



Food and Agriculture
Organization of the
United Nations

PHASE 1

Country Guidelines and
Technical Specifications for

Global Soil Nutrient and Nutrient Budget Maps

GSNmap



Country Guidelines on Digital Soil Mapping

Food and Agriculture Organization of the United Nations
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Placeholder

Chapter 1

Presentation

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1.1 Global Soil Partnership

1.2 Country-driven approach and tasks

1.3 How to use this book

1.4 Training material

Chapter 2

Soil Nutrients

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2.1 Soil properties governing nutrient availability

Chapter 3

Setting-up the software environment

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3.1 Use of R, RStudio and R Packages

3.1.1 Obtaining and installing R

3.1.2 Obtaining and installing RStudio

3.1.3 Getting started with R

3.2 R packages

3.3 GEE - google earth engine

3.4 rgee - Extension to use google earth engine in R

Chapter 4

Digital Soil Mapping

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Chapter 6

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6.6 Harmonise units

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8.4 Uncertainty assessment

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Chapter 10

Way forward

This technical manual provided step-by-step guidance on how to generate nutrient maps by means of quantile regression forest models within a digital soil mapping framework. The array of maps produced belongs to the first implementation phase of the GSNmap initiative and provides urgently needed data on nutrient stocks and soil properties that govern nutrient availability. Policymakers will be able to use this data to derive conclusions on where to concentrate efforts to improve soil and land management to strengthen agrifood systems. The second phase of the GSNmap will make use of the first phase data products to derive nutrient budget maps. Therefore, additional datasets will be used for calculating input and output terms of nutrient stocks. The methodology is currently under development by the GSNmap working group. The technical documentation towards implementing the second phase will be made available in mid 2023.

10.1 Frequent asked questions and Troubleshooting answers

To be developed soon...

10.2 Issues in the GSNmap Technical Manual

Please, report any issue in the GSNmap Technical Manual in its issues GitHub page <https://github.com/FAO-GSP/GSNmap-TM/issues>.

10.3 Get help

- Check the issues GitHub page <https://github.com/FAO-GSP/GSNmap-TM/issues>
- Issues with R packages: search for solutions in <https://stackoverflow.com/>
- `caret` package <https://topepo.github.io/caret/>
- `terra` package <https://rspatial.org/terra/pkg/1-introduction.html>
- `tidyverse` package <https://r4ds.had.co.nz/>
- `sf` package <https://r-spatial.github.io/sf/>

If these links do not help you, contact us including the following text:

I am [FULL NAME], responsible for producing the GSNmap of [COUNTRY].

marcos.angelini@fao.org

Annex I: Compendium of R scripts

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Script 0: Installation of rgee

Script 1: Data preparation

Script 2: Download environmental covariates

Script 3: Modelling, validation and prediction using soil data with coordinates

Annex III: Mapping without point coordinates

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Annex IV: Quality assurance and quality control

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Step 1: Completeness of layers

Step 2: Check the projection and resolution of all data products

Step 3: Check the extent

Step 4: Check the units, ranges, and outliers

Major nutrients

Associated soil properties

References



The Global Soil Partnership (GSP) is a globally recognized mechanism established in 2012. Our mission is to position soils in the Global Agenda through collective action. Our key objectives are to promote Sustainable Soil Management (SSM) and improve soil governance to guarantee healthy and productive soils, and support the provision of essential ecosystem services towards food security and improved nutrition, climate change adaptation and mitigation, and sustainable development.



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