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Coral
Dense seagrass
Pachy seagrass

**Quantifying the role
of marine and coastal
ecosystems in mitigating
beach erosion**

Training Manual

**Risk and Vulnerability Assessment
Methodology Development Project (RiVAMP)**

2012



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Introduction

The Risk and Vulnerability Assessment Methodology Development Project (RiVAMP) is a collaboration between the United Nations Environment Programme Division of Early Warning and Assessment (DEWA) and Division of Environmental Policy Implementation (DEPI) and aims to identify and quantify the role of ecosystems in Disaster Risk Reduction (DRR) and climate change adaptation (CCA).

Such methodology can be applied in different ecosystems, this one is tailored to the role of coastal and marine ecosystems in mitigating beach erosion, thus reducing impacts from storm surges generated by tropical cyclones and the impacts from sea level rise. This is more specifically targeting for Small Islands Developing States (SIDS).

The pilot study was carried out in Jamaica and concentrate on beach erosion in Negril area (at the request of the Jamaican government). The methodology includes local experts and community consultations integrated with spatial analysis (GIS and remote sensing), erosion modelling and statistical analysis.

The assessment tool was pilot tested in Jamaica, as a small island developing state. The national partner was the Planning Institute of Jamaica (PIOJ). According to the IPCC's Fourth Assessment Report, global climate change will particularly impact on small island developing states (SIDS), such as Jamaica, which have a high coastal population density and existing vulnerability to natural hazards. The importance of nature-based tourism and climate sensitive livelihoods (agriculture and fisheries) in Jamaica make it critical to understand changing patterns of risk and develop effective response.

Following the release of the RiVAMP study results, the government of Jamaica, through PIOJ, requested UNEP to get a transfer of this methodology to Jamaican scientists. DEWA financed the creation of the training manual, including the transfer of the methodology on free OpenSource software (to avoid creating dependencies) and DEPI/PCDMB financed the mission itself.

In agreement with the Jamaican government, we are pleased to provide access to this training on-line, so that anybody who is interested in quantifying the role of ecosystems can access such training and related tools (GIS, statistics and beach erosion modelling software).

This training document has been created by Bruno Chatenoux (UNEP/DEWA/GRID-Geneva) – GIS chapter, Pascal Peduzzi (UNEP/DEWA/GRID-Geneva) – Statistical analysis chapter and Adonis Velegrakis (University of the Aegean) – Hydrology chapter.

RiVAMP GIS Training

In brief

The aim of this training is to introduce you to the potential of open source applications in the context of a study such as RiVAMP GIS analysis. To do so the training has been divided into sessions during which you will learn how to practically apply the RiVAMP methodology step by step.

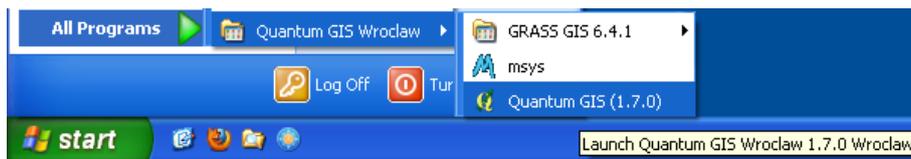
The open source GIS software Quantum GIS 1.7.0 (QGIS) will be used (without using GRASS 6.4.1 even if it will be installed jointly) and the worksheet editor of LibreOffice (fork of OpenOffice).

The training documentation has been prepared under a Windows XP environment, but is easily reproducible in any other OS after a few adjustments (installation, paths). Administrator privileges are required.

Typographic convention

In a general manner the text you have to focus because it figures in the applications or you have to type has been highlighted with ***Bold Italic*** format. They constitute the technical skeleton of the process

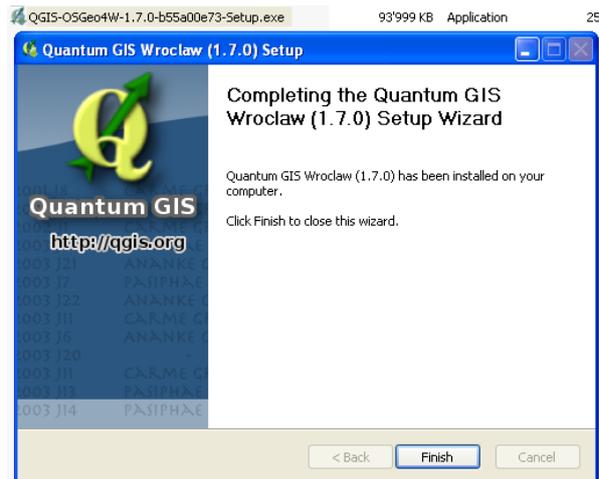
Menu > Item Instructs you to select the named *item* from the named *menu*. Note that some menus contains *sub-menus*. For example ***Start > All programs > Quantum GIS Wroclaw > Quantum GIS (1.7.0)*** is equivalent to the figure below:



>> instructs you to look on the figure on the right for the parameters to be applied.

