

# DIVA



**Dynamic Interactive Vulnerability Assessment**

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## Introduction

### **DINAS-COAST: Dynamic and Interactive Assessment of National, Regional and Global Vulnerability of Coastal Zones to Climate Change and Sea-Level Rise**

Some of the world's richest and most diverse environments are found in coastal zones. From polar to equatorial areas, the coastline is a dynamic interface where land, sea and air interact on scales ranging from pebbles to continents and from seconds to centuries. In recent decades, urban development, agriculture, industry, transportation and tourism have all grown rapidly in coastal zones worldwide. The sheer intensity of these activities and lack of adequate management have created considerable pressure on coastal environments. Climate change, in particular an accelerated rise in sea level, will add to the existing pressure on coastal zones.

The effects of climate change on coastal zones will include increased flood risk and storm damage, loss of low-lying land and coastal wetlands, increased erosion, and intrusion of salt water into coastal freshwater resources. These effects will in turn cause socio-economic impacts, such as economic losses and risks to human lives. The need to prepare for climate change is widely recognised, and there is a great demand for relevant information. DINAS-COAST aims at helping decision-makers and analysts to interpret and evaluate coastal vulnerability to climate change on national, regional and global scales.

DINAS-COAST has produced the first comprehensive integration of state-of-the-art scientific data, knowledge and models from climatology, coastal morphology and ecology, economics, geography and computer sciences. The result of this integration is the dynamic, interactive and flexible assessment tool DIVA (Dynamic Interactive Vulnerability Assessment), which is available on this CD-ROM.

DIVA comprises four major components:

- A detailed global database with biophysical and socio-economic coastal data;
- Global and regionalised climate and socio-economic scenarios until the year 2500;
- An integrated model, enabling the interaction between modules that assess biophysical and socio-economic impacts and the potential effects and costs of adaptation;
- A graphical user interface for selecting data and scenarios, running model simulations and analysing the results.

DIVA allows its users to produce consistent quantitative information:

- On a range of coastal impact and adaptation indicators;
- For user-selected climate and socio-economic scenarios and coastal adaptation options;
- On national, regional and global scales, covering all coastal nations.

The information produced by DIVA will enable its users:

- To explore the effects of climate change on coastal environments and societies;
- To explore the costs and benefits of coastal adaptation options;
- To set priorities for international co-operation with respect to climate change and development;
- To use results for further scientific and policy analysis.

DIVA is recommended for carrying out trial runs and exploring broad coastal adaptation strategies.

The resolution of DIVA does not support analysis for operational coastal management and planning, as this requires a differently scaled approach.

## **The DINAS-COAST Consortium**

### **Partners**

Potsdam Institute for Climate Impact Research, Germany – Flood Hazard Research Centre, Middlesex University, United Kingdom – WL|Delft Hydraulics, The Netherlands – Centre for Marine and Atmospheric Research, University of Hamburg, Germany – Institute for Environmental Studies, Vrije Universiteit Amsterdam, The Netherlands.

### **Subcontractors**

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## **Recommended System Requirements and Installation Procedure**

### **System Requirements**

DIVA can be used on any PC with Windows 2000, Windows XP or higher. The PC should have at least 512 Mb of RAM memory, 1 Gb free hard disk space and a CD-drive for installation. To run DIVA, the Java™ 2 runtime environment and Adobe™ Reader™ must be installed on the PC.

### **DIVA Installation Procedure**

Place the CD in the CD-drive. The set-up should start automatically. If this is not the case, please run Diva1Setup.exe manually from the root folder of the CD. Follow the instructions on the screen to complete the set-up. If you do not have the Java™ 2 runtime environment installed on your PC, you need to download and install it from <http://java.sun.com/j2se/1.5.0/download.jsp>. If you do not have Adobe™ Reader™ installed on your PC, you need to download and install it from <http://www.adobe.com/products/acrobat/readstep2.html>.

### **Model Update Procedure**

Check the DINAS-COAST website at <http://www.dinas-coast.net/> for the latest information and the update procedure for DIVA.

### **What's (more) on this CD?**

The following files and directory are available on this CD:

1. Diva1Setup.exe
2. Java™ 2 runtime environment
3. Autorun.inf
4. Directory DIVAGISDATA containing the DIVA GIS database

## **Software Licences, Intellectual Property Rights, Copyright and Disclaimer**

### **DIVA Licence**

You may install, use, access, display, run, or otherwise interact with DIVA on any computer that meets the system requirements. The DINAS-COAST consortium warrants that DIVA will perform substantially in accordance with the accompanying written materials. To the maximum extent permitted by applicable law, in no event shall the DINAS-COAST consortium or its suppliers be liable for any special, incidental, indirect or consequential damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information, or any other pecuniary loss) arising out of the use of or inability to use the software product or the provision of or failure to provide support services.

