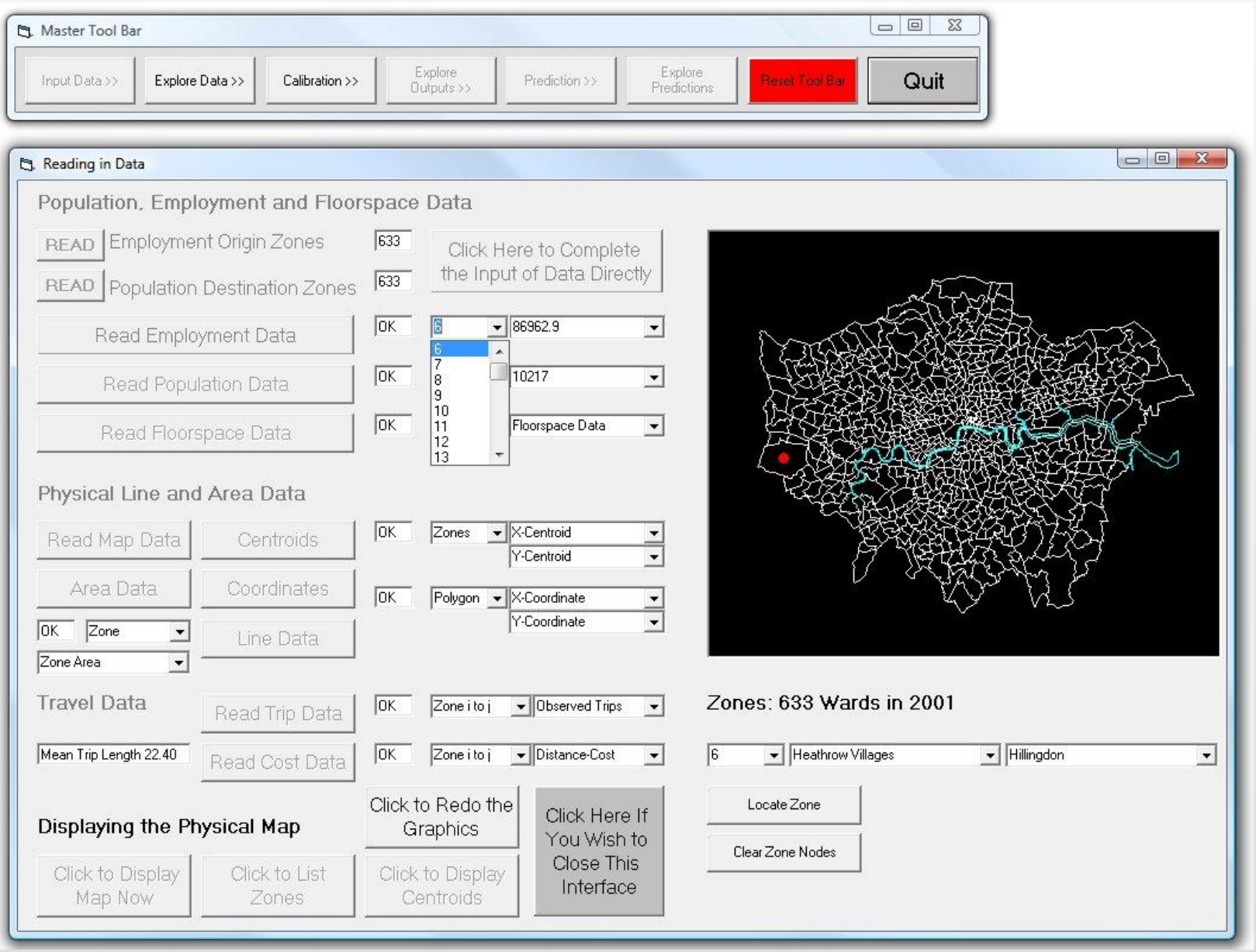
The programme enables the user to read in the data and explore it spatially, to calibrate the parameters of the model and explore its outputs spatially and to engage in various predictions ranging from the typical' business as usual scenarios' to much more radical changes posed limits on spatial behaviour which either result from climate change and, or mandated by government. The predictions and scenarios are intended to go out to 2100 and thus the model is largely designed as a sketch planning tool.

