UCH UNIVERSIDAD DE CIENCIAS Y HUMANIDADES

EDUCACIÓN DE CALIDAD
UNIVERSIDAD
LICENCIADA
SUNEDU
EDUCACIÓN DE CALIDAD
RESOLUCIÓN Nº 071-2017-SUNEDU/CD

ESCUELA PROFESIONAL DE INGENIERÍA DE SISTEMAS E INFORMATICA

SIMULACIÓN DE SISTEMAS

UNIDAD DIDÁCTICA 2 SEMANA 15 SESIÓN 1

TEMA DE SESIÓN: TEORÍA GENERAL DE SISTEMAS

APRENDIZAJES ESPERADOS:

- Elabora modelos con el diagrama de forrester

CAPACIDAD GENERAL:

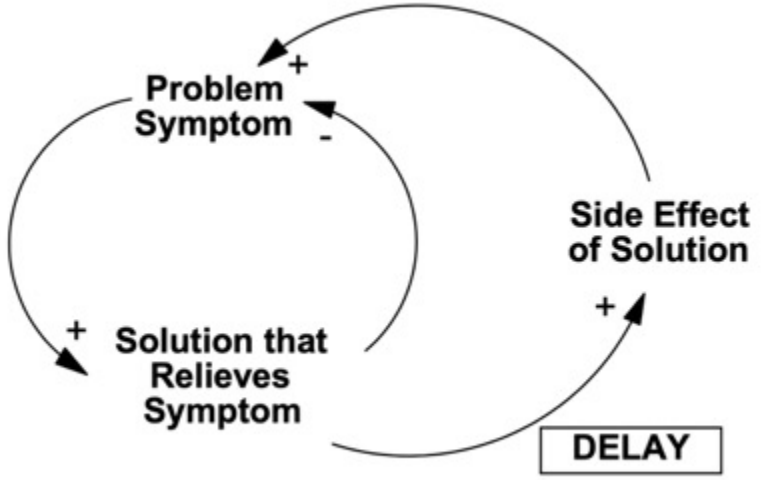
- Ejercicios de Diagramas Forrester
- Modelo Pandemia

CAPACIDAD ESPECÍFICA:

- Dinámica de Sistemas

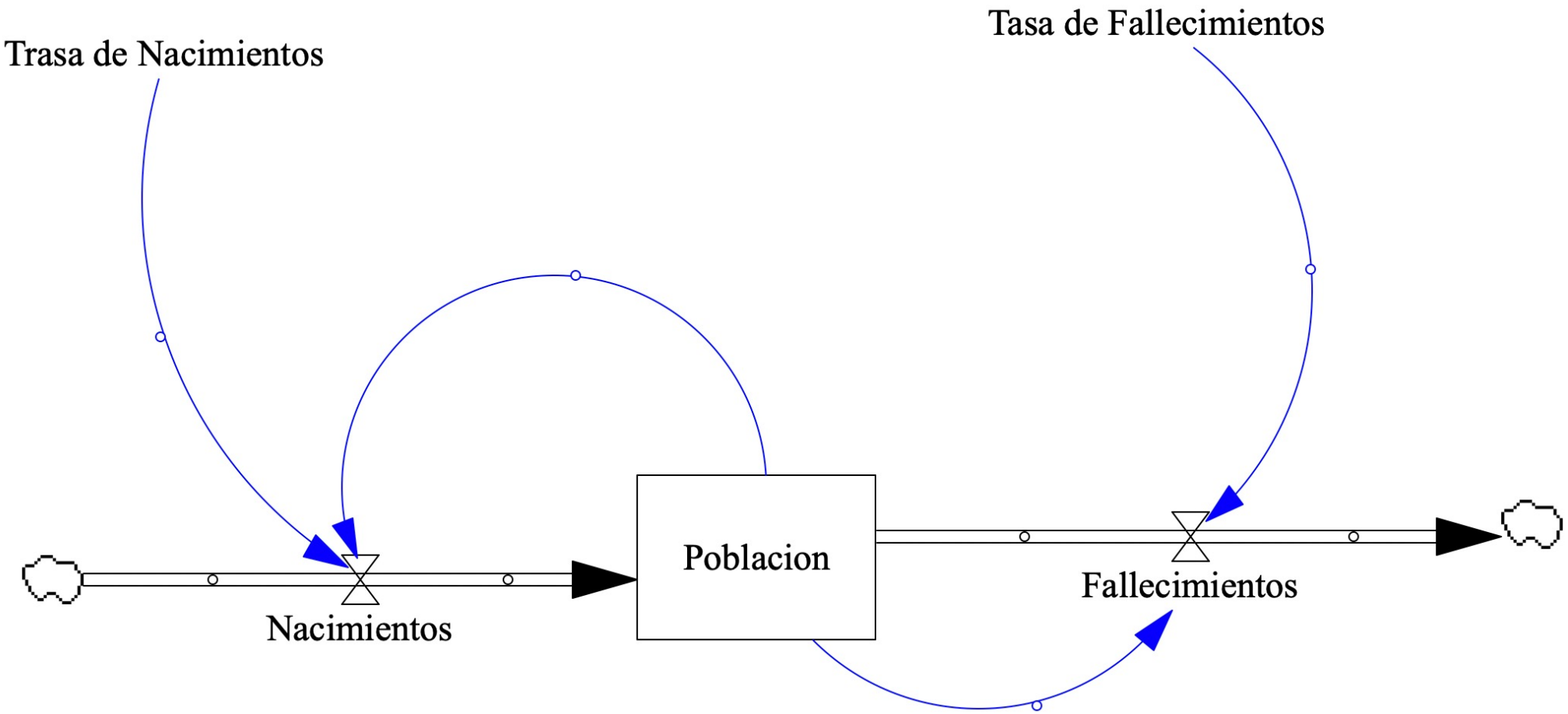
- **Objetivo de la Sesión**
  - Aprender a usar Arreglo de Variables y Variables Auxiliares

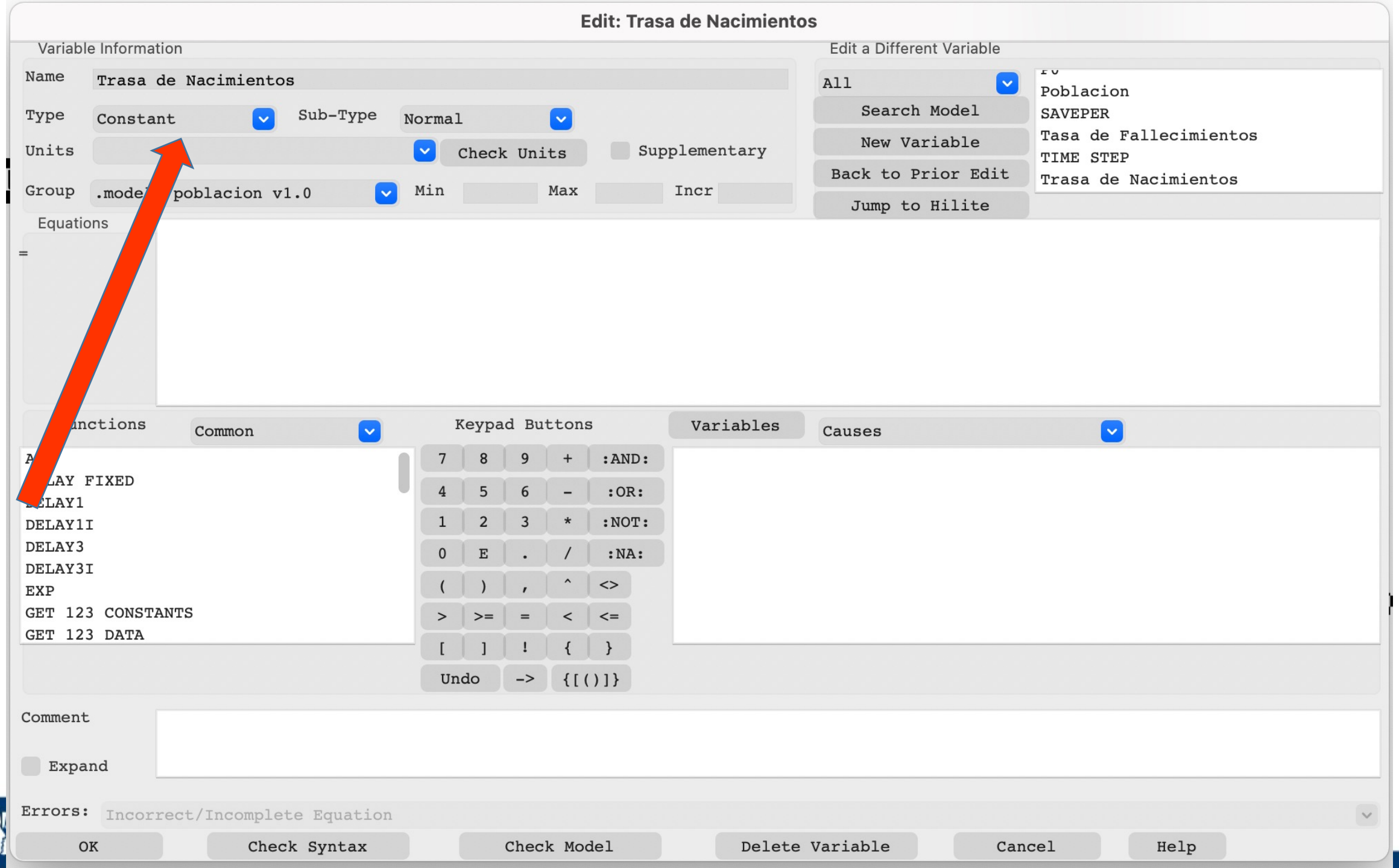
- **CONTENIDOS:**
  - Arreglo de Variables y Variables Auxiliares



Arreglo de Variables y Variables Auxiliares

Arreglo de Variables y Variables Auxiliares

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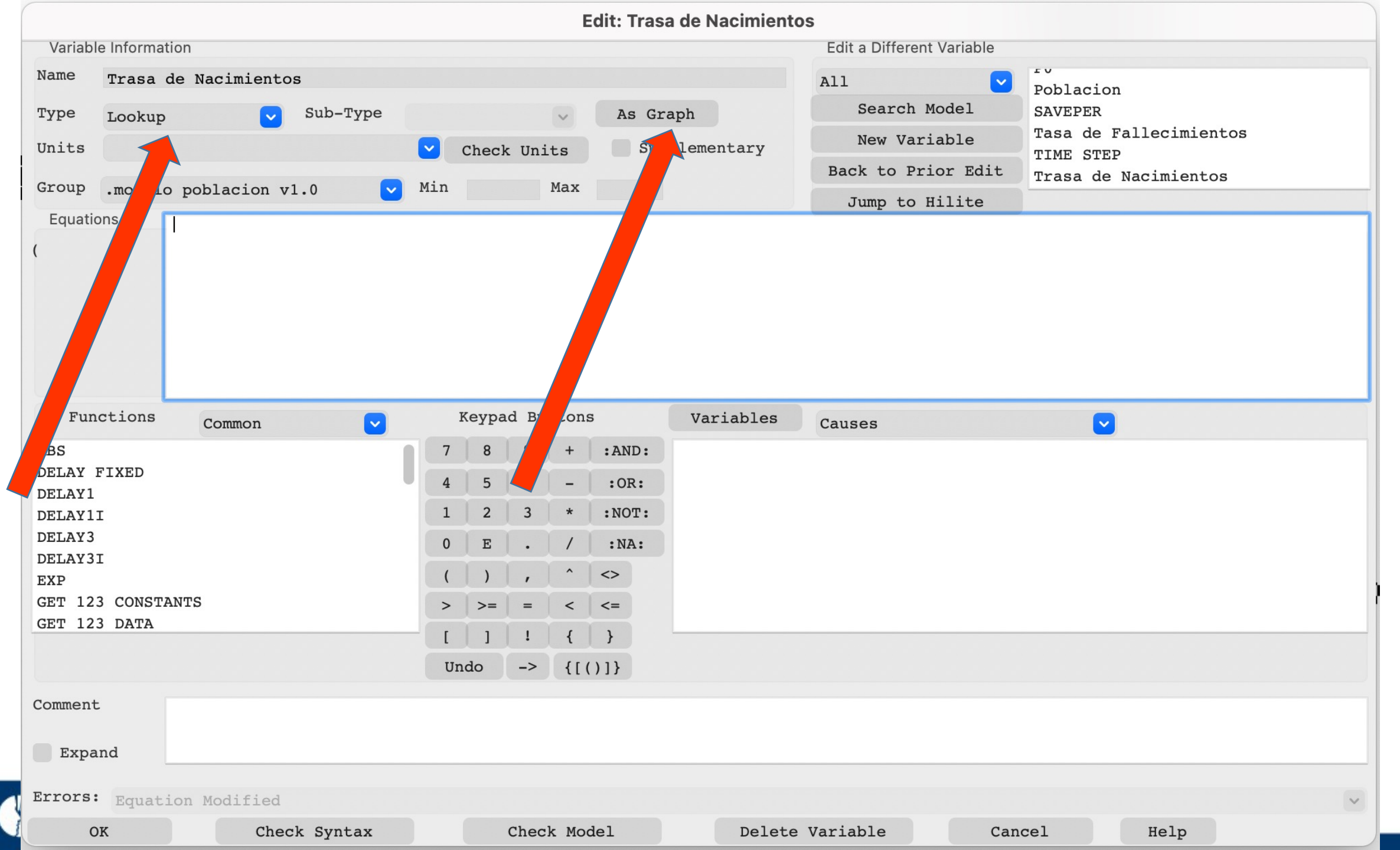
Variable Information
Name
Trasa de Nacimientos
Type
Constant
Sub-Type
Normal
Units
Check Units
Supplementary
Group
.model poblacion v1.0
Min
Max
Incr
Edit a Different Variable
All
Search Model
New Variable
Back to Prior Edit
Jump to Hilite
Poblacion
SAVEPER
Tasa de Fallecimientos
TIME STEP
Trasa de Nacimientos
Equations
=
Functions
Common
DELAY FIXED
DELAY1
DELAY1I
DELAY3
DELAY3I
EXP
GET 123 CONSTANTS
GET 123 DATA
Keypad Buttons
7 8 9 + :AND:
4 5 6 - :OR:
1 2 3 * :NOT:
0 E . / :NA:
( ) , ^ <>
> >= = < <=
[ ] ! { }
Undo -> {[()]}
Variables
Causes
Comment
Expand
Errors:
Incorrect/Incomplete Equation
OK
Check Syntax
Check Model
Delete Variable
Cancel
Help


