Coastal M&Ms

SCER

Putting Coastal Research Into ICZM

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Presented at: Joint LOICZ – Institute for Coastal Research Conference, 14 June, 2006, GKSS

GKSS FORSCHUNGSZENTRUM

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The M&Ms of ICZM

(with special reference to the social sciences)

Integrated Coastal Zone *Management* **=M**

&

Integrated Coastal Zone *Mechanisms*

=Ms

Integrated Coastal Zone *Models*

Integrated Coastal Zone Management

'... a continuous process with the general aim of implementing sustainable development in coastal zones and maintaining their diversity. To this end, it aims, by more efficient *management*, to establish and maintain optimum (sustainable) levels of use, development and activity in coastal zones, and eventually to improve the state of the coastal environment.'.

(http://europa.eu.int/comm/environment/iczm/pdf/themf_ex.pdf)

Management

verb: the act of *administration* or *controlling*, or the application of skills in the *manipulation*, use or control of things or persons

noun: the collective body of those who *manage or direct*

This is not the role of science!

Coastal Issues

EU Communication (COM(95)511) lists the following: 'demographic pressure, reduction of biodiversity, pollution of water resources, the impoverishment of the landscape, competition for space and resources, and the complexity of relationships between human activities and the coastal environment'.

The Communication (COM(95)511) suggests addressing these problems in two ways:

1. ‘ providing concrete technical information about factors and *mechanisms* which either encourage or discourage sustainable *management* of coastal zones [...] evaluated in a wide range of physical, cultural and socio-economic conditions.’

... the tasks of various scientific disciplines.

2. ‘stimulating a broad *debate* and exchange of information *among various actors involved in planning* and implementation of coastal zone *management*, including those at the local, regional, national and community levels.’

... this is clearly not the role of scientific disciplines.

These are tasks for facilitators of coastal zone *management*.

The human/social sciences have heavily emphasized 'stakeholder involvement', and have tended to avoid 'the provision of concrete technical information and mechanisms' as suggested, that would result in informed discussion. Instead, they have made the process of the discussion the main topic of research or have attempted to provide 'scenarios' of human driven processes.

In spite of the recognition of the need to understand the 'mechanism' of human induced change, the human sciences, for whatever reason, have been reluctant to address the issues by the means necessary for integrated multidisciplinary analysis and/or develop an efficient and flexible *tool* for decision makers.

Most coastal research (natural science) has tended to focus on biological and physical systems in isolation from human influence, or has considered humans and their activities as external perturbations to the functioning of bio-physical systems.

Most social science research on coastal systems has focused on social, economic and political systems in isolation from the bio-physical context.

A move towards *mechanisms and models* in the social sciences would do much to enhance the 'integration' of integrated coastal zone research.

For analytical purposes we can define coast by its specific properties:

1. geo-physical specificity;

2. ecological specificity;

3. potential resources;

4. and the interaction of these with humans, in the forms of dwellers, visitors and users.

For the purpose of this discussion these will be considered as analytical coastal segments.

Interactions between and among these segments constitute *mechanisms.*

Most often in coastal research, be it descriptive or statistical, we often only demonstrate that a relationship is likely to exist, but provide no clue as to why this is likely to be the case. We fail to stipulate the mechanisms linking the explanatory premises and the thing to be explained.

The mechanism must be specified if we wish to gain an acceptable explanation and if we wish to understand why we observe what we observe.

What the social sciences should be able to contribute to coastal analysis is a systematic explanation of the social *mechanisms* that generate and explain observed associations between humans and the coast.

Social science needs to offer more than mere description that accounts for a chain of events leading from one situation to another. It needs to develop the ability to address an integrated ensemble of mechanisms that are time and context specific.

Mechanisms

Observations are made of a systematic, non-random relationship between two events, *1* and *0* . The link between the two events is expressed as a mechanism *M*.

$$1 \longrightarrow M \longrightarrow 0$$

This explanation is characterized by the link between input and output.