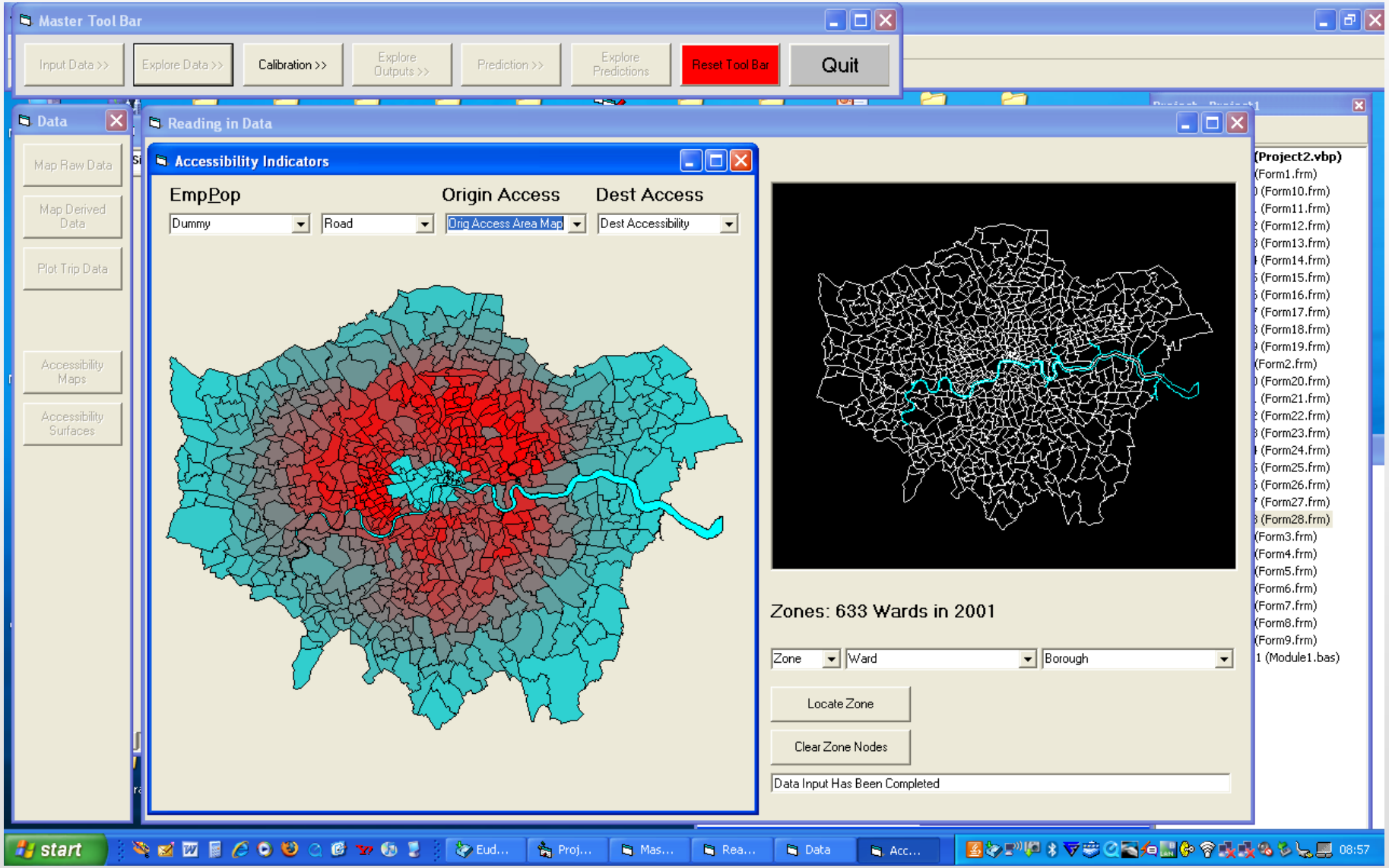
These various stages of the model contained in a master tool bar which is activated when the GO! button is pressed on this screen. The master tool bar enables the users to proceed through the various stages indicated and to display outputs in map and statistical form at any stage.

with GLAECONOMICS LONDON

GO!