Edit: Trasa de Nacimientos
Variable Information
Name
Trasa de Nacimientos
Type
Lookup
Sub-Type
As Graph
Units
Check Units
Group
Min
Max
Equations
Edit a Different Variable
All
Search Model
New Variable
Back to Prior Edit
Jump to Hilite
Poblacion
SAVEPER
Tasa de Fallecimientos
TIME STEP
Trasa de Nacimientos
Functions
Common
DELAY FIXED
DELAY1
DELAY1I
DELAY3
DELAY3I
EXP
GET 123 CONSTANTS
GET 123 DATA
Keypad
Variables
Causes
Comment
Expand
Errors:
Equation Modified
OK
Check Syntax
Check Model
Delete Variable
Cancel
Help

Graph Lookup - Trasa de Nacimientos

Print

Input | Output

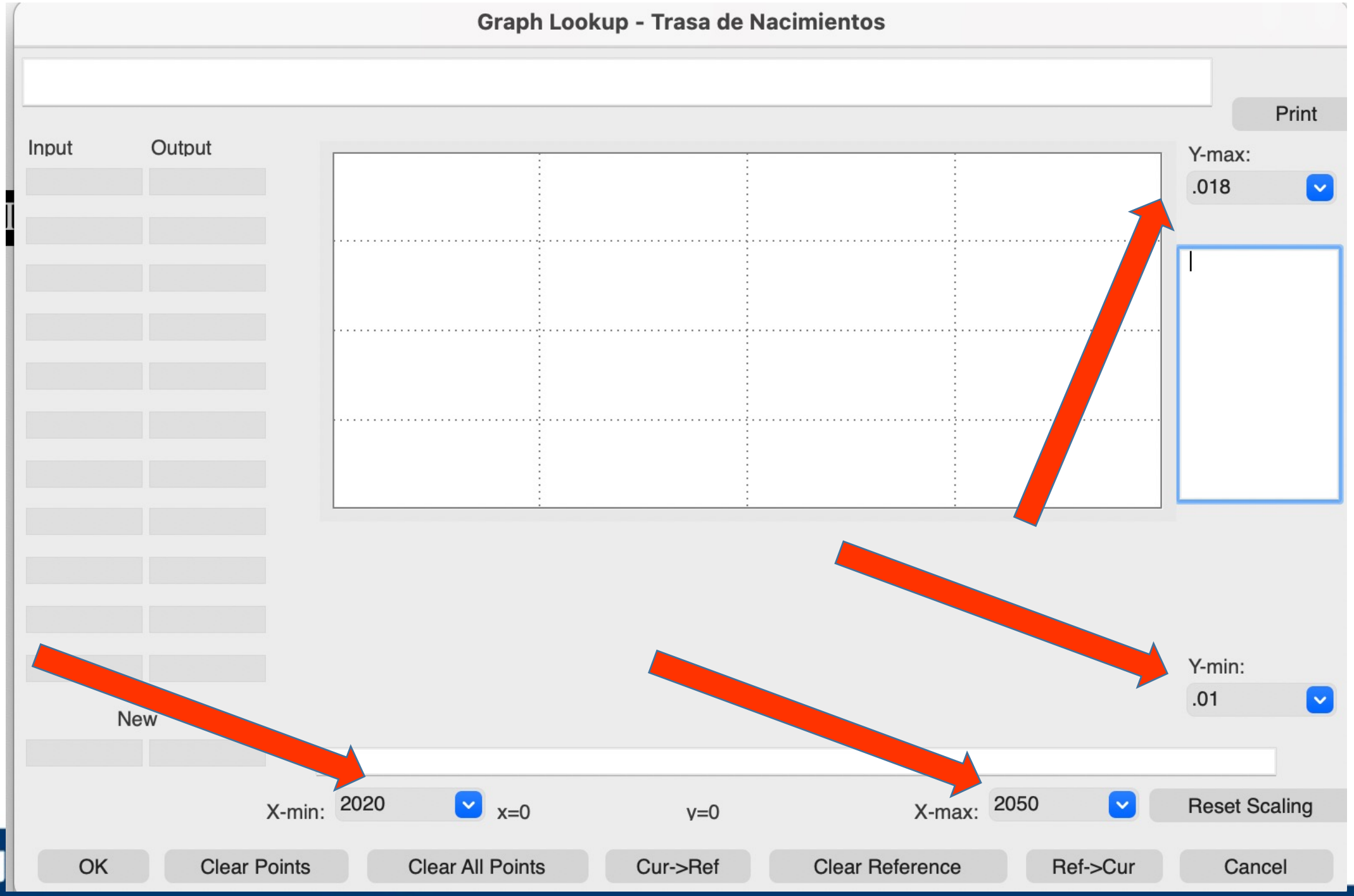
Y-max: 10

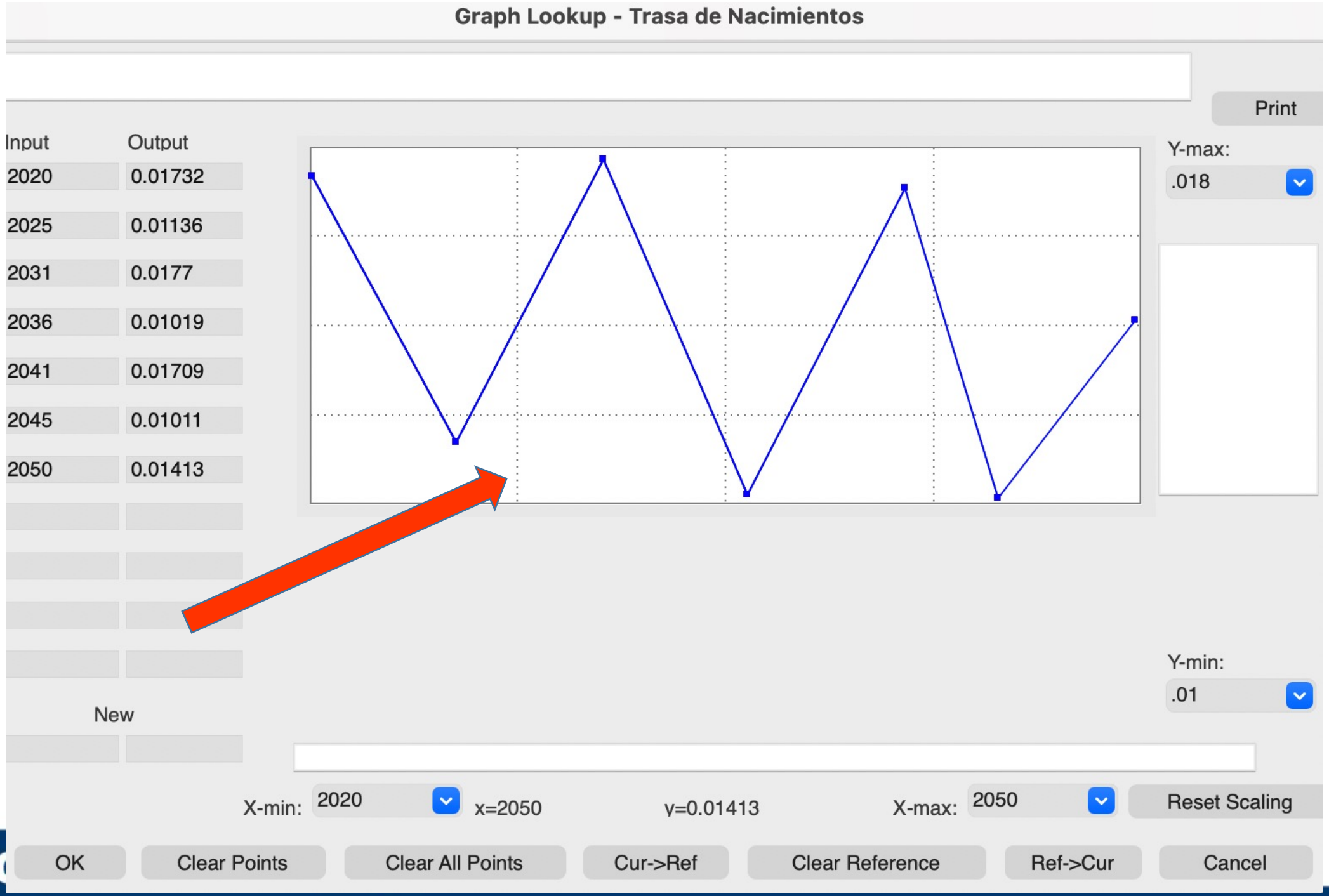
Y-min: 0

New

X-min: 0 x=0 y=0 X-max: 10 Reset Scaling

OK | Clear Points | Clear All Points | Cur->Ref | Clear Reference | Ref->Cur | Cancel


Graph Lookup - Trasa de Nacimientos
Print
Input
Output
Y-max:
.018
Y-min:
.01
New
X-min:
2020
x=0
y=0
X-max:
2050
Reset Scaling
OK
Clear Points
Clear All Points
Cur->Ref
Clear Reference
Ref->Cur
Cancel


Graph Lookup - Trasa de Nacimientos
Print
Input
Output
2020
0.01732
2025
0.01136
2031
0.0177
2036
0.01019
2041
0.01709
2045
0.01011
2050
0.01413
New
Y-max:
.018
Y-min:
.01
X-min:
2020
x=2050
y=0.01413
X-max:
2050
Reset Scaling
OK
Clear Points
Clear All Points
Cur->Ref
Clear Reference
Ref->Cur
Cancel

Edit: Trasa de Nacimientos

Variable Information

Name: Trasa de Nacimientos

Type: Lookup Sub-Type: As Graph

Units: Check Units Supplementary

Group: .modelo poblacion v1.0 Min: Max:

Edit a Different Variable

All

Search Model

New Variable

Back to Prior Edit

Jump to Hilite

Poblacion
SAVEPER
Tasa de Fallecimientos
TIME STEP
Trasa de Nacimientos

Equations

(

```
[(2020,0.01)-(2050,0.018)],(2020.06,0.0173175),(2025.25,0.0113649),(2030.63,0.0176967),(2035.76,0.0101896),
(2041.45,0.01709),(2044.81,0.0101137),(2049.76,0.0141327)
```

Functions: Common

ABS
DELAY FIXED
DELAY1
DELAY1I
DELAY3
DELAY3I
EXP
GET 123 CONSTANTS
GET 123 DATA

Keypad Buttons

7	8	9	+	:AND:
4	5	6	-	:OR:
1	2	3	*	:NOT:
0	E	.	/	:NA:
(	)	,	^	<>
>	>=	=	<	<=
[	]	!	{	}
Undo	->	{[()]}		