Typically, *M* is assumed to be devoid of structure, or the structure is assumed to be of no inherent interest, possibly because it cannot be easily observed, measured or calculated, or perhaps because *0* can be predicted without consideration for *M*.

Yet, it is precisely at *M* where management takes place.

Typically, *M* is the human component, i.e. subsidies, prohibitions, market, etc., or in the natural sciences, where mechanisms *are* often employed, it could be temperature, salinity, etc.

However, in the tradition of causal modelling, *M*, the *explanatory* mechanism, is often simply a statistical coefficient linking *1* and *0*, and this coefficient is supposed to describe the causal influence.

Management, particularly management to bring about change, however, is about the actions and behaviours of people, not coefficients.

Management needs to address deeper problems:

How (i.e. through what process/mechanism) was this brought about?; through what process/mechanism could it be changed?

It is necessary not only to describe the magnitude of occurrence but also to explain *why* this is likely to occur.

A satisfactory explanation requires that those things that brought the relationship into existence be specified.

What brought the situation into existence is the component often missing in the natural science of coastal-environmental issues, while, in the social sciences, contributions have been devoid of input and output, often resulting in an inexplicit discursive analysis of process.

For successful management it is necessary that science make explicit the underlying generative mechanisms. Essentially then, a mechanism is part of an answer to a question about why something occurs.

In mathematical operations, they are function transforming variables, distinguished on the basis of functional form and parameter values.

Models

Models for management purposes should be constructed in a way so that management can actually use them.

Properly presented, model interfaces are a means for decision makers / stakeholders to construct their own scenarios, relieving science of the task of creating speculative fiction.

The task is to design the model of the mechanisms in a way that allows management to assess the impacts of their decisions in the form of various *management-designed* scenarios.

Model demonstration.

User can construct scenarios and test the outcome of the scenario design over a determined period of time.

Not only is the user capable of inserting "what if" questions, for example, "what if we increased the retirement age to 75 years old?" or "what if global warming resulted in x degrees rise in temperature or x mm rise in sea level?", but also to pause the model within the run to determine what would happen if a new decision was made at that particular time or new conditions were entered as a result of new scientific knowledge or unexpected events.