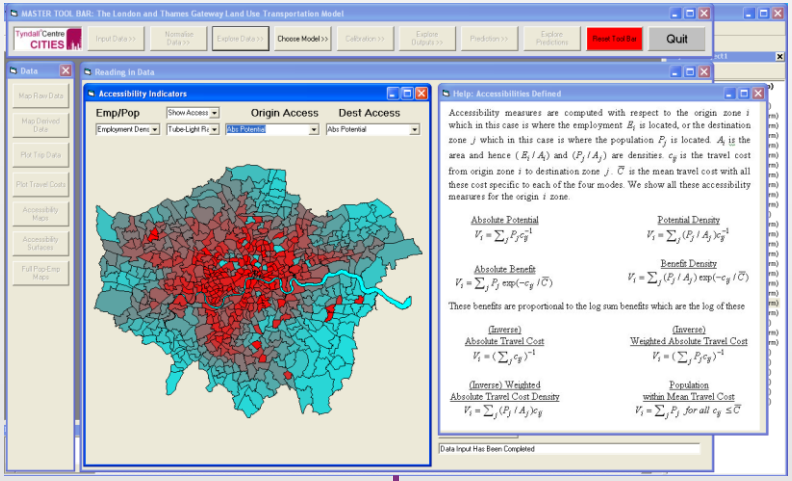
Program Manual


Master Tool Bar
Input Data >>
Explore Data >>
Calibration >>
Explore Outputs >>
Prediction >>
Explore Predictions
Reset Tool Bar
Quit
Reading in Data
Population, Employment and Floorspace Data
READ
Employment Origin Zones
633
READ
Population Destination Zones
633
Click Here to Complete the Input of Data Directly
Read Employment Data
OK
6
86962.9
6
7
8
9
10
11
12
13
Read Population Data
OK
10217
Read Floorspace Data
OK
Floorspace Data
Physical Line and Area Data
Read Map Data
Centroids
OK
Zones
X-Centroid
Y-Centroid
Area Data
Coordinates
OK
Polygon
X-Coordinate
Y-Coordinate
OK
Zone
Line Data
Zone Area
Travel Data
Read Trip Data
OK
Zone i to j
Observed Trips
Mean Trip Length 22.40
Read Cost Data
OK
Zone i to j
Distance-Cost
Zones: 633 Wards in 2001
6
Heathrow Villages
Hillingdon
Displaying the Physical Map
Click to Redo the Graphics
Click Here If You Wish to Close This Interface
Locate Zone
Clear Zone Nodes
Click to Display Map Now
Click to List Zones
Click to Display Centroids


Master Tool Bar
Input Data >>
Explore Data >>
Calibration >>
Explore Outputs >>
Prediction >>
Explore Predictions
Reset Tool Bar
Quit
Data
Map Raw Data
Map Derived Data
Plot Trip Data
Accessibility Maps
Accessibility Surfaces
Reading in Data
Accessibility Indicators
EmpPop
Origin Access
Dest Access
Dummy
Road
Orig Access Area Map
Dest Accessibility
Zones: 633 Wards in 2001
Zone
Ward
Borough
Locate Zone
Clear Zone Nodes
Data Input Has Been Completed
(Project2.vbp)
(Form1.frm)
(Form2.frm)
(Form3.frm)
(Form4.frm)
(Form5.frm)
(Form6.frm)
(Form7.frm)
(Form8.frm)
(Form9.frm)
1 (Module1.bas)
start
08:57

Accessibility from the LUTM model

Many different accessibility measures, 8 in all



Help: Accessibilities Defined

Accessibility measures are computed with respect to the origin zone i which in this case is where the employment E_i is located, or the destination zone j which in this case is where the population P_j is located. A_i is the area and hence (E_i / A_i) and (P_j / A_j) are densities. c_{ij} is the travel cost from origin zone i to destination zone j. $\overline{C}$ is the mean travel cost with all these cost specific to each of the four modes. We show all these accessibility measures for the origin i zone.