QGIS and GRASS installation

QGIS and GRASS can be installed at once, including a plugin that will connect them. To do so simply download and install the Windows ***Standalone Installer*** from <http://www.qgis.org/wiki/Download> (also available in the ***Software*** folder of the training DVD) using the default options and without adding components. Shortcuts will be created on the Desktop and Windows main menu.



Before to start

Copy locally (in you computer) the content of the training DVD and look at the way the data are organised.

In the **Documents** folder you will find the digital version of this documents as well as other relevant documentation.

In the **Software** folder you will find the installation files for QGIS and LibreOffice, as well as some files potentially useful.

In the **GIS** folder are located the data you will need during the training. The subfolders are organised by session, Coordinate Reference System (CRS, equivalent to projection) and data type.

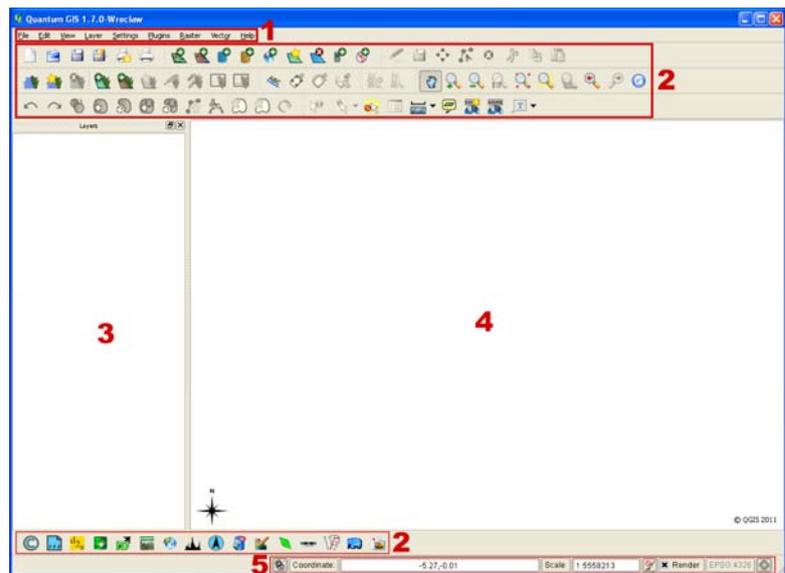
The folder **GIS_correction** is equivalent to the GIS folder but once the training has been completed in the case you missed one session or would like to compare your results.

Customizing QGIS

Start QGIS, by default you get a **QGIS Tips!** window every time you start the application. Even if it is a good source of information you can switch it off by checking the **I've had enough tips,...** checkbox to remove it from the start up.

The QGIS graphical interface is divided in 5 zones:

- 1 Menu bar,
- 2 Toolbars facilitate the access to the different functions (also available in the menu bar),
- 3 Table of Content (ToC) to manage the layers,
- 4 View, where you can interact with the map,
- 5 Status bar where you can see information such as coordinates of the pointer, extent, scale, coordinate system; start/stop rendering or define how the view is displayed.



Toolbars are divided by thematic (greyed icons means they are inactive because the appropriate conditions to use them are not fulfilled). Some of them are included by default in QGIS, some others can be added/removed from the interface:

File



Manage Layers



Map Navigation



Attributes



Label



Raster

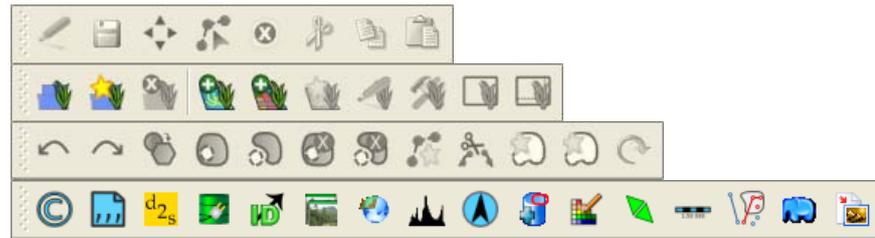


Digitizing

GRASS plugin

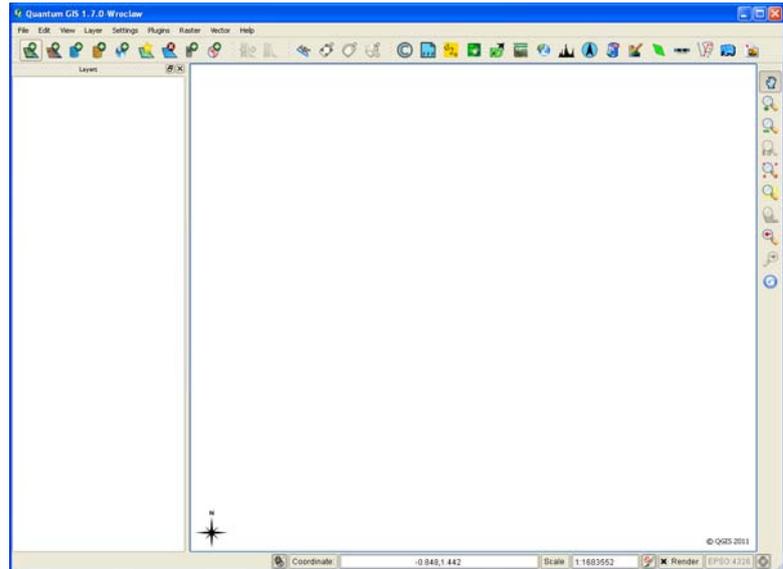
Advanced Digitization

Plugins



We will not describe here the functionalities of each function, some of them will be used during this training, and you will discover the remaining one on your own as long as you practice.