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### **Adobe™ Reader™ Licence**

Please consult <http://www.adobe.com/products/acrobat/readstep2.html> for the full licence agreement associated with the use of this programme.

### **Intellectual Property Rights**

Intellectual property rights for DIVA are within the DINAS-COAST consortium. Users are not allowed to reverse engineer, decompile or disassemble the software (interface and/or model).

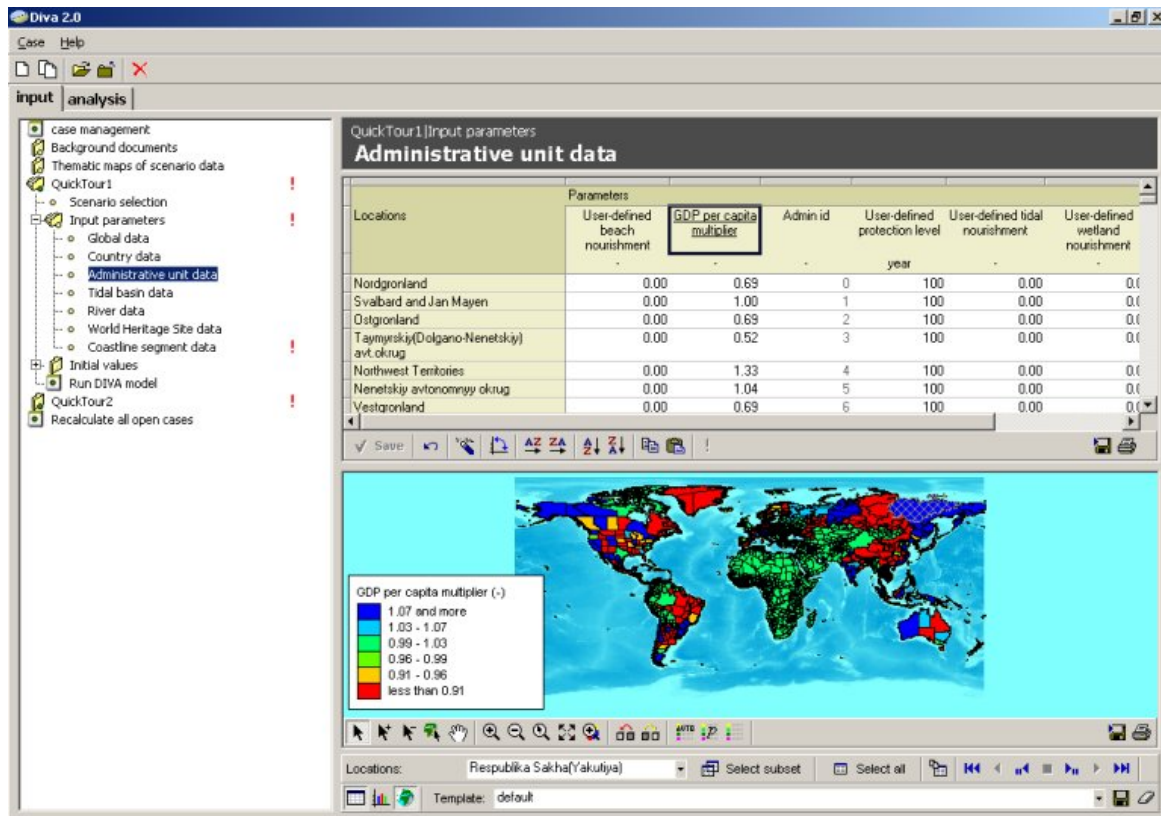
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DINAS-COAST Consortium, 2004: *DIVA 1.0*. Potsdam Institute for Climate Impact Research, Potsdam, Germany, CD-ROM.

## Welcome to DIVA

Welcome to this first release of the DIVA tool. DIVA is the final product of the DINAS-COAST consortium. This model is, from an end-user perspective, the most important innovation and is a fully dynamic and interactive tool. DIVA is able to explore and quantify impacts for changing scenarios and different adaptation approaches, and present results in various forms to meet the differing information needs of science and policy. In addition, the flexible modular approach to DINAS-COAST will allow DIVA to be easily upgraded to reflect improved scientific and technical innovations as they emerge. This version offers you the following:

- A user-interface which eases the usage of the model
- This Help-file in which the user can find information about the model