It is a *management tool* designed by science

MAIN CONTROL PANEL

Return To Welcome Page

1. CREATE YOUR SCENARIO

2. RUN THE MODEL

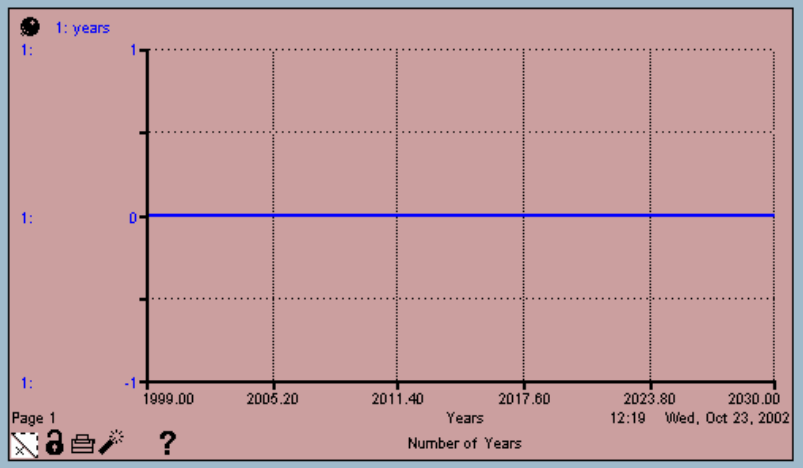
3. keep track of time

Time Spec Info

TIME SPECIFICATION

WARNINGS

Water Demand



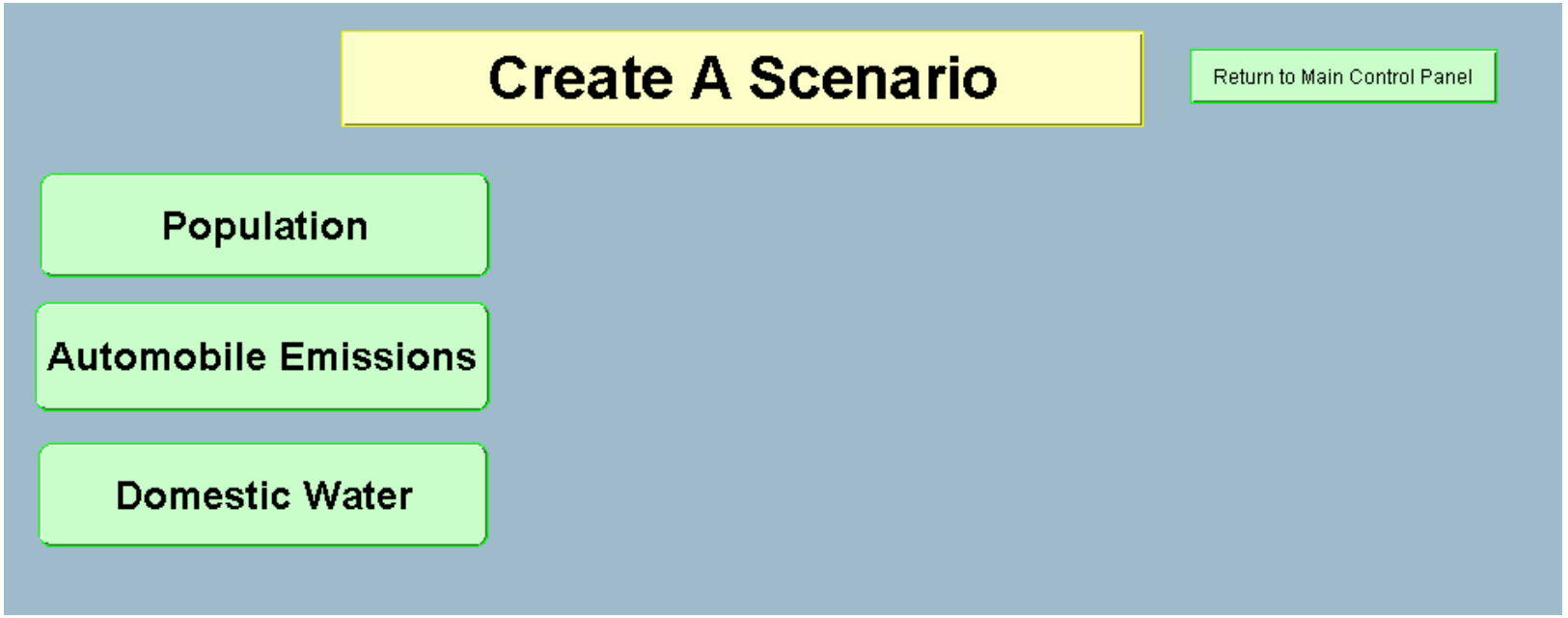
Pause your model run to change the scenario