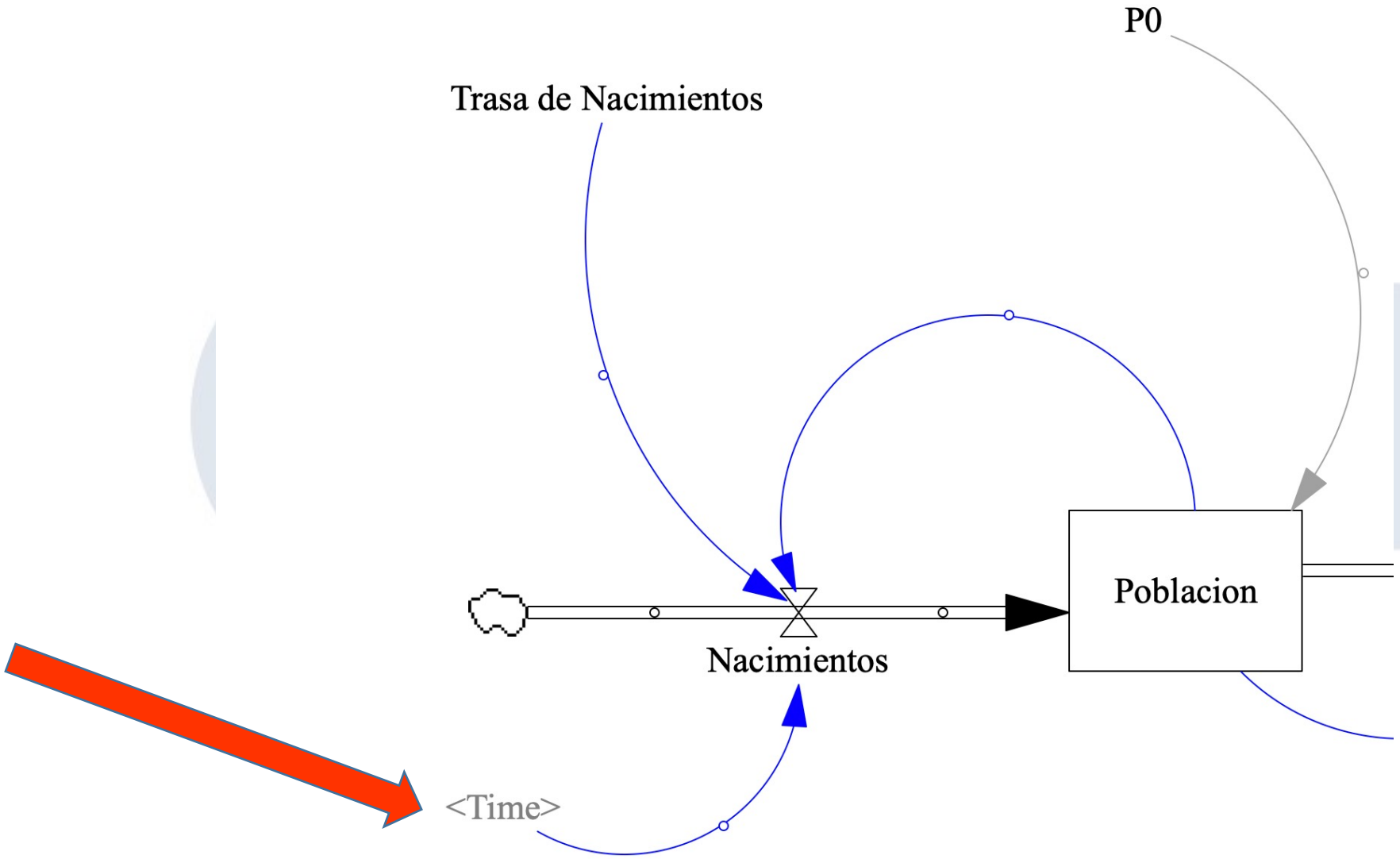
Variables Causes

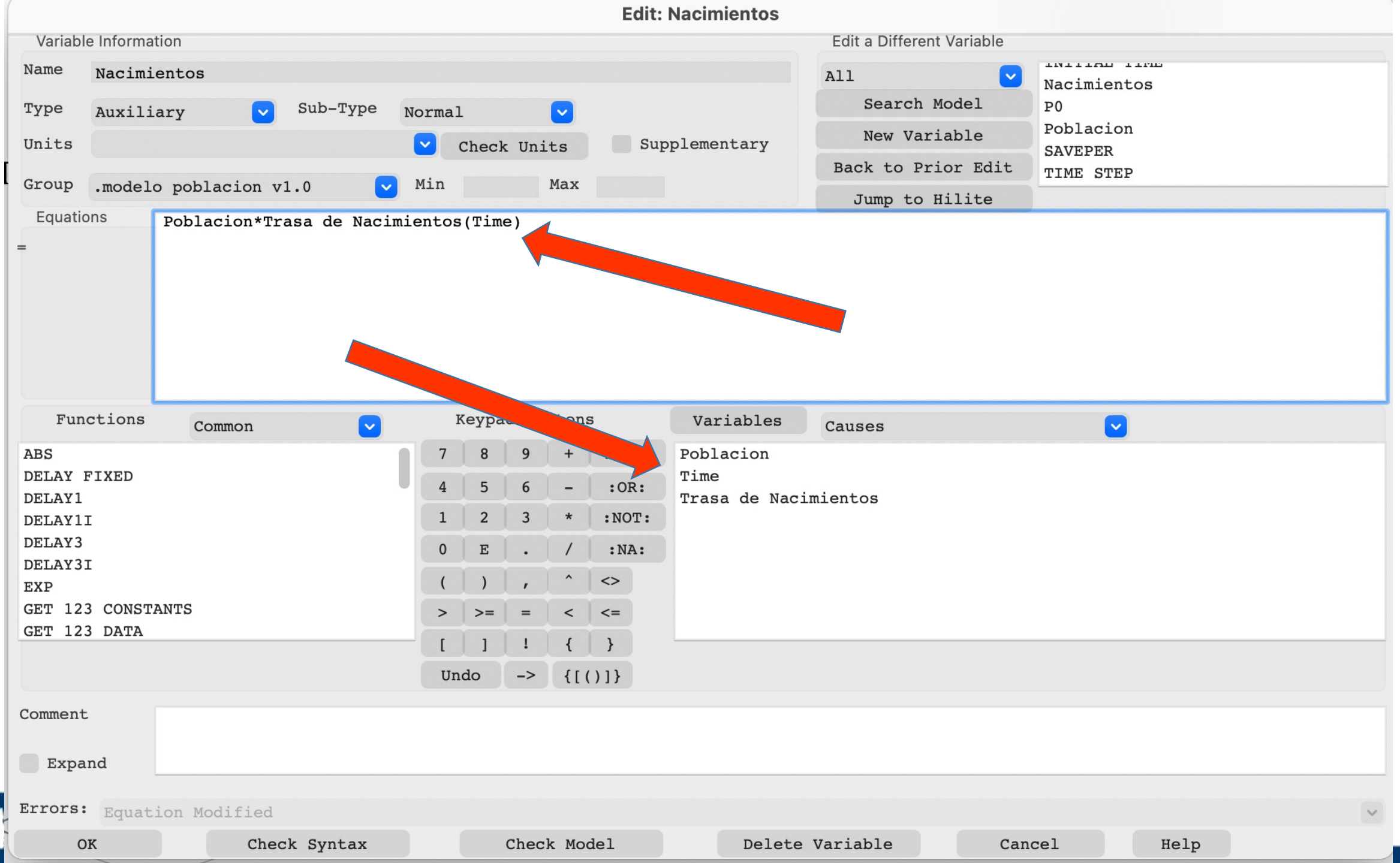
Comment

Expand

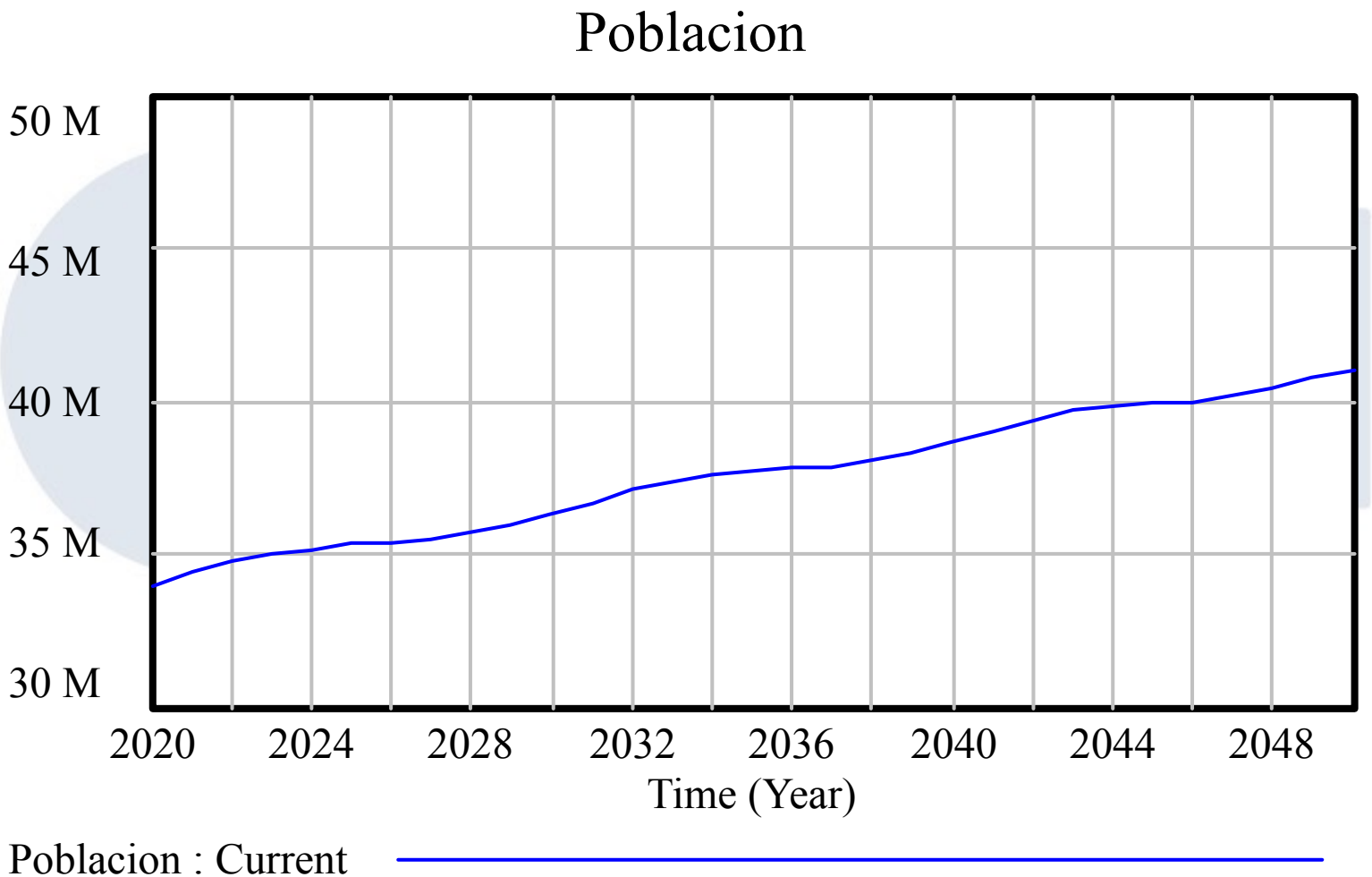
Errors: Equation Modified

OK Check Syntax Check Model Delete Variable Cancel Help

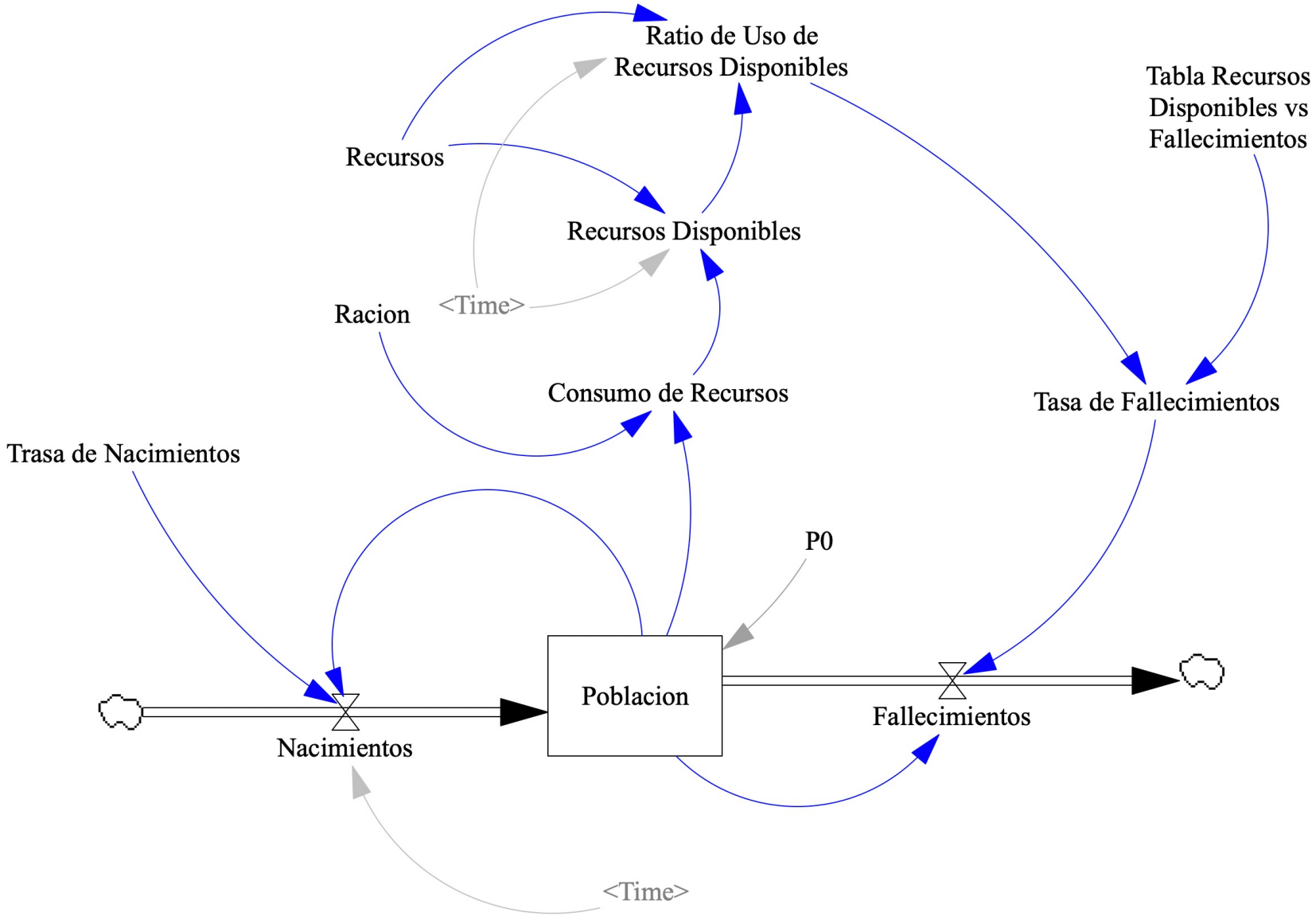

P0
Trasa de Nacimientos
Poblacion
Nacimientos
<Time>


Edit: Nacimientos
Variable Information
Name
Nacimientos
Type
Auxiliary
Sub-Type
Normal
Units
Check Units
Supplementary
Group
.modelo poblacion v1.0
Min
Max
Edit a Different Variable
All
Search Model
New Variable
Back to Prior Edit
Jump to Hilite
Nacimientos
P0
Poblacion
SAVEPER
TIME STEP
Equations
=
Poblacion*Trasa de Nacimientos(Time)