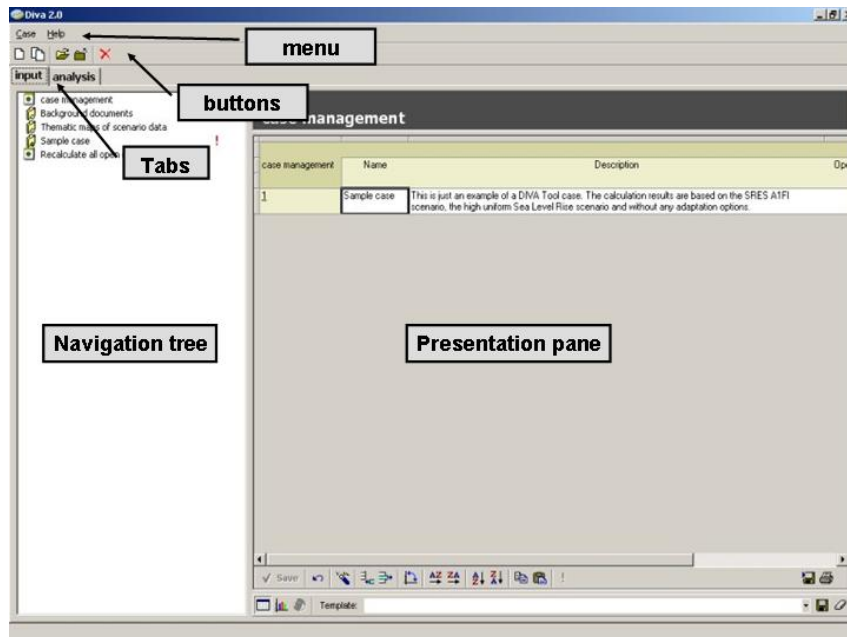


**TIP: First Go through the Getting Started section and then do a Quick Tour around DIVA. The Getting Started and the Quick Tour are also described in DIVA's help file (press F1 anytime using DIVA for opening the help file). Both are in the 'General' section.**

## Getting started

### Starting DIVA

When DIVA starts, this window will come up.



From top to bottom, 4 main items are present:

1. Menu bar
2. Buttons
3. Tabs
4. Navigation
5. Presentation pane

### DIVA GUI Elements

The *menu bar* supplies you with basic functionality like opening, copying and closing cases and exiting the program.

The *button bar* provides the same functionality as in the Case menu item

The *Tabs* provides the modes from DIVA: Input & Analysis.

- Input tab: scenario selection, naming & modification of (individual) values;
- Analysis tab: (re)view of input data, inspection and visualization of results;

On the left hand side, a *navigation tree* is available for browsing through the individual tables of all visible cases (calculations) and the option for starting the calculation(s).

On the right hand side, *presentation pane* is available for displaying the input and the results in tables, maps and charts. These presentation elements are 'live-linked', which means that (the subset of) visualized data is the same for all presentation elements. Any changes (e.g. selecting another parameter to inspect) in the table will cause a 'refresh' of the data displayed in the map and chart. In other words: in all elements you are viewing the same data.



## DIVA Cases

The model behind DIVA calculates so called 'cases'.

A case is a combination of:

- SRES Land Use / Population & Economic scenario;
- Derived SRES Sea Level Rise scenario (High-Medium-Low, uniform or regionalised);
- Input Parameters;
- Initial Values.

When you define a new case, a separate directory will be created on you hard disk to store all input and results data. You can manage your cases by selecting *Case management*.

## Quick Tour

To get familiar with the DIVA tool, a Quick Tour has been set-up in which you will be guided in adding new cases, defining the settings, calculation and analyze the results.

To get familiar with the different parts of the Interface and basic terminology, see Getting Started.

### Overview




- Step 1: Add a new Case
- Step 2: Specify settings for QuickTour1
- Step 3: Copy QuickTour1 and specify settings for QuickTour2
- Step 4: Inspect Input parameters & Initial values
- Step 5: Calculate
- Step 6: Switch Tabs and (re)view Input parameters/Initial values
- Step 7: Visualize results
- Step 8a: Analyze data: Selection of a subset
- Step 8b: Analyze data: Data on and order of the axes
- Step 9: Navigate through subset
- Step 10: Using the map and viewing an animation

### Preparation

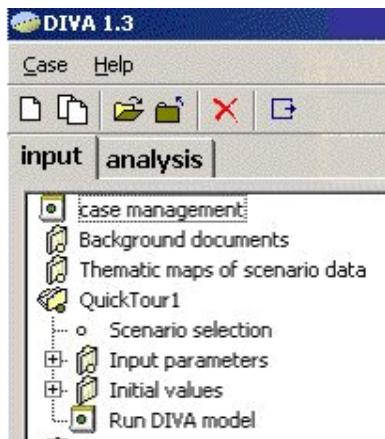
First, start DIVA and select the Input tab.