The toolbars can be added/removed from the interface by *right clicking* in any empty area of any toolbar or menu and enable/disable them. They can also be moved using *drag and drop*. The Figure on the right shows the way I generally organize my interface in order too keep it functional. Even if it fits my personal needs, try to get something similar and you will improve it little by little.



Once you get something satisfying, close QGIS and start it again, as you can see the interface remains as you arranged it.

You can see the plugin toolbar remains quite overcrowded, let's remove the plugins that we will not need frequently:

- **Plugins** >  **Manage Plugins...**,
- Uncheck the unnecessary plugins (see the following list with the plugins I generally keep): **Add Delimited Text Layer**, **CopyrightLabel**, **NorthArrow**, **Plugin Installer**, **ScaleBar**, **fTools**.

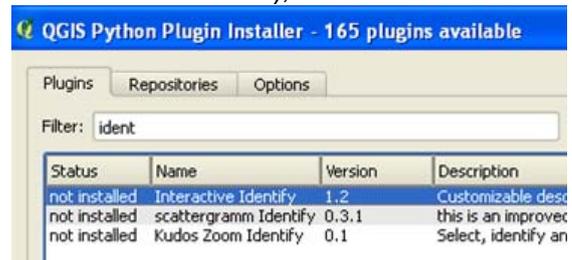
The disabled plugins will remain installed in QGIS, where they can be activated when needed (do not hesitate to use the **Filter** function to find more easily the plugin you are looking for). The enabled plugins will be available through the *Plugins* menu or specific menu some other through the *Plugin* toolbar.

Take some time to discover the various functions available through the interface.

We just saw how to enable or disable the plugins installed by default in QGIS, lets see now how we can add more functionalities:

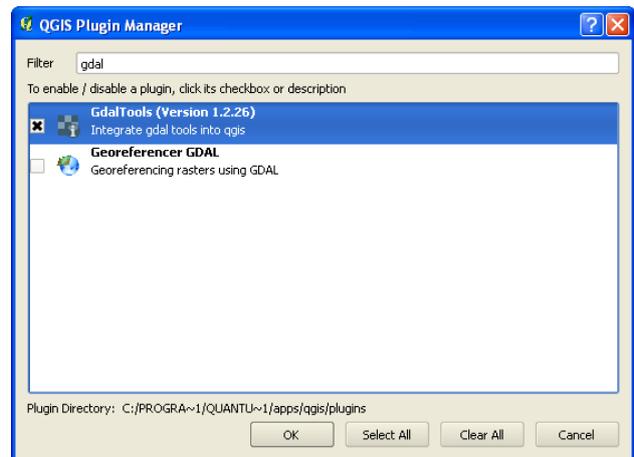
- **Plugins** >  **Fetch Python Plugins...**,
- Have a quick look at the official plugins available (6 at the time of writing this document),
- Move to the **Repositories** tab, click the **Add 3rd party repositories** button, and accept the disclaimer window (do not worry if you can not fetch all repositories, it happens some times).

- Move to the **Options** tab, and check the **Show all plugins, even those marked as experimental** radio button (even if “unsecure” this option is necessary at the time of writing this document to get all the functionalities for the **Raster** menu),
- Move back to the **Plugins** tab and notice you have now more than 170 plugins available and the **GdalTools** is now upgradable,
- You can upgrade it simply by selecting it and clicking the **Upgrade plugin** button (you do not need to restart QGIS yet as requested).
- Have a quick look at the plugins available and try to install the **Interactive Identify** plugin using the **Filter**,
- **Close** the window.



Before to go further we need to complete the **Raster** menu, by enabling the **GdalTools** plugin!!!

Notice how the plugins have been installed on the **Plugins** menu and toolbar. Each plugin displays differently in QGIS interface, then sometime you will have to search for them!



To complete this chapter let's customize a bit the QGIS **Options** the way (in my personal opinion) they should be by default:

- **Settings > Options...**,
- **General** tab: check **Display classification attribute names in legend**,
- **Map tools** tab: set the **Mouse wheel action** to **Zoom to mouse cursor**,
- **Digitizing** tab: check **Show markers only for selected features**,
- **CRS** tab: select **EPSG:3448 - JAD2001 / Jamaica Metric Grid** (supposing you are mainly working in Jamaica) as the **Default Coordinate System for new projects**, check the **Enable 'on the fly' reprojection by default**, and set the **Prompt for CRS** radio button,
- In the case the default interface language is not the appropriate one, you can **Override svstem local** (in other words change the interface language) in the **Locale** tab (this

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