Absolute Potential
$$V_i = \sum_j P_j c_{ij}^{-1}$$

Potential Density
$$V_i = \sum_j (P_j / A_j) c_{ij}^{-1}$$

Absolute Benefit
$$V_i = \sum_j P_j \exp(-c_{ij} / \overline{C})$$

Benefit Density
$$V_i = \sum_j (P_j / A_j) \exp(-c_{ij} / \overline{C})$$

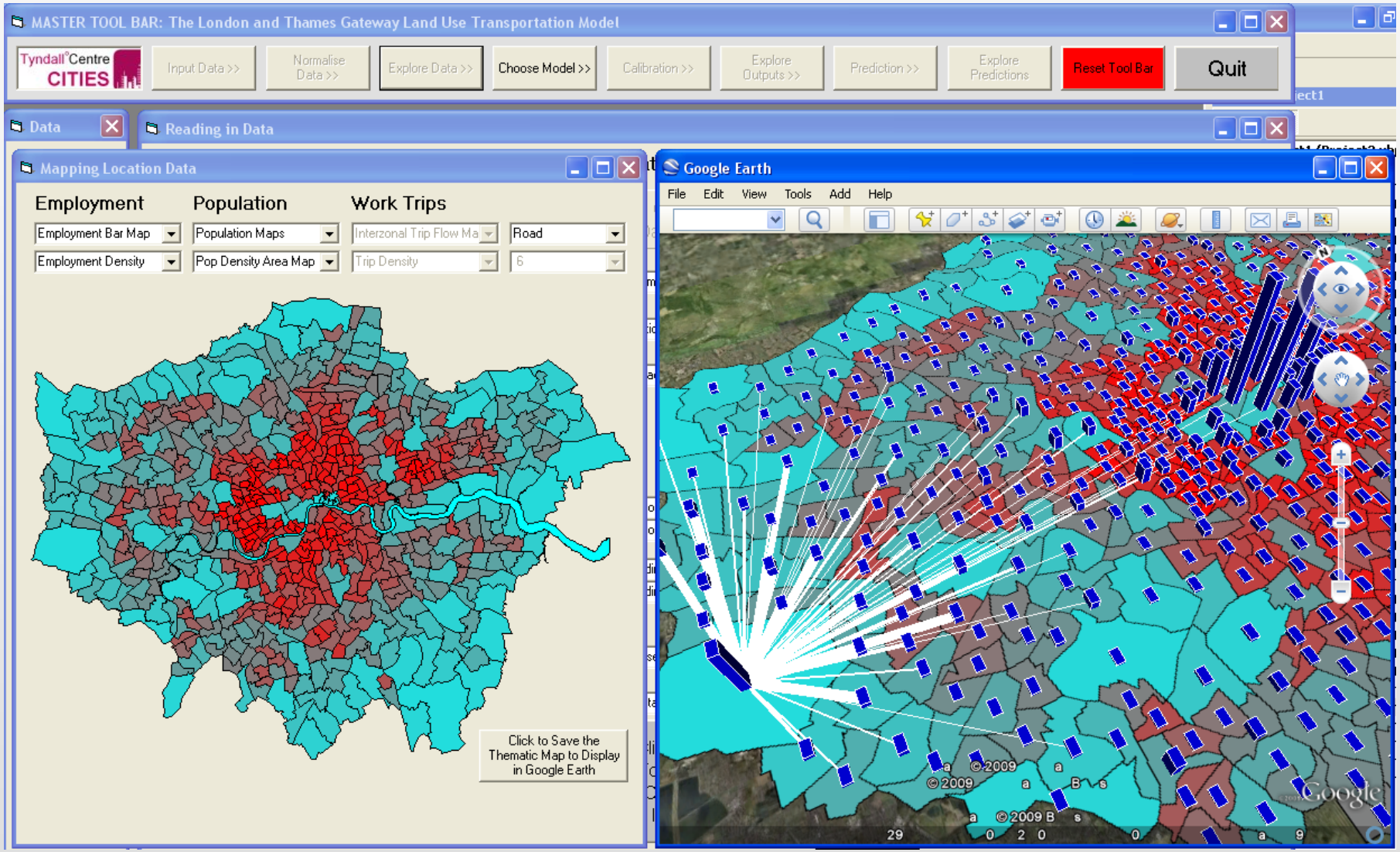
These benefits are proportional to the log sum benefits which are the log of these