#### Step 1: Add a new Case

#	icon/button	description
a.		In the navigation tree, select the Case management item (top item);
b.		In the presentation pane, a table opens displaying your available cases (on your hard disk);
c.		At the right end of the 'Sample Case' row (use horizontal scroll bars if necessary), un-select the checkbox.
d.		Click <b>Save</b> to confirm.
e.		Select the Create Case button from the button bar
f.		Specify a Name for your case in the Input box: specify "QuickTour1". In the navigation tree, the new case 'QuickTour1' is being added.




Now QuickTour1 is part of the navigation tree, you can specify the settings for this case. If QuickTour1 is not expanded yet, double-click on its name in the navigation tree to expand it. The following should be visible.



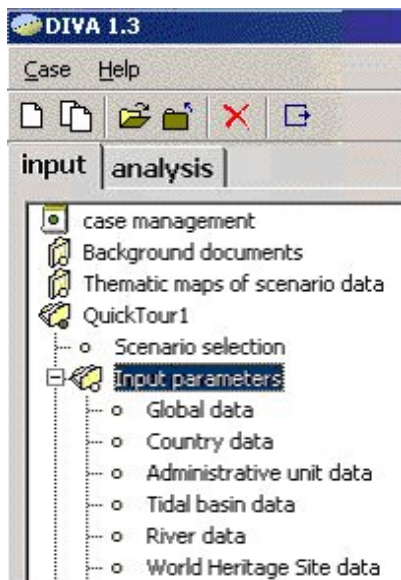
### Step 2: Specify settings for QuickTour1

#	icon/button	description
a.		Click on the Scenario selection item (of the QuickTour1 case) in the navigation tree. The Scenario selection table appears.
b.		In this table, use the drop-down boxes by clicking in the cell to specify the following: 1. SRES scenario for Socio-economic and Land use data: A1B 2. Sea level rise Scenario: SLR_High_Uniform
c.		Click <b>Save</b> to confirm.


### Step 3: Copy QuickTour1 and specify settings for QuickTour2

#	icon/button	description
a.		Select the QuickTour1 item in the navigation tree
b.		Select the Copy case button and specify "QuickTour2" in the Input box.
c.		Click on the Scenario selection item (of the QuickTour2 case) in the navigation tree. The Scenario selection table appears.
d.		In this table, use the drop-down boxes by clicking in the cell to specify the following: 1. SRES scenario for Socio-economic and Land use data: A1B 2. Sea level rise Scenario: SLR_Low_Uniform
c.		Click <b>Save</b> to confirm.

You can inspect and edit all individual input tables of each case. By expanding (double-clicking) the Input parameters item of the QuickTour1 case in the navigation tree, the following input tables are available.



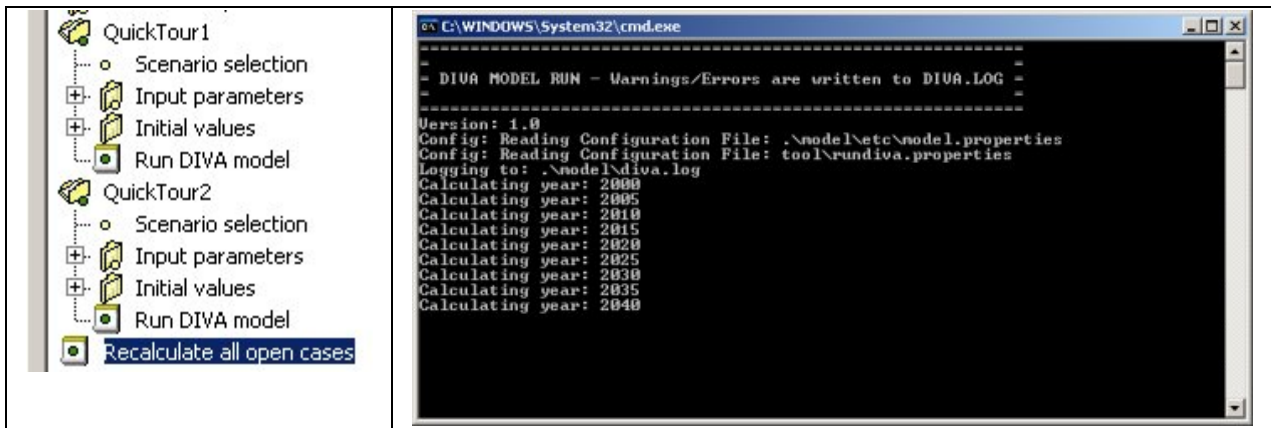
#### Step 4: Inspect Input parameters & Initial values

#	icon/button	description
a.		Click the <i>Administrative unit data</i> item, the content of this dataset will be visible in the presentation pane. By default the table and map open.
b.		Click the <b>Show/hide map</b> button to hide the map. Only the table is visible now. You are able to change the values in the <b>editable</b> fields. These fields are displayed with a white background and black font. The read-only fields are marked with a grey font. You can edit individual cells by selecting them and start typing or by selecting them and press <F2> (like in MS Excel).
c.		For (both) the QuickTour cases, leave all Input parameters as they are (defaults).
d.		Double-click the <i>Initial values</i> item to inspect this data in the same way. Do not change the default settings.