Functions
Common
ABS
DELAY FIXED
DELAY1
DELAY1I
DELAY3
DELAY3I
EXP
GET 123 CONSTANTS
GET 123 DATA
7 8 9 +
4 5 6 - :OR:
1 2 3 * :NOT:
0 E . / :NA:
( ) , ^ <>
> >= = < <=
[ ] ! { }
Undo -> {[()]}
Variables
Causes
Poblacion
Time
Trasa de Nacimientos
Comment
Expand
Errors:
Equation Modified
OK
Check Syntax
Check Model
Delete Variable
Cancel
Help

Arreglo de Variables y Variables Auxiliares



Arreglo de Variables y Variables Auxiliares

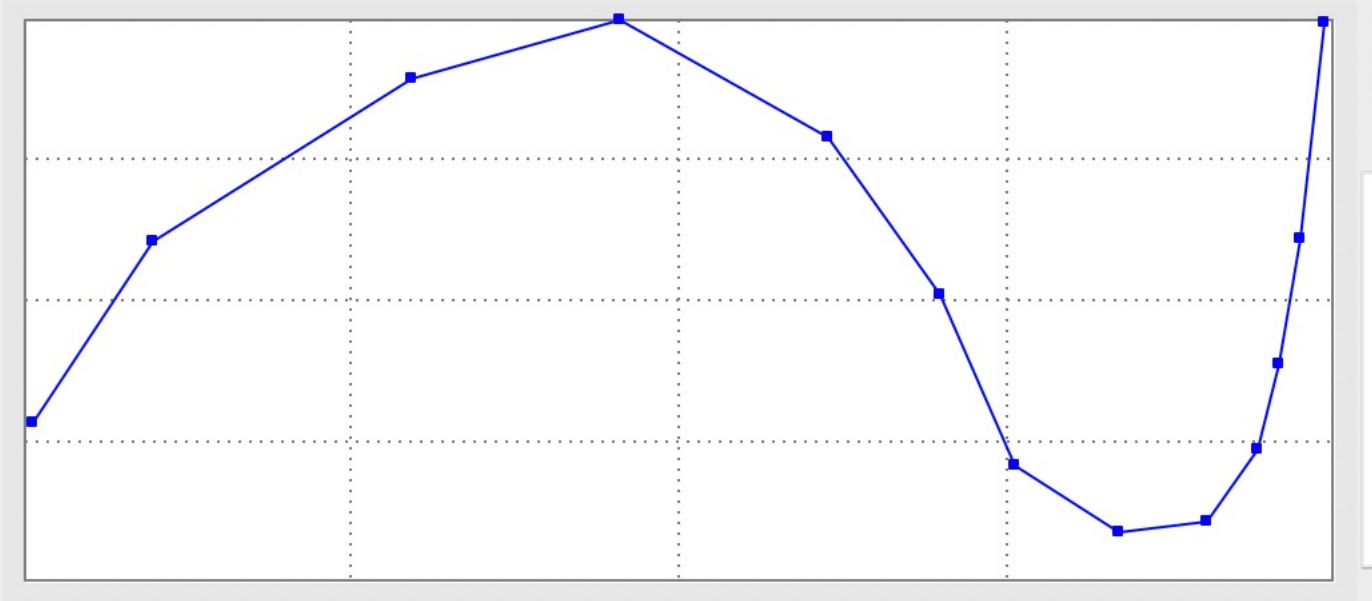


Graph Lookup - Recursos

Print

Input	Output
2020	1.853e+08
2023	2.806e+08
2029	3.687e+08
2034	4e+08
2038	3.36e+08
2041	2.521e+08
2043	1.626e+08
2045	1.27e+08
2047	1.313e+08
2048	1.711e+08
2049	2.152e+08