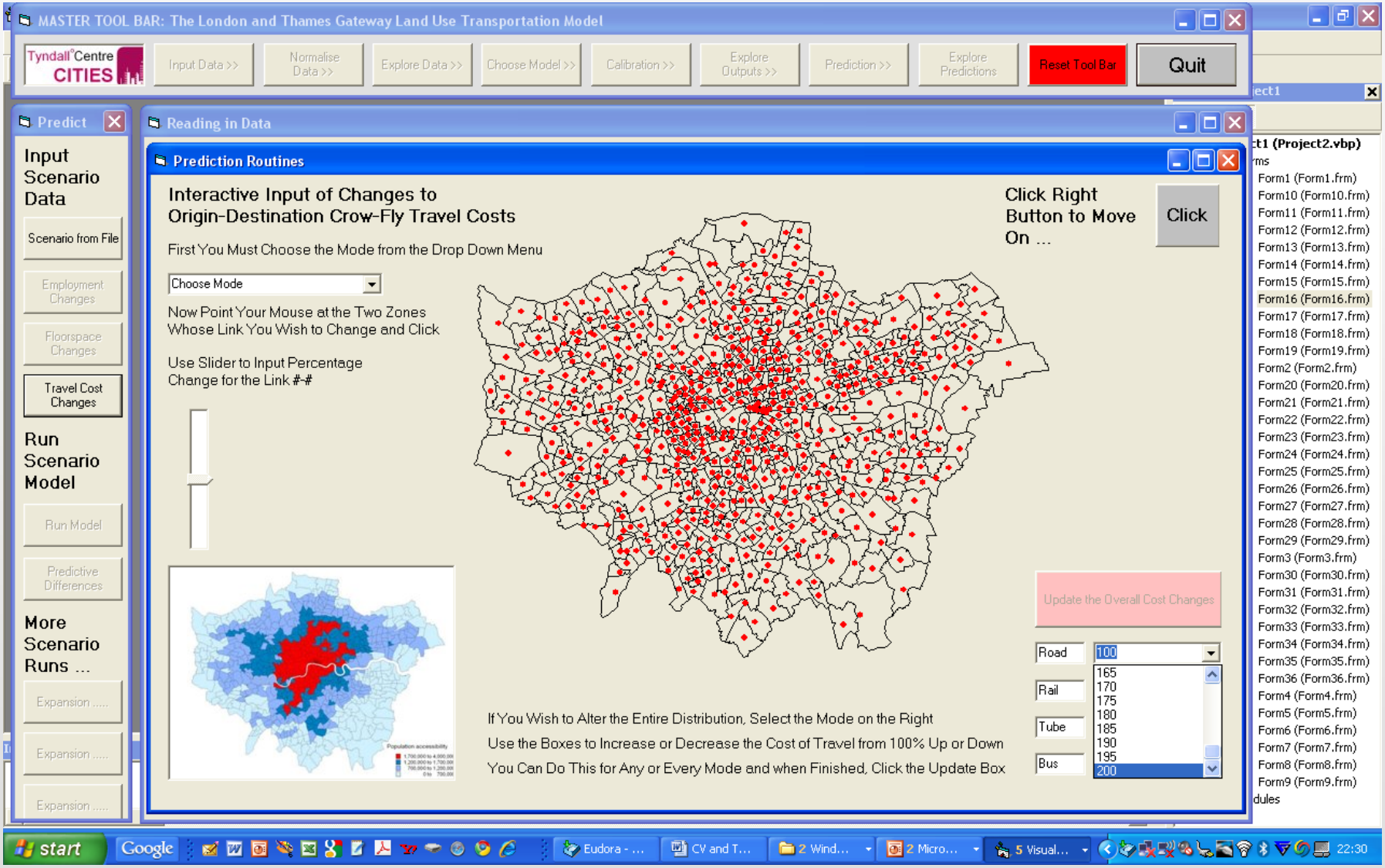
(Inverse) Absolute Travel Cost
$$V_i = (\sum_j c_{ij})^{-1}$$

(Inverse) Weighted Absolute Travel Cost
$$V_i = (\sum_j P_j c_{ij})^{-1}$$

(Inverse) Weighted Absolute Travel Cost Density
$$V_i = \sum_j (P_j / A_j) c_{ij}$$

Population within Mean Travel Cost
$$V_i = \sum_j P_j \text{ for all } c_{ij} \leq \overline{C}$$


MASTER TOOL BAR: The London and Thames Gateway Land Use Transportation Model
Tyndall Centre CITIES
Input Data >>
Normalise Data >>
Explore Data >>
Choose Model >>
Calibration >>
Explore Outputs >>
Prediction >>
Explore Predictions
Reset Tool Bar
Quit
Data
Reading in Data
Mapping Location Data
Employment
Population
Work Trips
Employment Bar Map
Employment Density
Population Maps
Pop Density Area Map
Interzonal Trip Flow Ma
Trip Density
Road
6
Click to Save the Thematic Map to Display in Google Earth
Google Earth
File
Edit
View
Tools
Add
Help
© 2009
Google