*The difference between input parameters and initial values is that input parameters are static and will not change during the calculation. Initial values represent variables which will be calculated and changed during a model run, but they have to start with a value to initiate them.)*

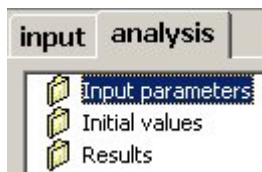
#### Step 5: Calculate

The easiest way to start the calculation is to select the bottom item in the navigation tree Calculate all open cases. By doing so, the model will calculate all cases available in the navigation tree. If you have followed the steps as described, two calculations will start consecutively (QuickTour1 and QuickTour2). The progress of the calculation is monitored in the window. Wait until the calculation window(s) have disappeared.



Now the calculations have been carried out it is time to look at some results and especially compare the two cases with each other.

### Step 6: Switch Tabs and (re)view Input parameters/Initial values

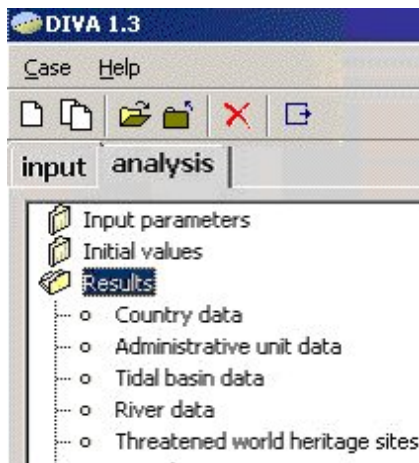


#	description
a.	Select the <i>Analysis</i> tab. Both the navigation tree and presentation pane change. In the navigation tree, the items <i>Input parameters</i> , <i>Initial values</i> and <i>Results</i> are available.
b.	Double-click the <i>Input parameters</i> item to expand and select any dataset. Briefly inspect the data in the presentation pane.
c.	Double-click the <i>Initial values</i> item to expand and select any dataset. Briefly inspect the data in the presentation pane.

(You may have noticed that all fields have grey fonts now, which means you are not able to change the values here. If you would like to, you can go back to the corresponding table on the *Input* tab and recalculate).

### Step 7: Visualize results

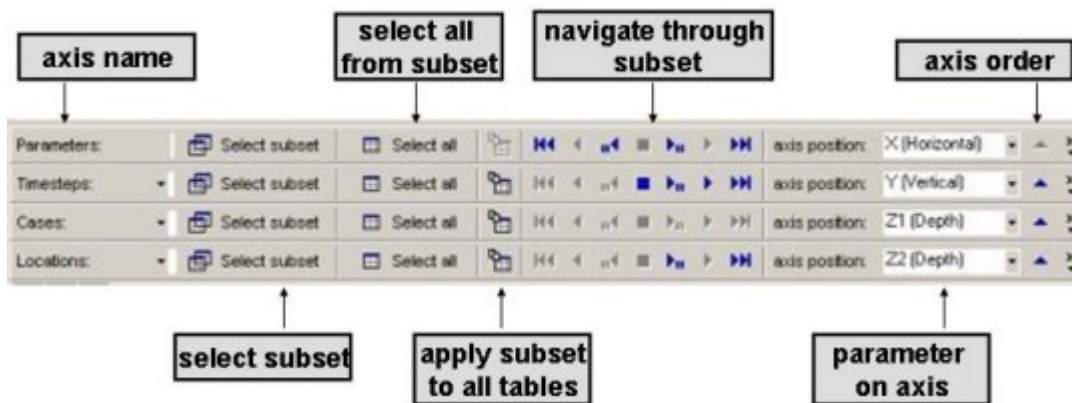
On the *Analysis* tab, navigate to the *Results* item and double-click for expanding the tree. The following output tables are available.



#	description
a.	Select the <i>Country data</i> item. In the presentation pane, the table, map and chart will be visible displaying a range of data.

### Step 8a: Analyze data: Selection of a subset

At first impression you might be overwhelmed with the amount of data visualized, but we are going to guide you how you can focus on certain parts of the available datasets. This focusing is best described as creating a **Subset**. This subset is being created by the **Subset toolbar** which is available at the bottom of the presentation pane.