New

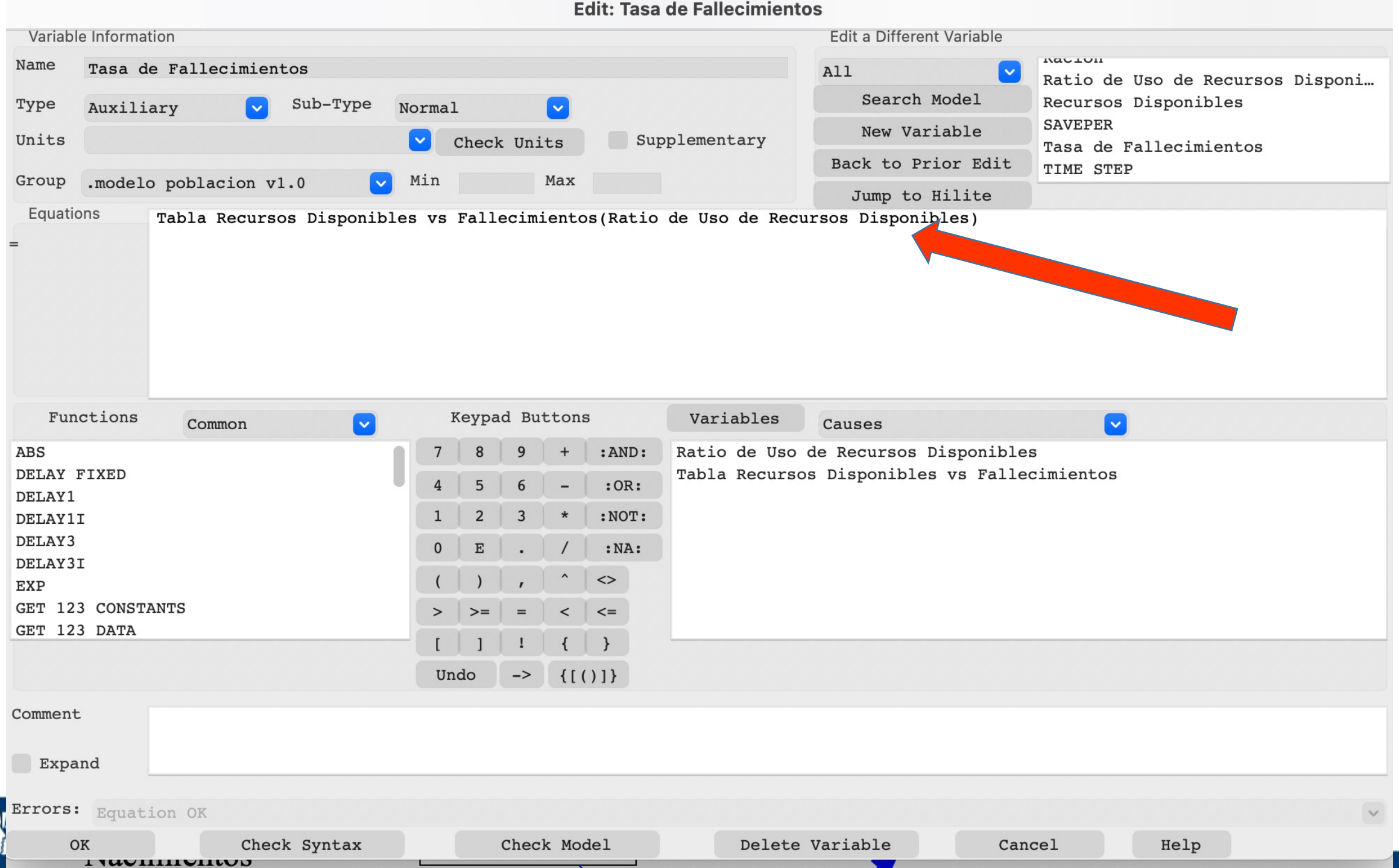


Y-max: 4e+08

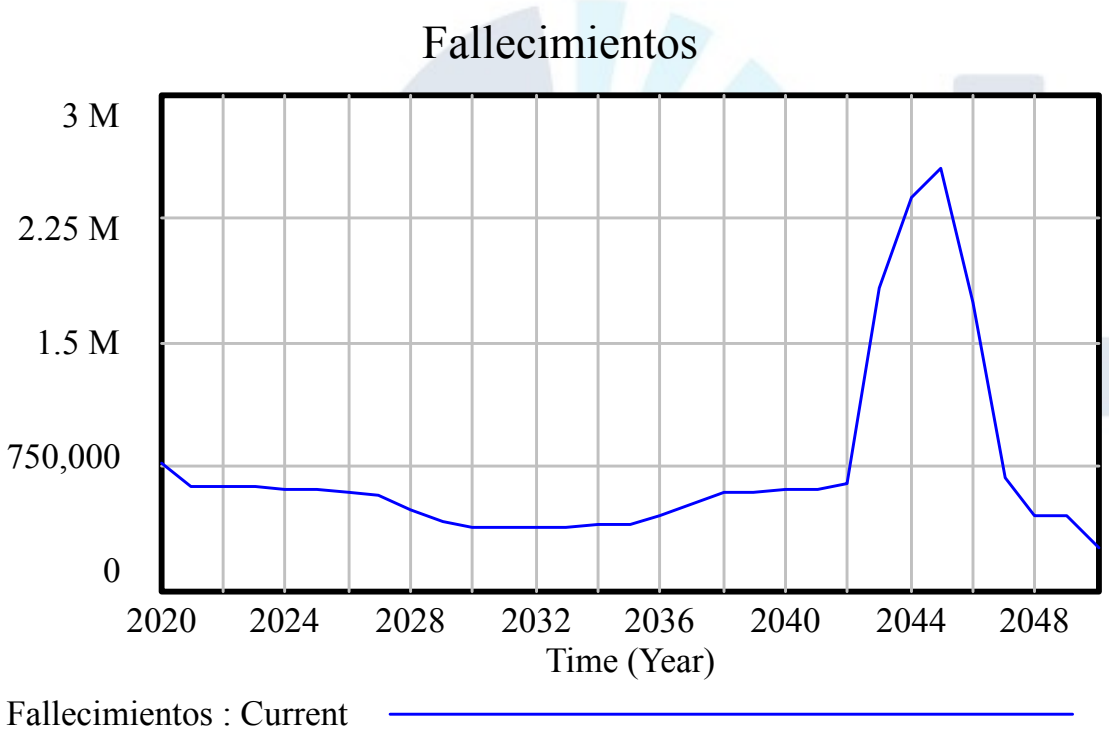
Y-min: 1e+08

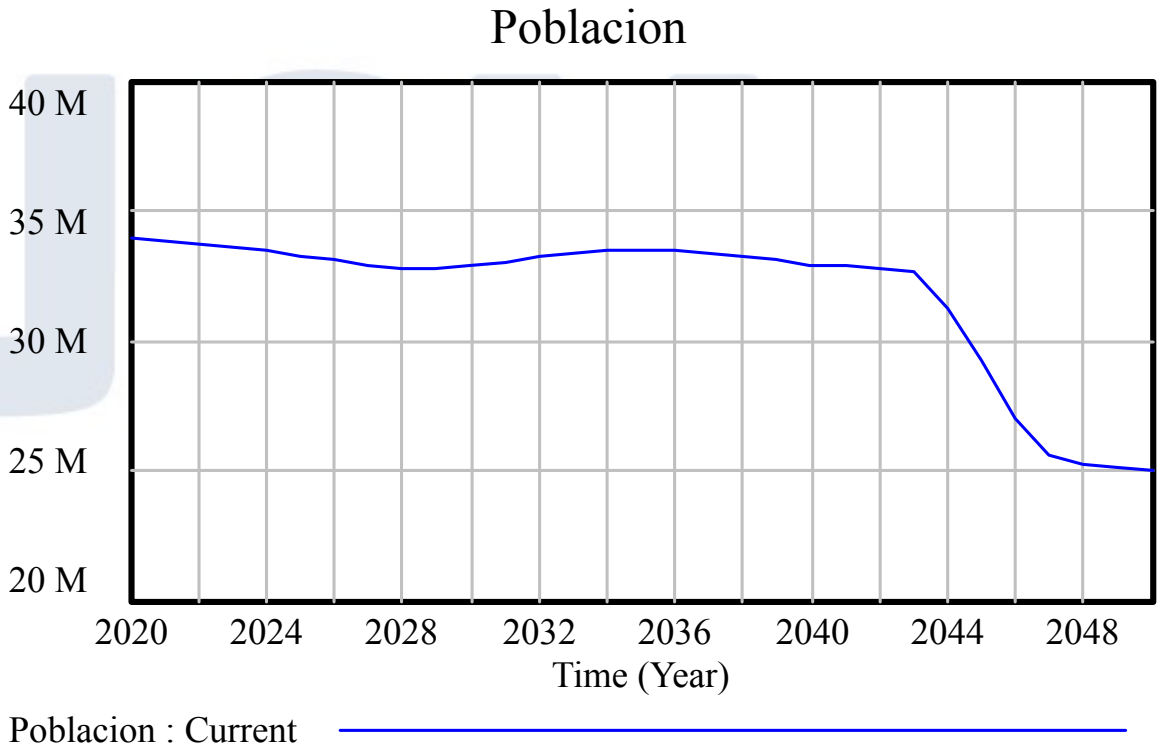
X-min: 2020 x=2029 y=4.1e+08 X-max: 2050 Reset Scaling

OK | Clear Points | Clear All Points | Cur->Ref | Clear Reference | Ref->Cur | Cancel


Edit: Tasa de Fallecimientos
Variable Information
Name
Tasa de Fallecimientos
Type
Auxiliary
Sub-Type
Normal
Units
Check Units
Supplementary
Group
.modelo poblacion v1.0
Min
Max
Edit a Different Variable
All
Search Model
New Variable
Back to Prior Edit
Jump to Hilite
Ratio de Uso de Recursos Disponi…
Recursos Disponibles
SAVEPER
Tasa de Fallecimientos
TIME STEP
Equations
=
Tabla Recursos Disponibles vs Fallecimientos(Ratio de Uso de Recursos Disponibles)
Functions
Common
ABS
DELAY FIXED
DELAY1
DELAY1I
DELAY3
DELAY3I
EXP
GET 123 CONSTANTS
GET 123 DATA
Keypad Buttons
7 8 9 + :AND:
4 5 6 - :OR:
1 2 3 * :NOT:
0 E . / :NA:
( ) , ^ <>
> >= = < <=
[ ] ! { }
Undo -> {[()]}
Variables
Causes
Ratio de Uso de Recursos Disponibles
Tabla Recursos Disponibles vs Fallecimientos
Comment
Expand
Errors:
Equation OK
OK
Check Syntax
Check Model
Delete Variable
Cancel
Help

Arreglo de Variables y Variables Auxiliares





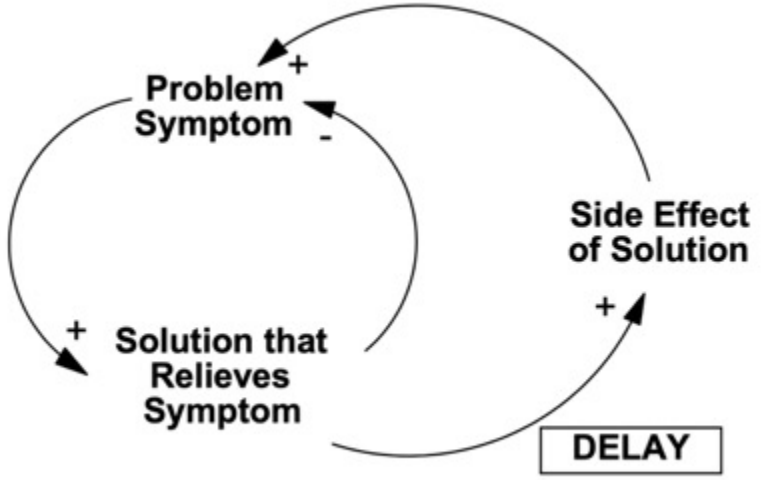
SIR Model Covid19 y
¿si le agregamos la segunda ola?

Bibliografía

- **MIT SCALE Certificate Program :** Sergey Naumov and Ross Collins System Dynamics Group, 2017

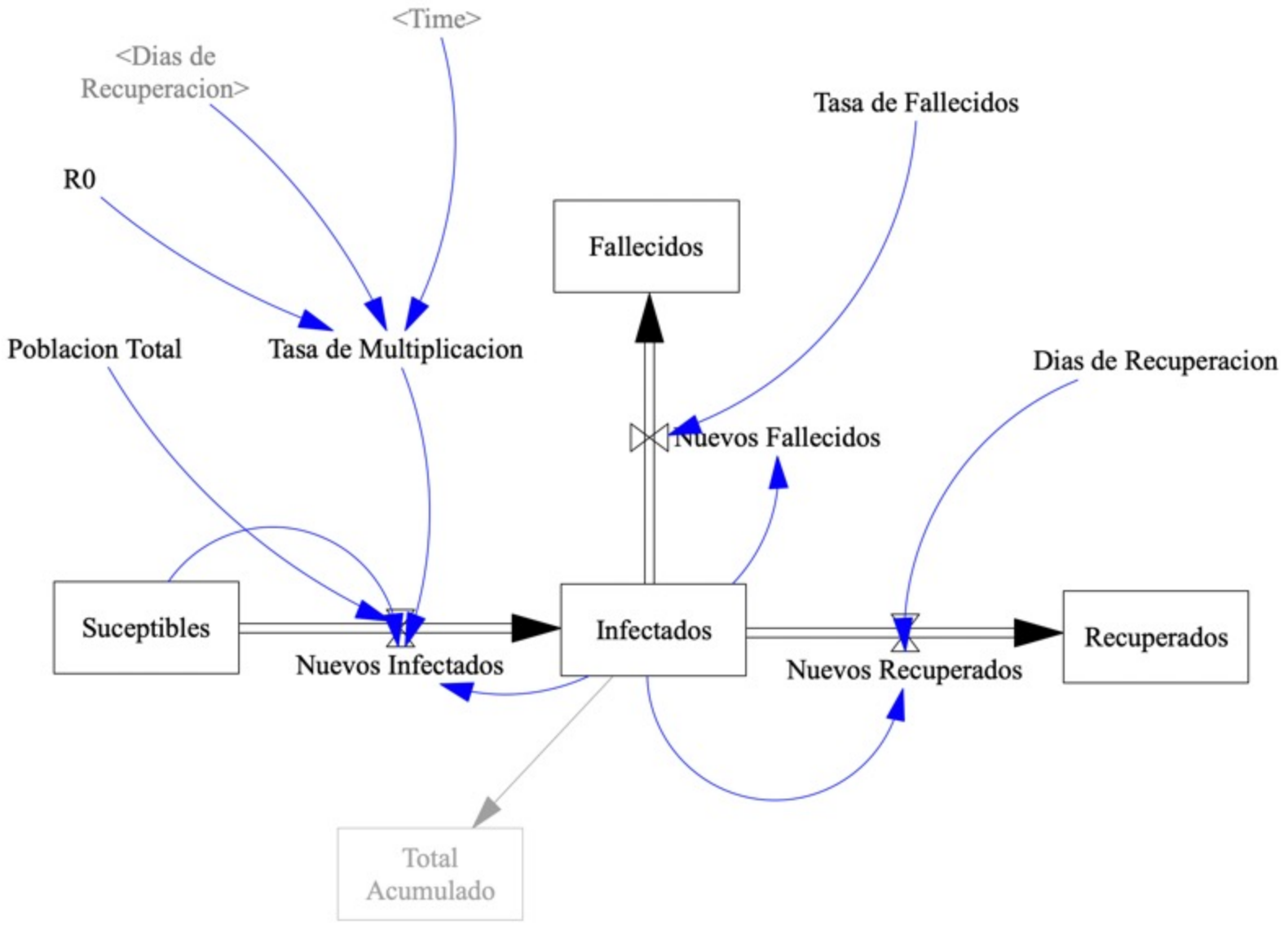
- **Objetivo de la Sesión**
  - Aprender un conjunto de recomendaciones y buenas prácticas para hacer un modelo de dinámica de sistemas