MASTER TOOL BAR: The London and Thames Gateway Land Use Transportation Model
Tyndall Centre CITIES
Input Data >>
Normalise Data >>
Explore Data >>
Choose Model >>
Calibration >>
Explore Outputs >>
Prediction >>
Explore Predictions
Reset Tool Bar
Quit
Predict
Input Scenario Data
Scenario from File
Employment Changes
Floorspace Changes
Travel Cost Changes
Run Scenario Model
Run Model
Predictive Differences
More Scenario Runs ...
Expansion .....
Expansion .....
Expansion .....
Reading in Data
Prediction Routines
Interactive Input of Changes to Origin-Destination Crow-Fly Travel Costs
First You Must Choose the Mode from the Drop Down Menu
Choose Mode
Now Point Your Mouse at the Two Zones Whose Link You Wish to Change and Click
Use Slider to Input Percentage Change for the Link #-#
Click Right Button to Move On ...
Click
If You Wish to Alter the Entire Distribution, Select the Mode on the Right
Use the Boxes to Increase or Decrease the Cost of Travel from 100% Up or Down
You Can Do This for Any or Every Mode and when Finished, Click the Update Box
Update the Overall Cost Changes
Road
Rail
Tube
Bus
100
165
170
175
180
185
190
195
200
Project1
Project1 (Project2.vbp)
Forms
Form1 (Form1.frm)
Form10 (Form10.frm)
Form11 (Form11.frm)
Form12 (Form12.frm)
Form13 (Form13.frm)
Form14 (Form14.frm)
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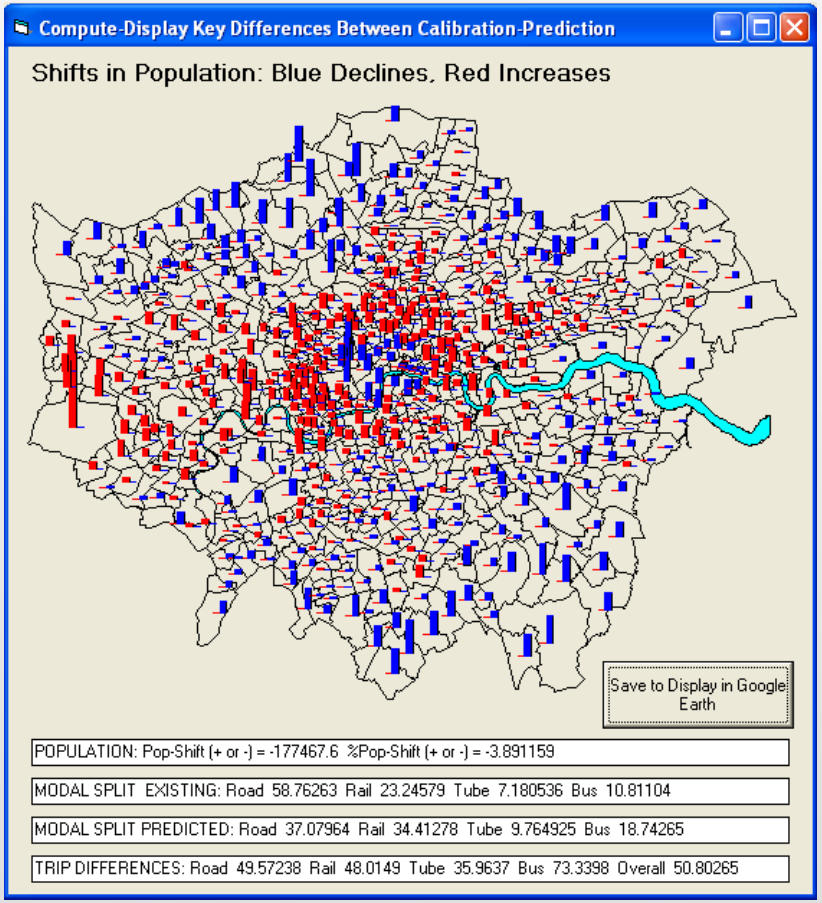
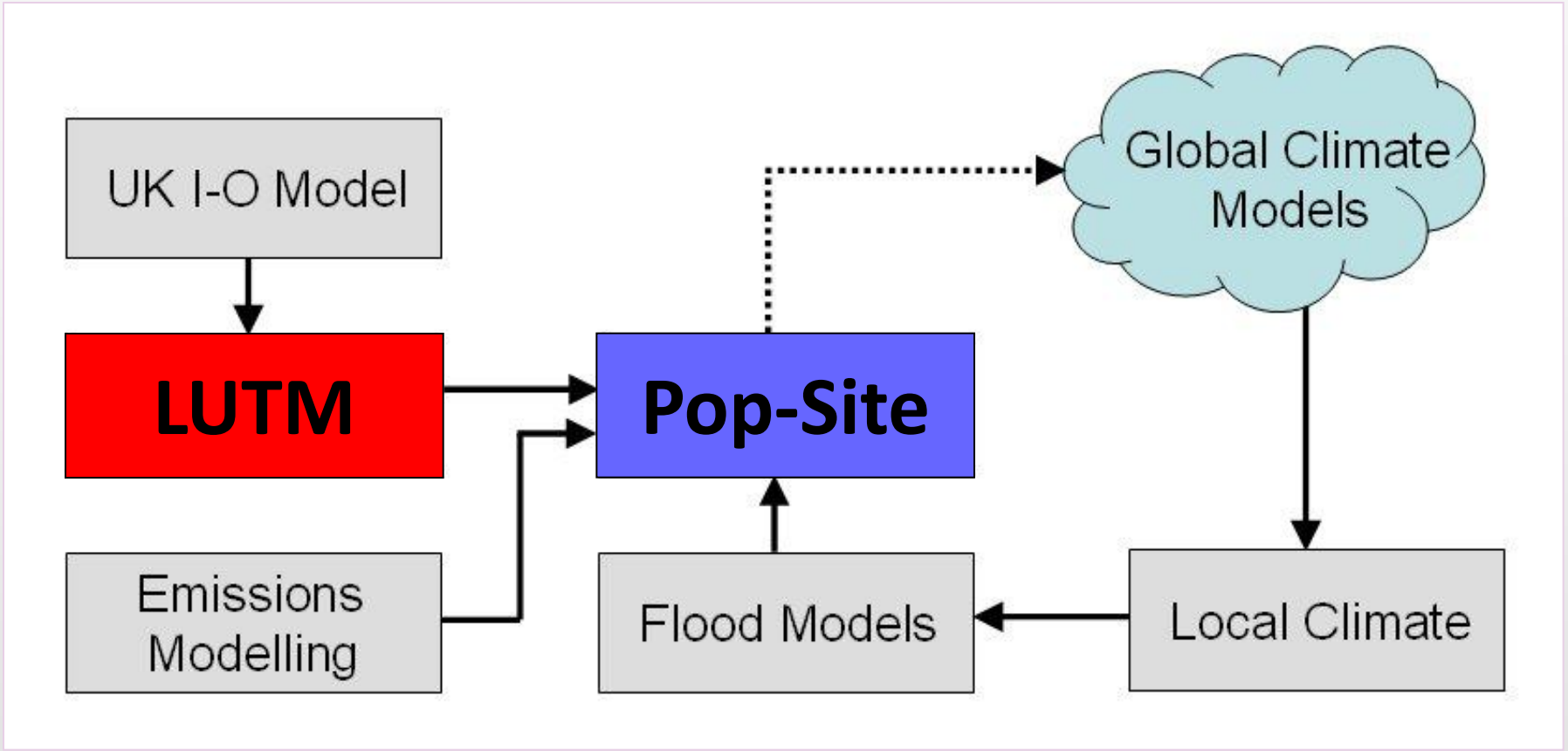
Form35 (Form35.frm)
Form36 (Form36.frm)
Form4 (Form4.frm)
Form5 (Form5.frm)
Form6 (Form6.frm)
Form7 (Form7.frm)
Form8 (Form8.frm)
Form9 (Form9.frm)
Modules
start
Google
Eudora - ...
CV and T...
2 Wind...
2 Micro...
5 Visual...
22:30