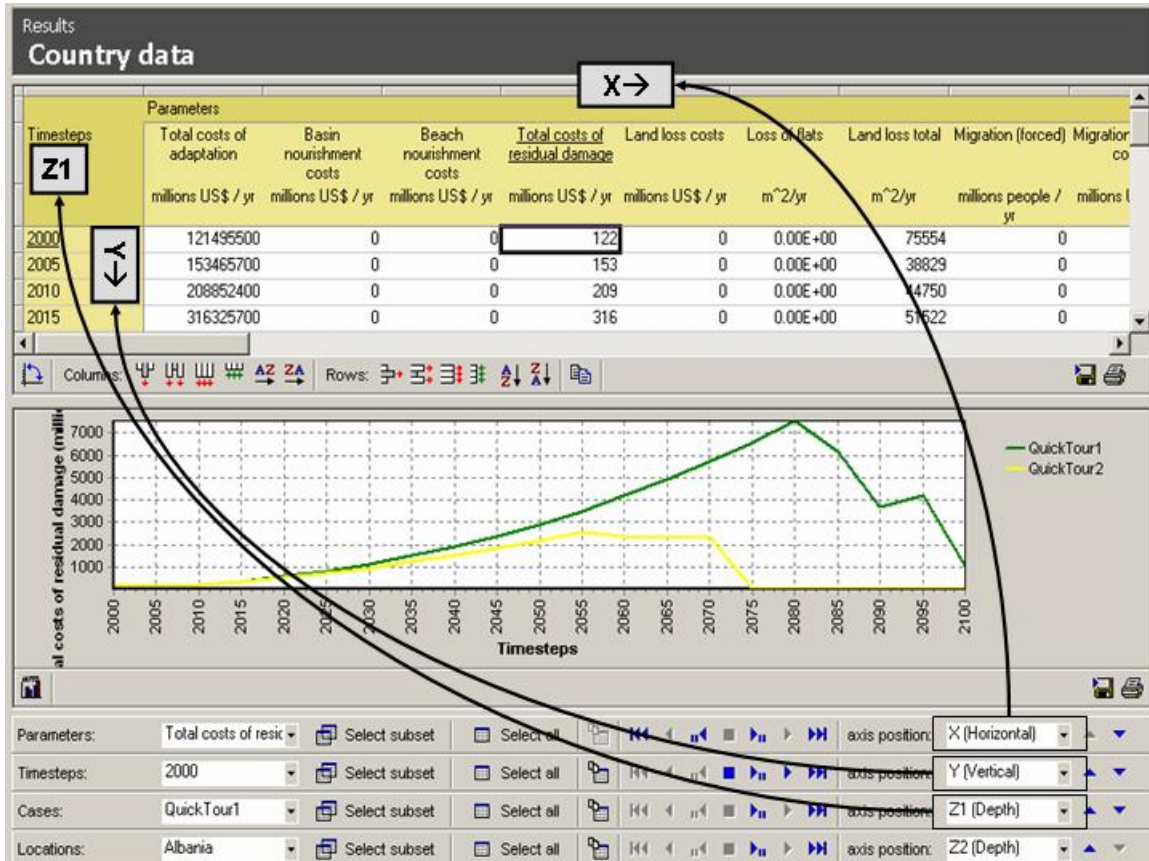
#	icon/button	description
a.		We now focus on table and chart so make the map invisible clicking the <b>show/hide map</b> button
b.		You would like to be sure that both cases are part of the analysis. To check this, find the <i>cases</i> part of the toolbar (axis name). Click the <b>Select subset</b> button. A new window appears.
c.		The red marked items on the left hand side are invisible. The green ones on the right hand side are part of the analysis. Use the (>>) button to move the 'QuickTour2' case to the right for including it in the analysis.
d.		Click <b>Apply</b> to confirm your new subset.

Repeat steps 7b/c/d to include all *parameters* in the analysis. Check the other subsets as well (*Locations* and *Timesteps*)

### Step 8b: Analyze data: Data on and order of the axes

The results of the cases are so called *4-dimensional* datasets. The dimensions are: Time, Locations, Parameter and Case. It is important to realize what consequences this may have for visualization, especially in a 1-dimensional element like a map or a 2-dimensional element like a table or chart.

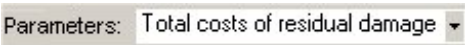


To visualize a situation like below, you should specify the following settings:



#	icon/button	description
a.		The order of the axis can be changed by using the blue <b>up</b> and <b>down</b> buttons on every part of the Subset toolbar.
b.		Specify the order (and axis position) as follows: <ol style="list-style-type: none"> <li>1. Parameters (X)</li> <li>2. Timesteps (Y)</li> <li>3. Cases (Z1)</li> <li>4. Locations (Z2)</li> </ol>
c.		Use the redraw chart button if the chart is not drawn correctly.