- **CONTENIDOS:**
  - Recomendaciones y buenas prácticas



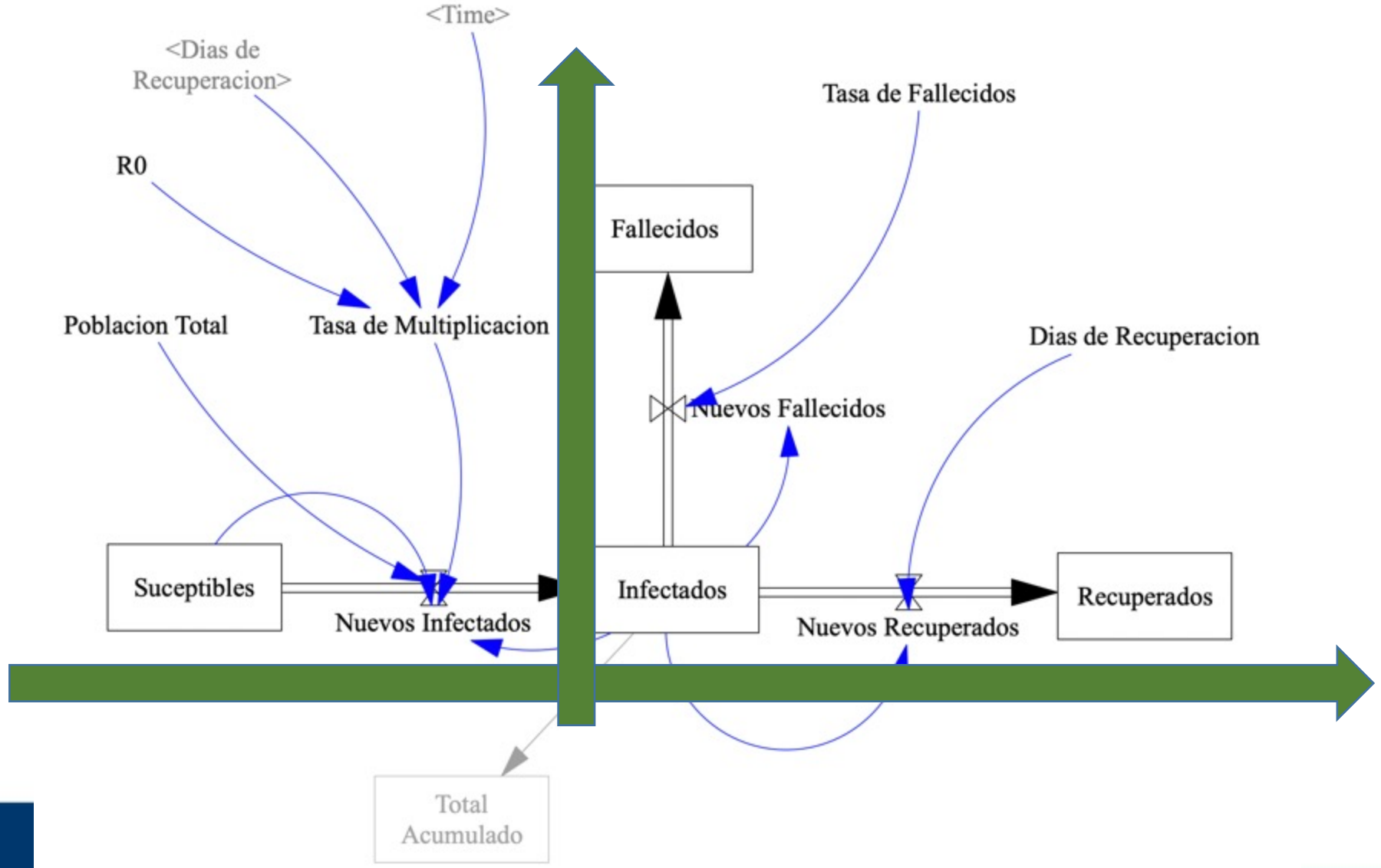
Consistencia en Unidades de Medida

Consistencia en Unidades de Medida

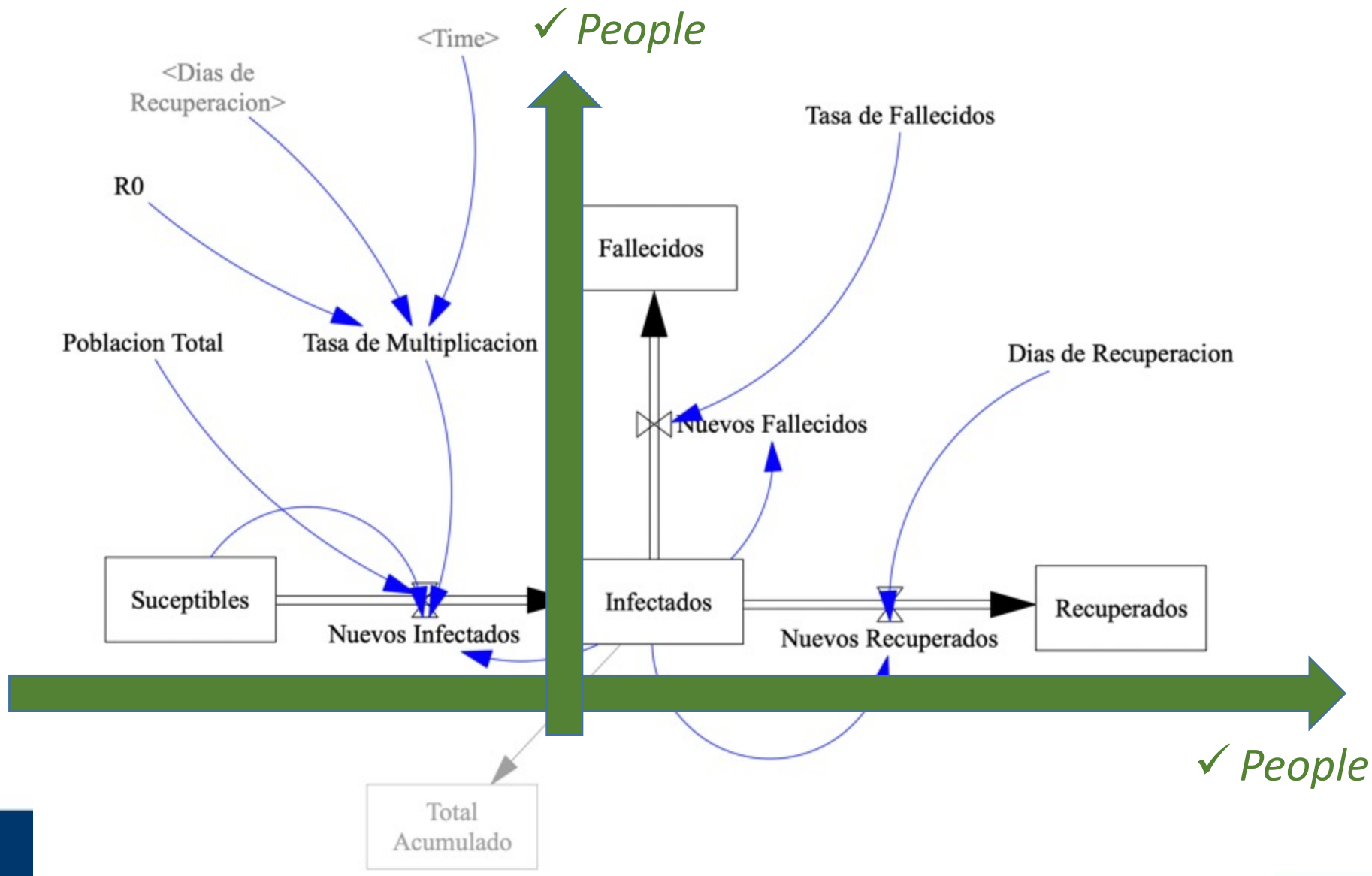


Consistencia en Unidades de Medida

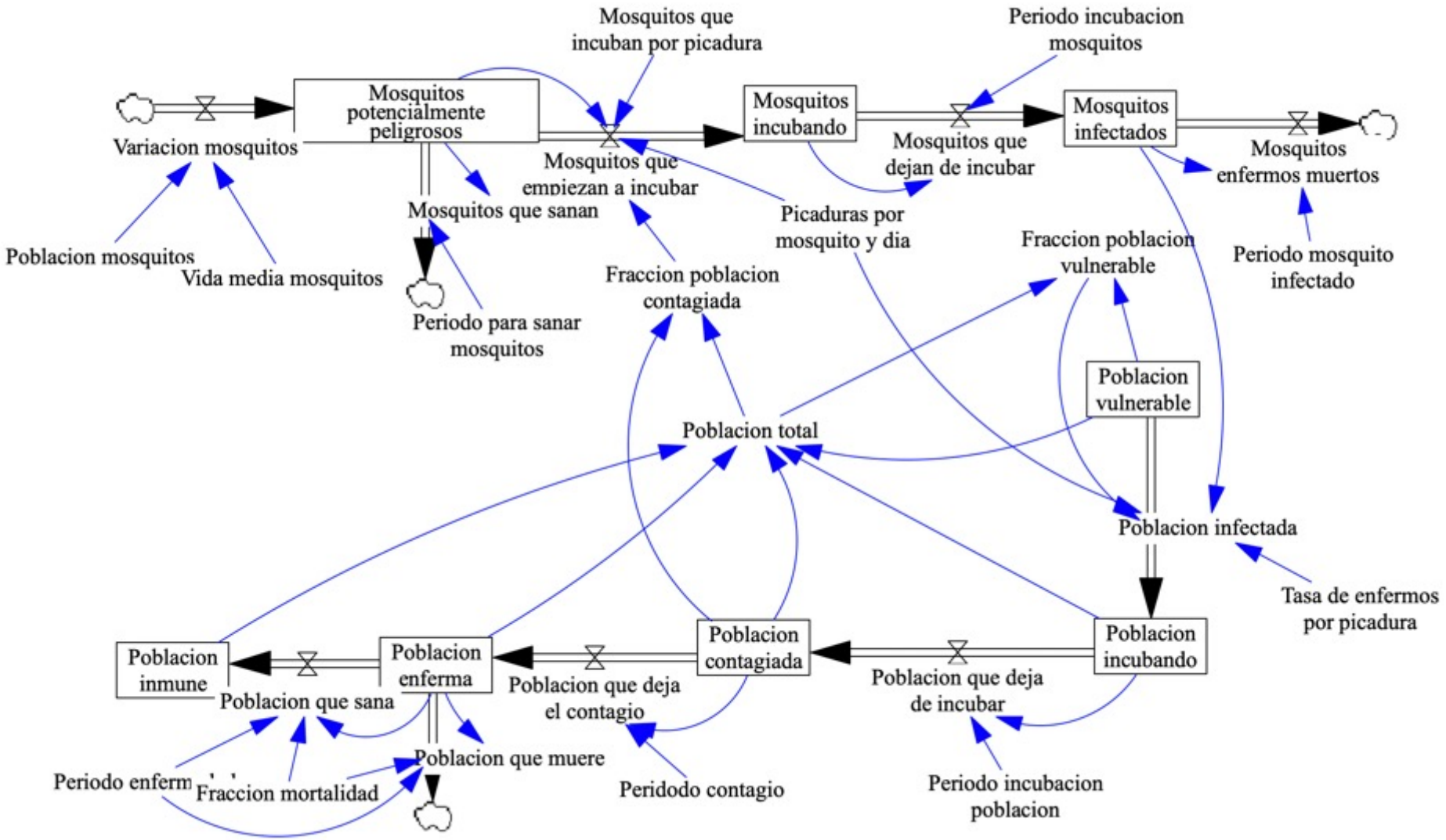
✓ *¿Qué material se mueve en estos flujos?*