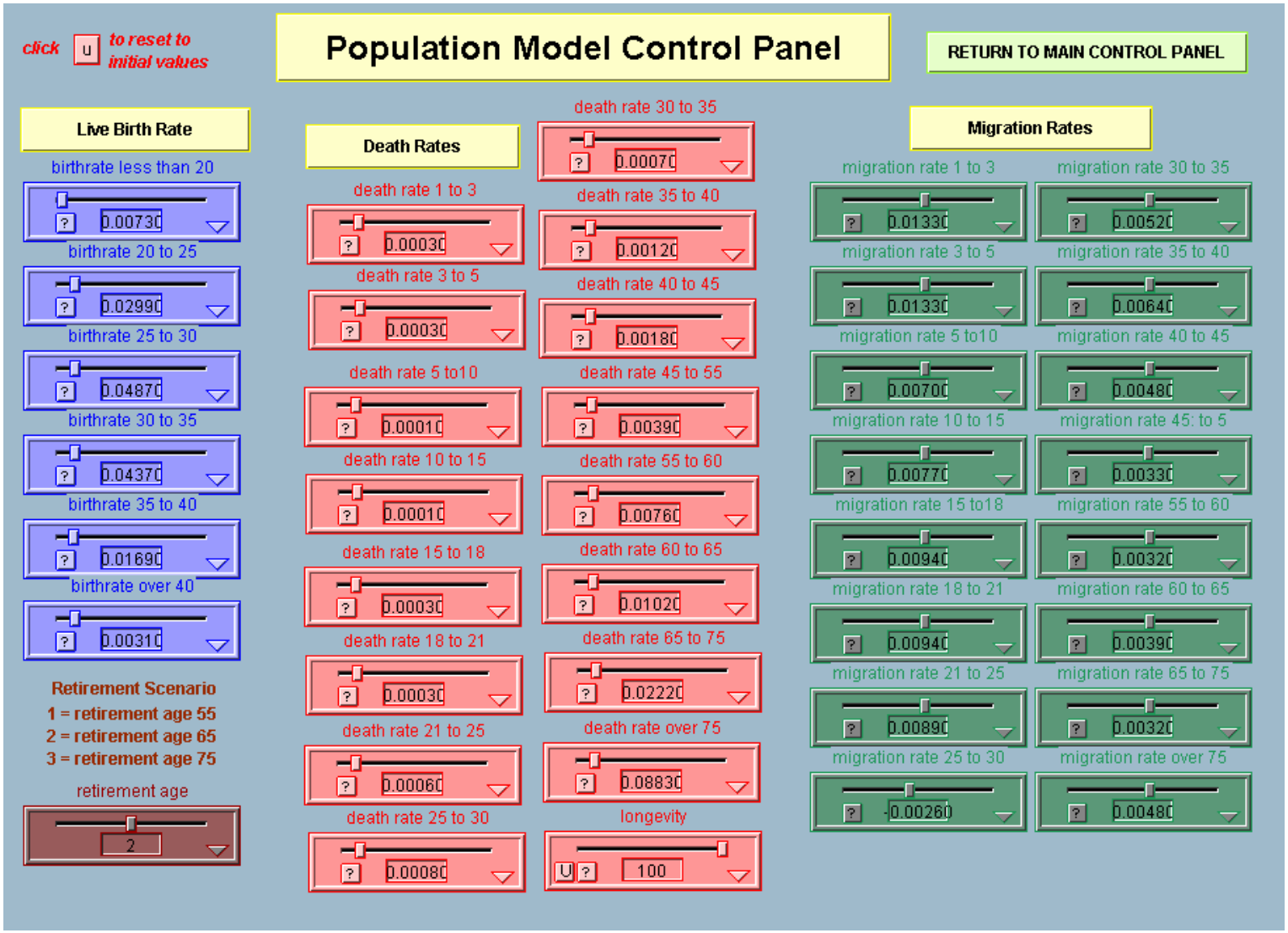
Resume running the model from where you stopped