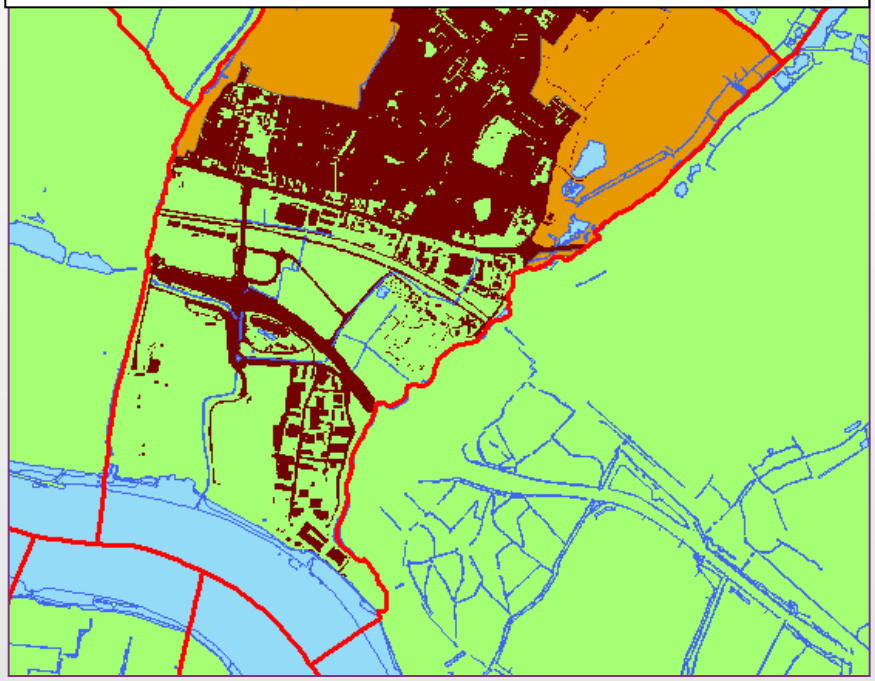
- The following figures show what happens if gas costs rise by 100% i.e. double