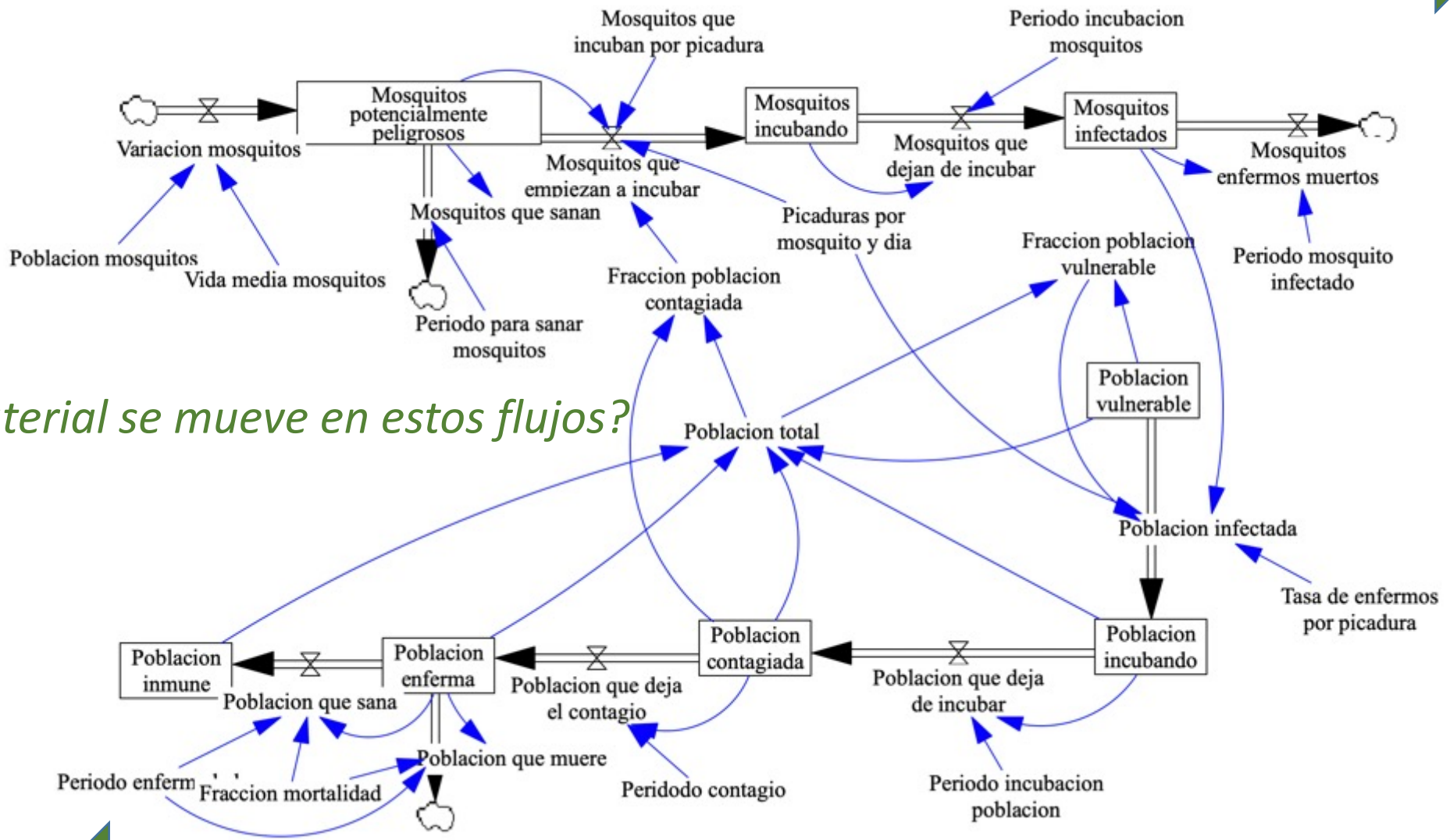
Consistencia en Unidades de Medida



Consistencia en Unidades de Medida



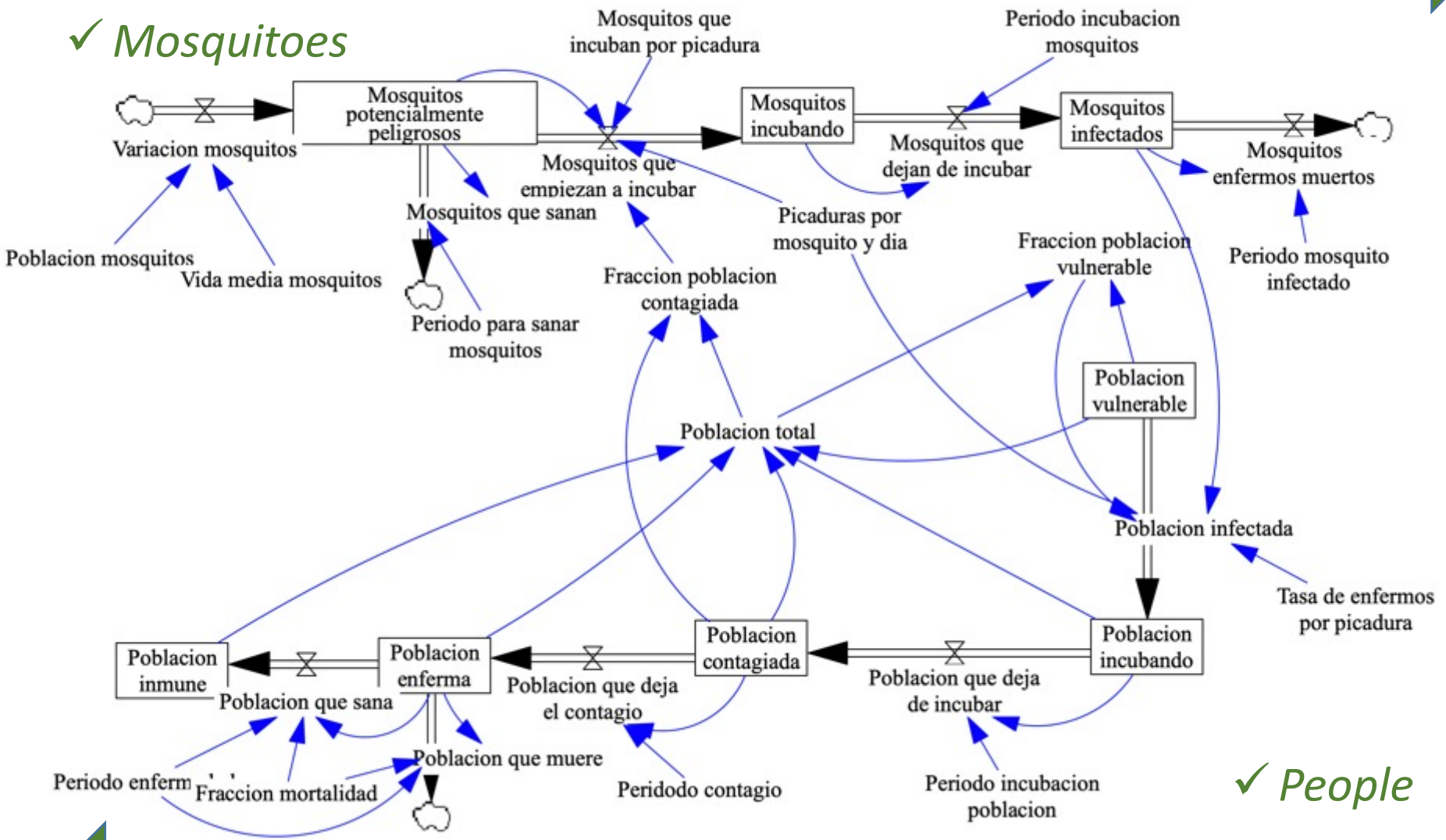
Consistencia en Unidades de Medida



✓ *¿Qué material se mueve en estos flujos?*

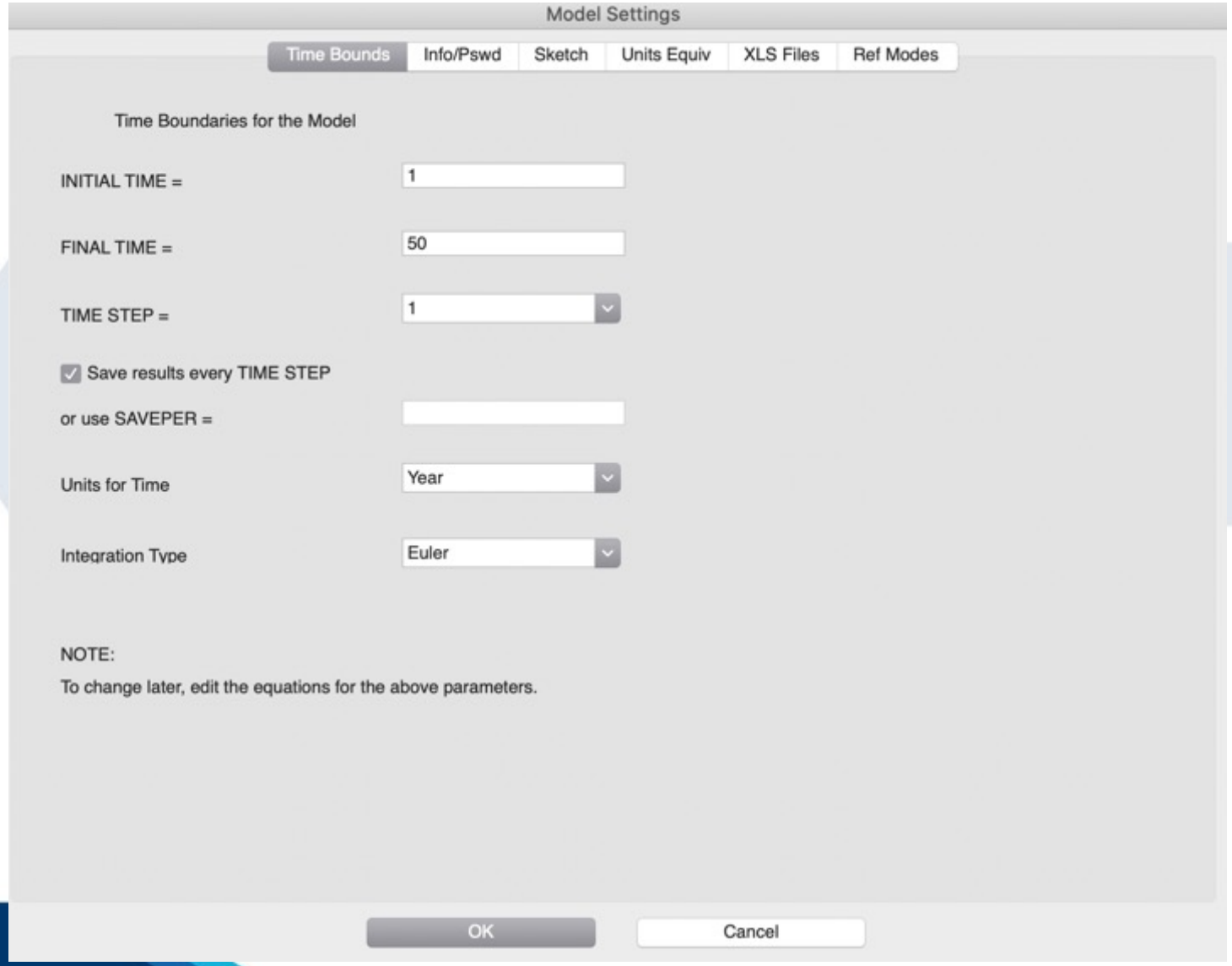
Consistencia en Unidades de Medida

✓ *Mosquitoes*

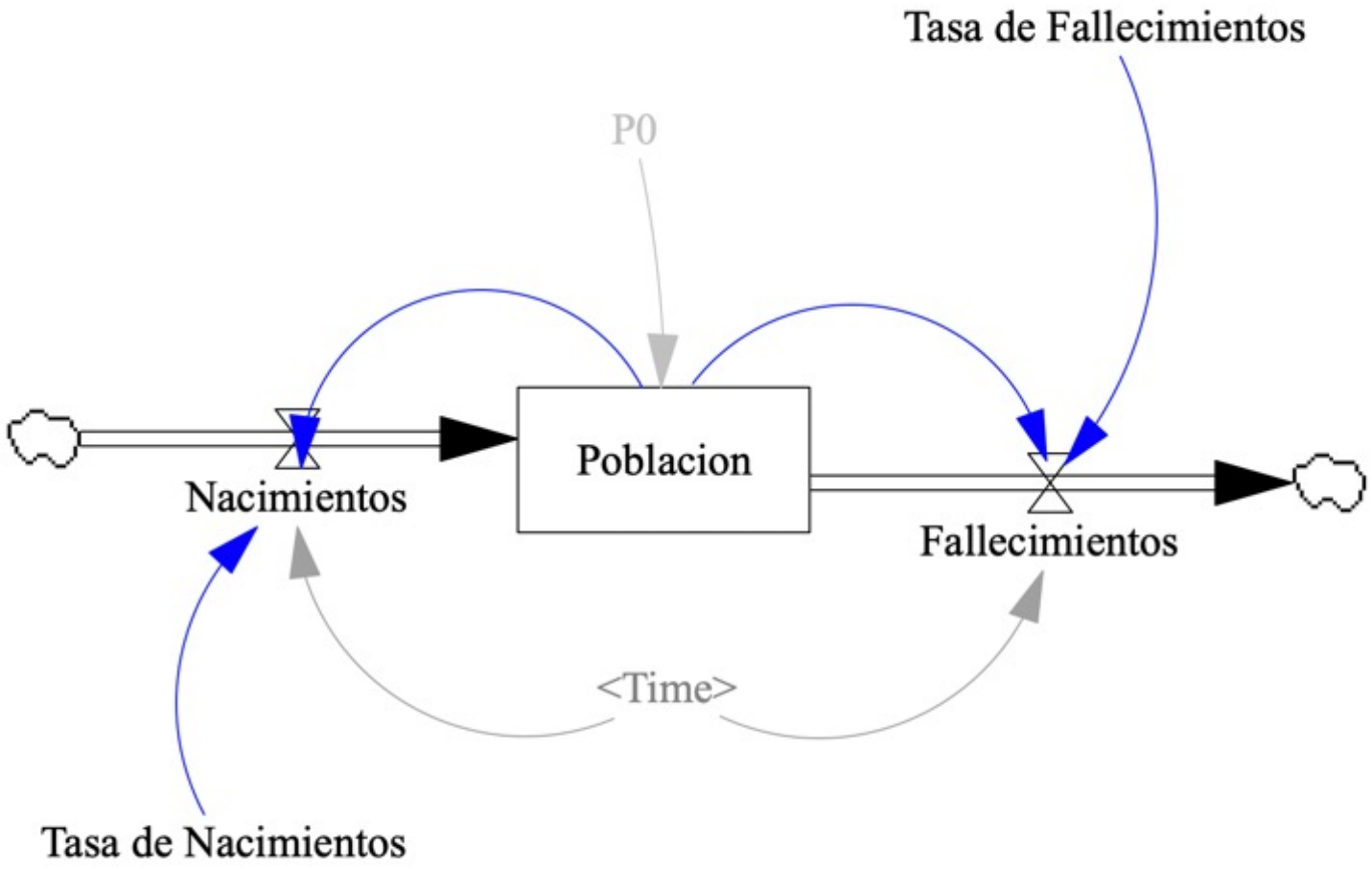


✓ *People*

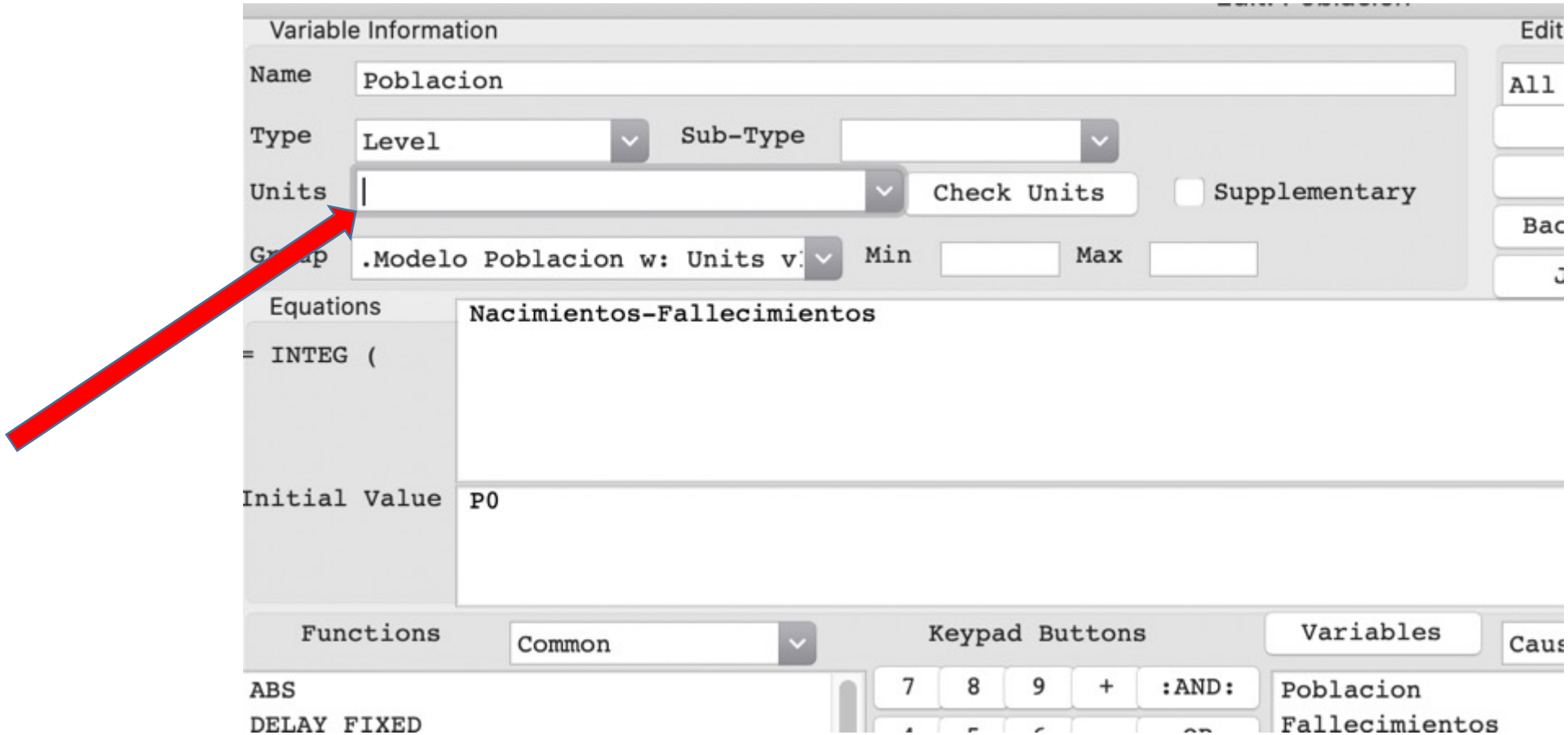
Consistencia en Unidades de Medida: Vensim



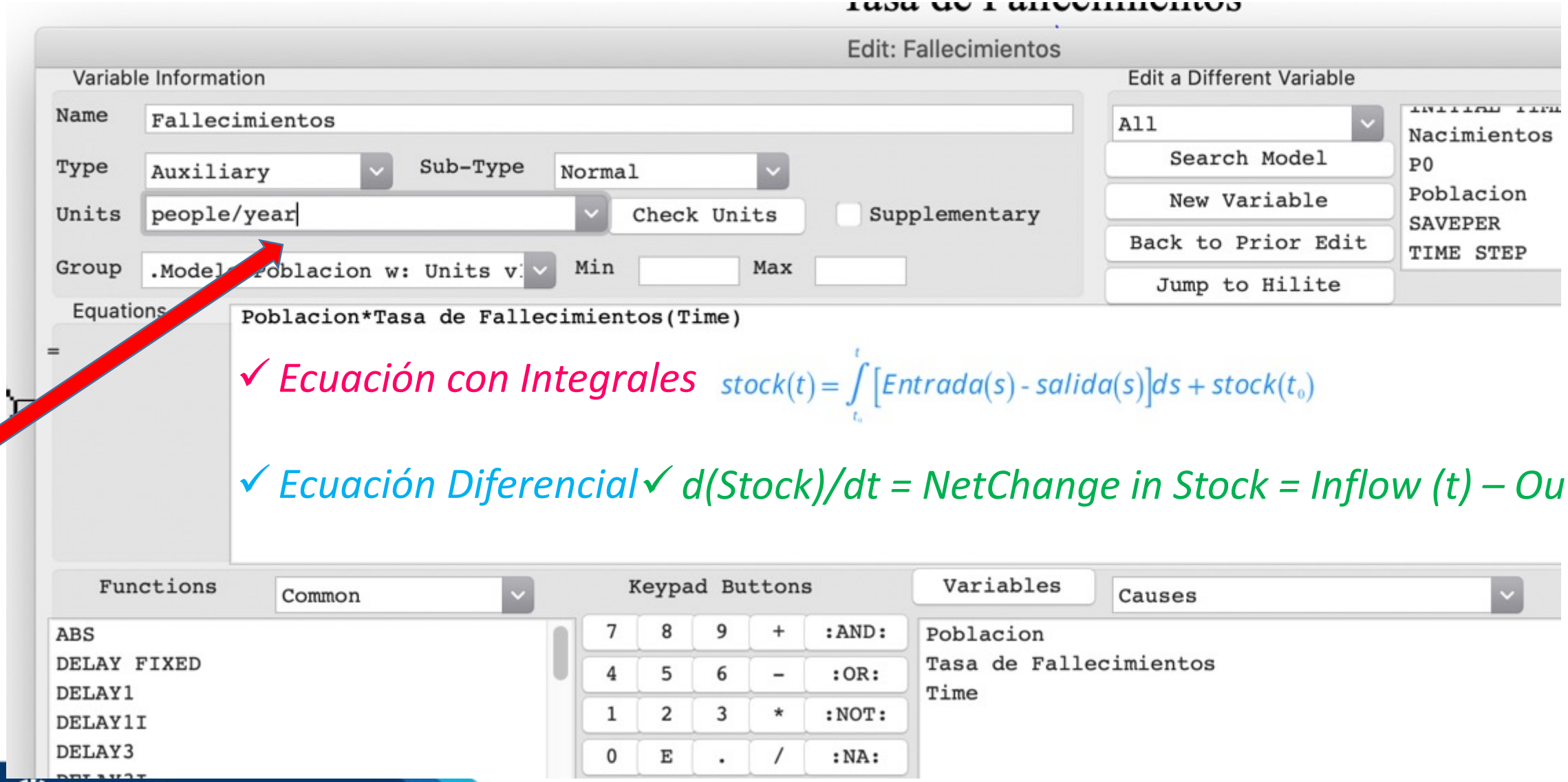
Consistencia en Unidades de Medida: Vensim

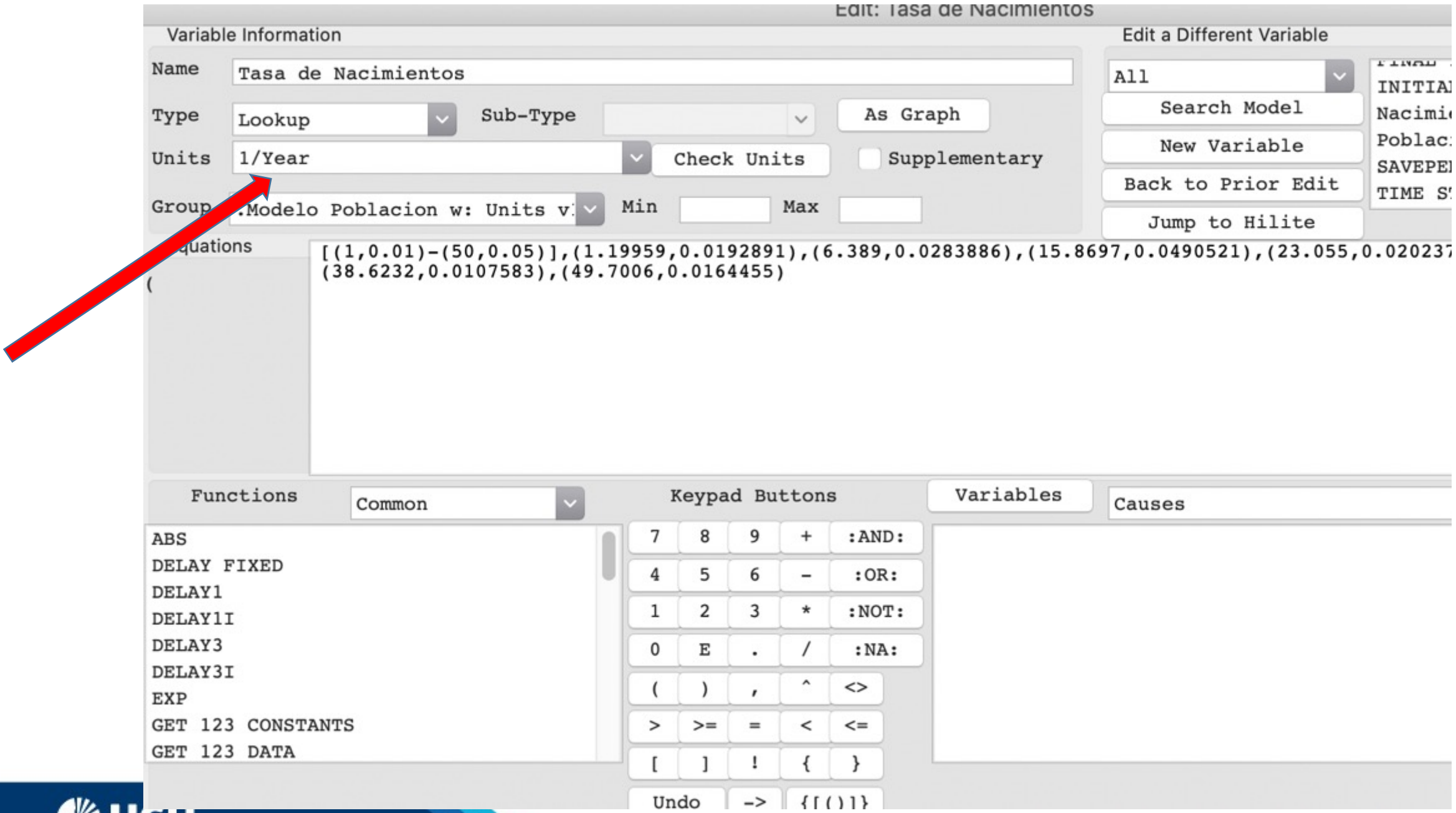


Consistencia en Unidades de Medida: Vensim



Consistencia en Unidades de Medida: Vensim




Edit: Tasa de Nacimientos
Variable Information
Edit a Different Variable
Name
Tasa de Nacimientos
Type
Lookup
Sub-Type
As Graph
Units
1/Year
Check Units
Supplementary
Group
.Modelo Poblacion w: Units v
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Max
All