### Step 9: Navigate through subset



You can select other parameters and locations very quickly by making use of the corresponding combo boxes or navigate buttons.

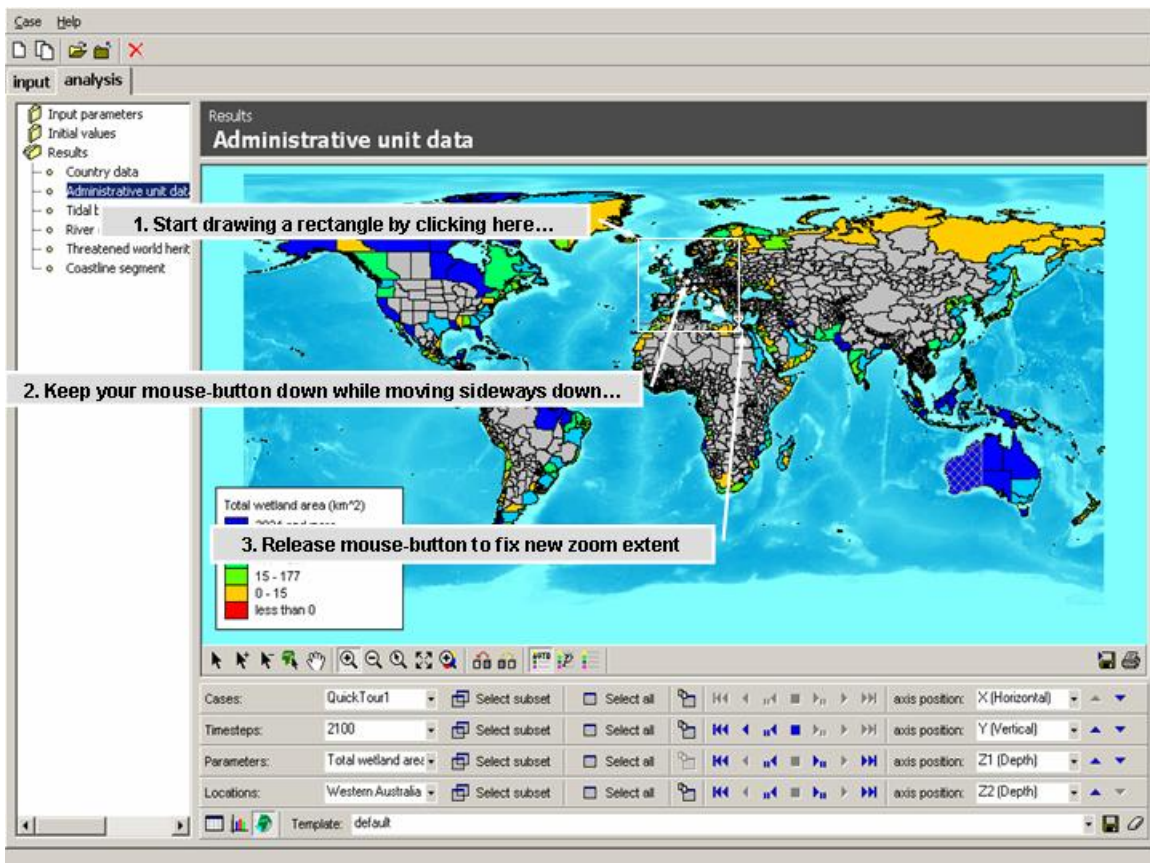
#	icon/button	description
a.		Use the <i>Parameter</i> combo box to change the parameter to be displayed.
b.		Use the <i>Parameter navigate</i> buttons (next/previous) to change the parameter to be displayed.
c.		Use the <i>Locations navigate</i> buttons (next/previous) to change the location to be displayed.

**TIP:** You can also select any cell in the table to change the content of the chart.

### Step 10: Using the map and viewing an animation

Last example is how to use the map for displaying data.

#	icon/button	description
a.		In the navigation tree (under Results), select the <i>administrative unit</i> item. (In the map, all landlocked administrative units are grey)
b.		To focus on the map only, select the <b>show/hide chart</b> button to make the chart invisible. (In case the table is visible, select <b>show/hide map</b> too.)
c.		Use the <b>zoom-in</b> button to 'draw' a box around Western Europe (see below: step 1, 2 and 3)


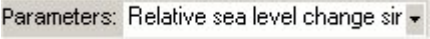


The screenshot shows a software interface with a world map. The map is color-coded by wetland area. A zoomed-in view of Western Australia is shown. Three numbered instructions are overlaid on the map:

1. Start drawing a rectangle by clicking here...
2. Keep your mouse-button down while moving sideways down...
3. Release mouse-button to fix new zoom extent

The interface includes a navigation tree on the left, a toolbar at the bottom, and a legend for 'Total wetland area (km<sup>2</sup>)'.