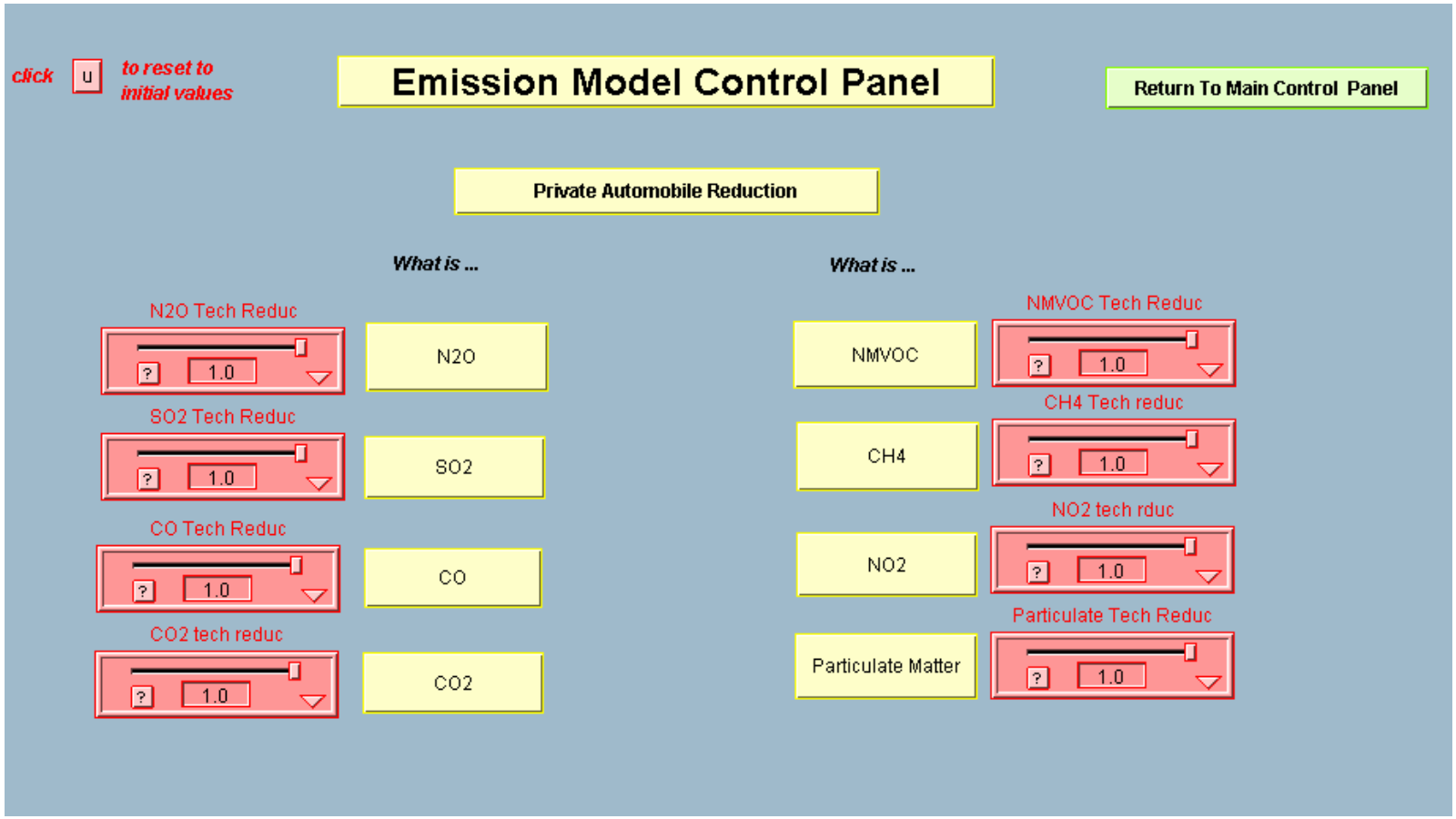
Stop the model run

4. SEE THE RESULTS

Restore Model To Initial Values


Create A Scenario
Return to Main Control Panel
Population
Automobile Emissions
Domestic Water