Search Model
New Variable
Back to Prior Edit
Jump to Hilite
INITIA
Nacimi
Poblac
SAVEPE
TIME S
quations
(
[(1,0.01)-(50,0.05)],(1.19959,0.0192891),(6.389,0.0283886),(15.8697,0.0490521),(23.055,0.020237
(38.6232,0.0107583),(49.7006,0.0164455)
Functions
Common
Keypad Buttons
Variables
Causes
ABS
DELAY FIXED
DELAY1
DELAY1I
DELAY3
DELAY3I
EXP
GET 123 CONSTANTS
GET 123 DATA
7 8 9 + :AND:
4 5 6 - :OR:
1 2 3 * :NOT:
0 E . / :NA:
( ) , ^ <>
> >= = < <=
[ ] ! { }
Undo -> {[()]}

Estructura del Trabajo Final

Índice

- Resumen de la Primera Parte del Curso (Metodología de Sistemas Blandos)
- Diagrama Causal
- Diagrama de Forrester
- Ejecución del Modelo
- Cuadros Gráficos
- Conclusiones

Simulación de Sistemas

Primera edición: MARZO, 2022
Asignatura: SIMULACION DE SISTEMAS

Unidad didáctica 2 | Semana 10 | Sesión 1

UNIVERSIDAD DE CIENCIAS Y HUMANIDADES.

ESCUELA PROFESIONAL DE INGENIERÍA DE SISTEMAS E INFORMATICA

Av. Universitaria 5175, Los Olivos, Lima-Perú