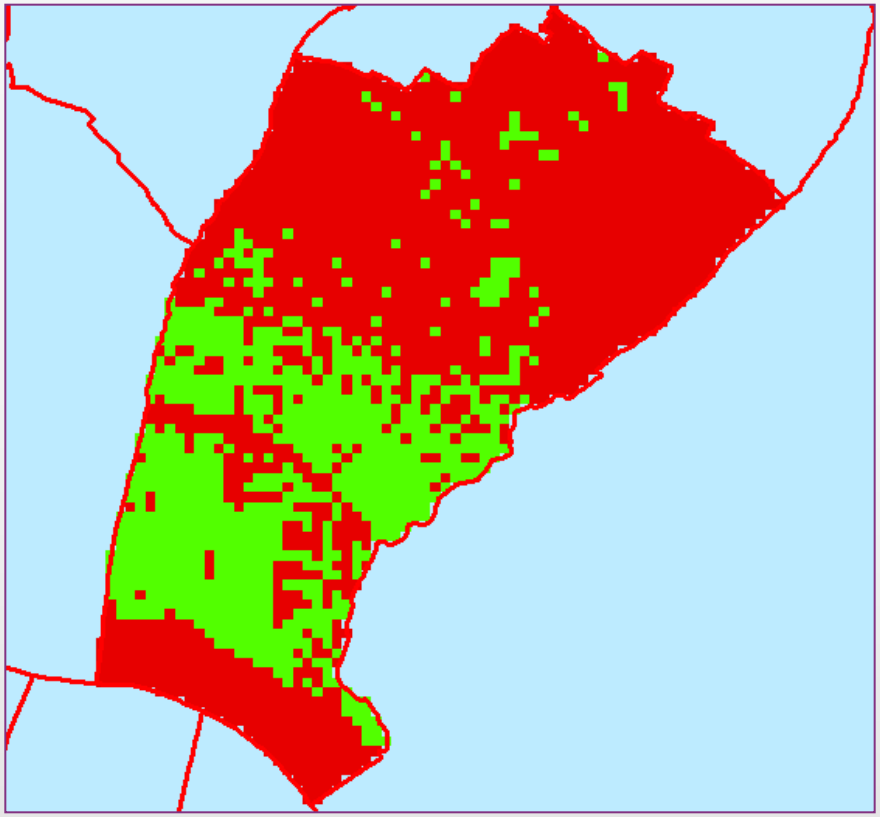


Mode	*Observed*	*Percent Shift*
Road	39%	-50%
Rail	12%	+48%
Tube	33%	+36%
Bus	16%	+73%
Population Shift		4%


UK I-O Model
LUTM
Emissions Modelling
Pop-Site
Flood Models
Global Climate Models
Local Climate

The local development model
GIS layers at 50 metre resolution

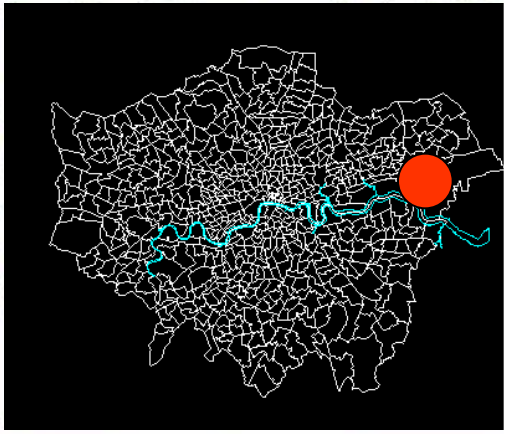


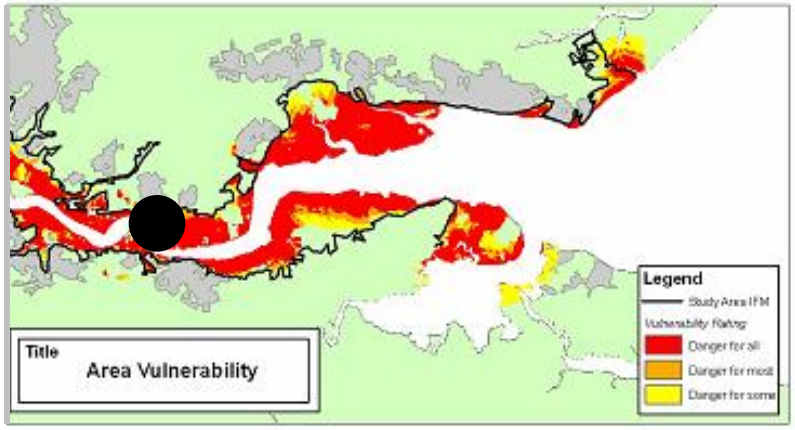


Current Water

Currently Developed

Planning Constrained Land





The New Model

- Many models – suite of models we are calling SIMULACRA
- Built within the visualization package World Wind
- Built using ECLIPSE IDE
- Good networks- tackle the slow modes issue
- Flexible so we can produce many different models
- Temporal dynamics – tricky – not convinced we should or can do this at this stage
- Camilo Vargas is working on programming the model, Duncan will be on the data, Joan on the transport networks, and all of us on formulating the model etc