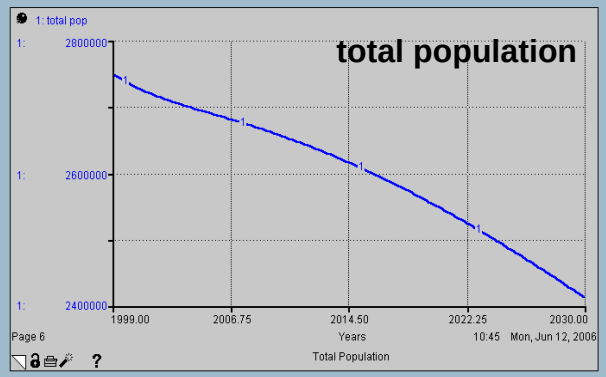

click u to reset to initial values
Population Model Control Panel
RETURN TO MAIN CONTROL PANEL
Live Birth Rate
birthrate less than 20
0.00730
birthrate 20 to 25
0.02990
birthrate 25 to 30
0.04870
birthrate 30 to 35
0.04370
birthrate 35 to 40
0.01690
birthrate over 40
0.00310
Retirement Scenario
1 = retirement age 55
2 = retirement age 65
3 = retirement age 75
retirement age
2
Death Rates
death rate 1 to 3
0.00030
death rate 3 to 5
0.00030
death rate 5 to10
0.00010
death rate 10 to 15
0.00010
death rate 15 to 18
0.00030
death rate 18 to 21
0.00030
death rate 21 to 25
0.00060
death rate 25 to 30
0.00080
death rate 30 to 35
0.00070
death rate 35 to 40
0.00120
death rate 40 to 45
0.00180
death rate 45 to 55
0.00390
death rate 55 to 60
0.00760
death rate 60 to 65
0.01020
death rate 65 to 75
0.02220
death rate over 75
0.08830
longevity
100
Migration Rates
migration rate 1 to 3
0.01330
migration rate 3 to 5
0.01330
migration rate 5 to10
0.00700
migration rate 10 to 15
0.00770
migration rate 15 to18
0.00940
migration rate 18 to 21
0.00940
migration rate 21 to 25
0.00890
migration rate 25 to 30
-0.00260
migration rate 30 to 35
0.00520
migration rate 35 to 40
0.00640
migration rate 40 to 45
0.00480
migration rate 45: to 5
0.00330
migration rate 55 to 60
0.00320
migration rate 60 to 65
0.00390
migration rate 65 to 75
0.00320
migration rate over 75
0.00480


click
u
to reset to initial values
Emission Model Control Panel
Return To Main Control Panel
Private Automobile Reduction
What is ...
What is ...
N2O Tech Reduc
1.0
N2O
SO2 Tech Reduc
1.0
SO2
CO Tech Reduc
1.0
CO
CO2 tech reduc
1.0
CO2
NMVOC
NMVOC Tech Reduc
1.0
CH4
CH4 Tech reduc
1.0
NO2
NO2 tech rduc
1.0
Particulate Matter
Particulate Tech Reduc
1.0

Return To Results Panel

Population Results

Return to Main Control Panel



Click on the tab on the left bottom corner of the graph to go to next page of results

Return To Results Panel

Population Results

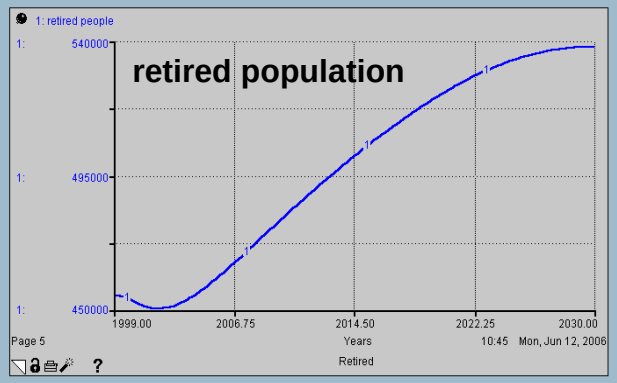
Return to Main Control Panel

Click on the tab on the left bottom corner of the graph to go to next page of results

Return To Results Panel

Population Results

Return to Main Control Panel



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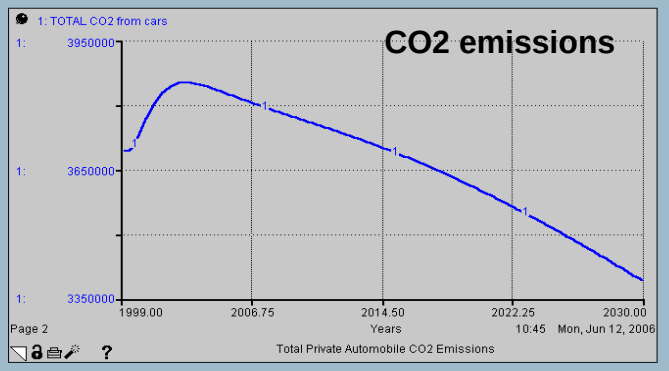
Return To Results Panel

Emission Results

Return to Main Control Panel

Private Automobiles



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modeling of mechanisms

= integrated coastal zone *research*

use of the model

= integrated coastal zone *management*

thank you for your attention