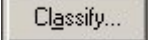


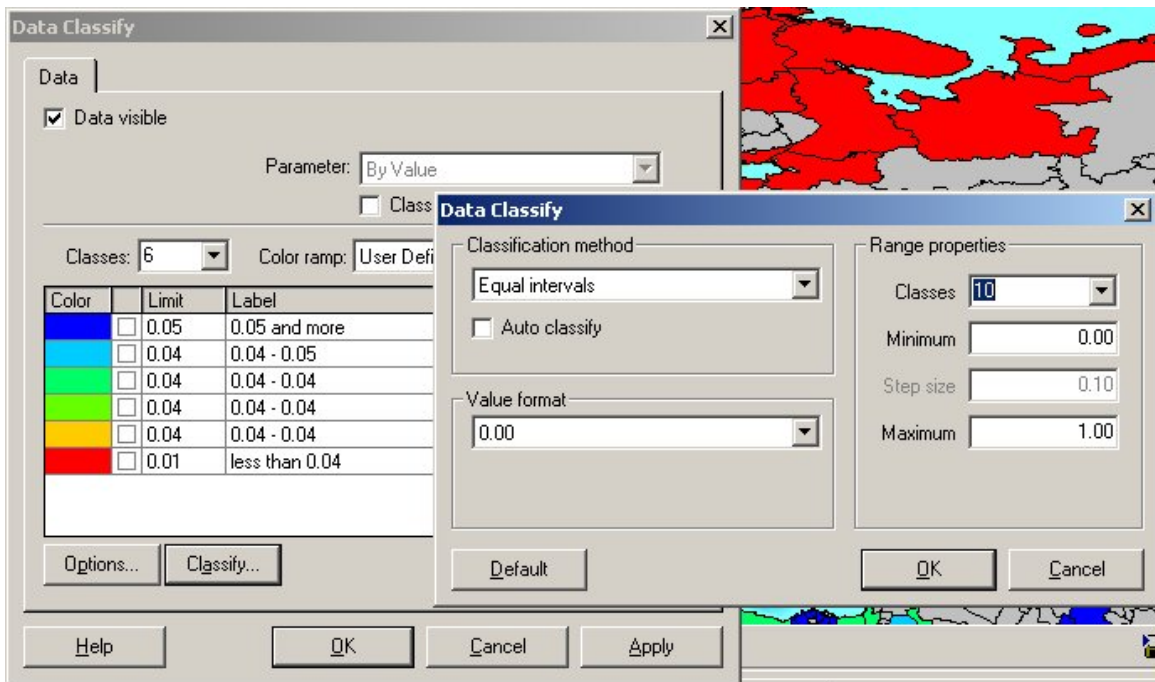
#	icon/button	description
a.		Select the <b>go to start</b> button on the <i>Timesteps</i> part of the Subset toolbar.
b.		Select the "Relative Sea level change since 1995 (m)" parameter from the <i>Parameters</i> drop-down box

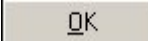
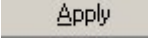
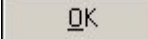
By default the parameter will be classified with a legend (including colors and break values). When you are not satisfied with the default settings you can adjust the legend.

**TIP: Be sure that the AUTO-legend option is switched off (up-position)**





#	icon/button	description
c.		Select the <b>modify legend</b> button. The Data Classify window pops up (see below).
d.		Select the <b>Classify</b> button to adjust number of classes.



#	icon/button	description
c.		Specify: 1. "Equal intervals" in the Classification method drop-down box; 2. "10" in the Classes drop-down box; 3. Minimum value: "0.00"; 4. Maximum value: "1.0".
d.		Click OK button to confirm. The window closes
e.		Specify: "Rainbow colors" in the Color ramp drop-down box
f.		Click the <b>Apply</b> button to impose the new legend to the dataset.
g.		Click the <b>OK</b> button to close the window

## Viewing the animation and saving the layout

#	icon/button	description
h.		Click the <b>play forward</b> button on the <b>Timesteps</b> part of the Subset toolbar. Automatically, the map refreshes every timestep using the defined legend (animation).
i.		At the bottom of the presentation pane, use the <b>save</b> button to store your current layout. Specify a name.

Here ends the Quick Tour around DIVA.

## Disclaimer

Neither the DINAS-COAST consortium, nor any organisation providing additional software or databases comprised within DIVA, is responsible for the use that may be made of the model, data or information contained on the CD-ROM.

## DIVA Dynamic Interactive Vulnerability Assessment



Developed by the DINAS-COAST consortium



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