



SURVEY OF THE STATE OF KNOWLEDGE OF THE MEASUREMENT OF CONSERVATION ACTION STUDIES IN THE ECOSYSTEM SERVICE FOR WATER EROSION CONTROL: CASE STUDY IN THE GUANDU RIVER BASIN- RJ

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Introduction

To assess the impact of water erosion on the provision of ecosystem services that supports planning and control of soil and water degradation processes. There are several information gaps that are required to assess water erosion on an appropriate scale, which poses a major challenge for science and decision making. Thus, this study aimed to identify the state of the art of research conducted in Brazil and Latin America under its methodological aspect, considering the impact of conservation initiatives on soil loss and ecosystem services to control water erosion. Its viability and potential use were verified from the available databases for the Guandu River Basin (BHRG) in the State of Rio de Janeiro. This study was divided into three methodological phases: the survey and the database organization, including information on the models and parameters most commonly used in the national and Latin American literature and other related factors; selection of models and evaluation parameters of erosion control; and application potential analysis using BHRG databases and metadata. From the methodologies observed to estimate the erosion rate in Latin America, according to the international database SCOPUS and WEB of SCIENCE, it was found that the traditional USLE, MUSLE, RUSLE and SWAT were the most reproduced (63%). However, for the study area, the prospective data did not present representativeness, quality and consistency due to deficiencies, data gaps and the difference in spatial scales.

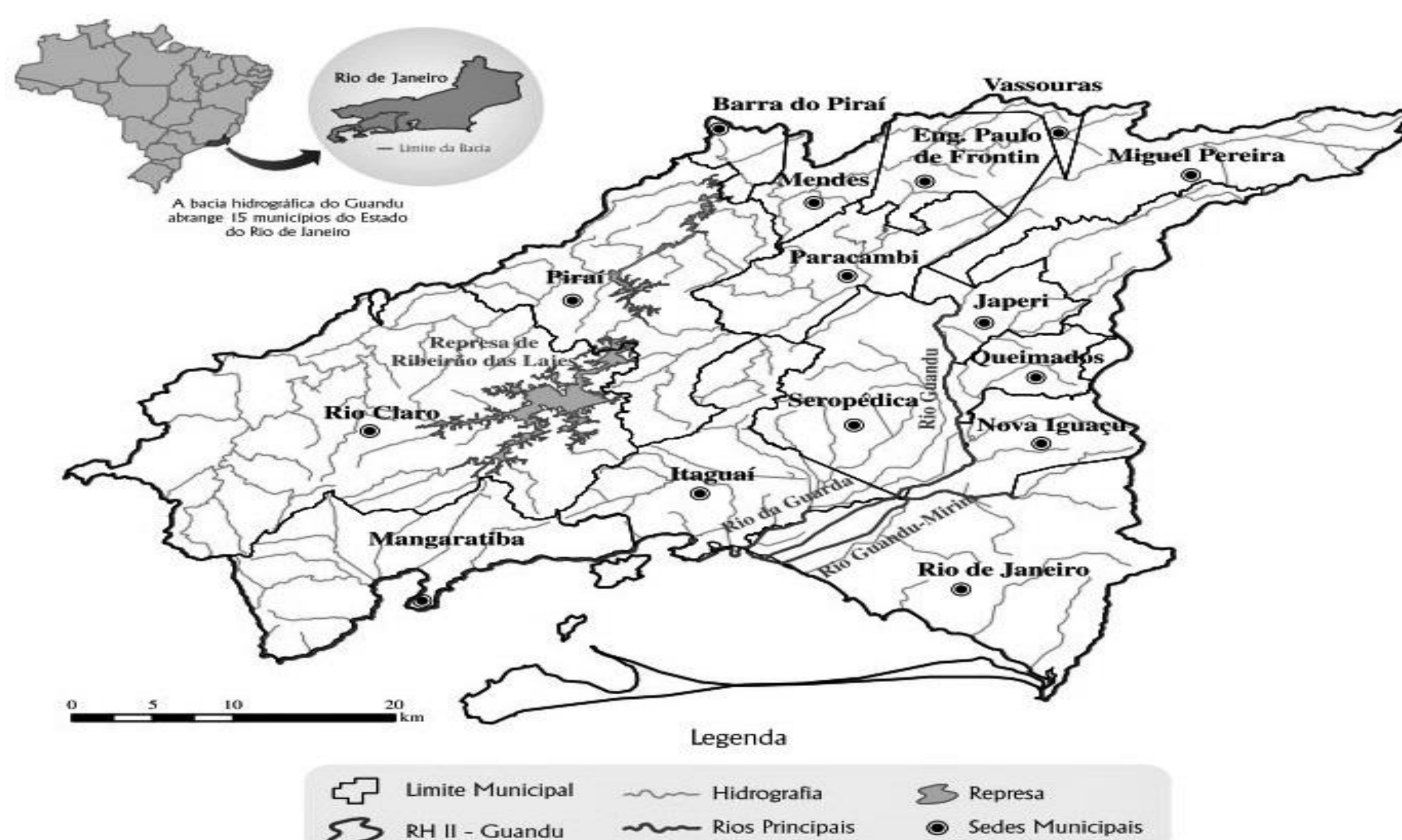
Objective

Identify the state of the art of assessing the impacts of conservationist actions on the ecosystem service to control water erosion obtained from the review of the scientific literature on the subject and the potential application of the models and parameters identified in the Guandu River basin - RJ, from the available databases

Materials and Methods:

Study Area

The study was conducted in the Guandu River Basin (BHRG) (Fig.1), located in the southwest of the state of Rio de Janeiro formed by the Guandu, Guarda and Guandu Mirim rivers. This area covers 3,600 km² and is located entirely in the Atlantic Forest biome and covers 15 municipalities, with a predominantly urban population, totalling an average of eight million inhabitants (COMMITTEE GUANDU - INEA, 2012).



Source: Comitê Guandu (2012).

Methodological procedures

The proposed methodology consisted of three stages, where:

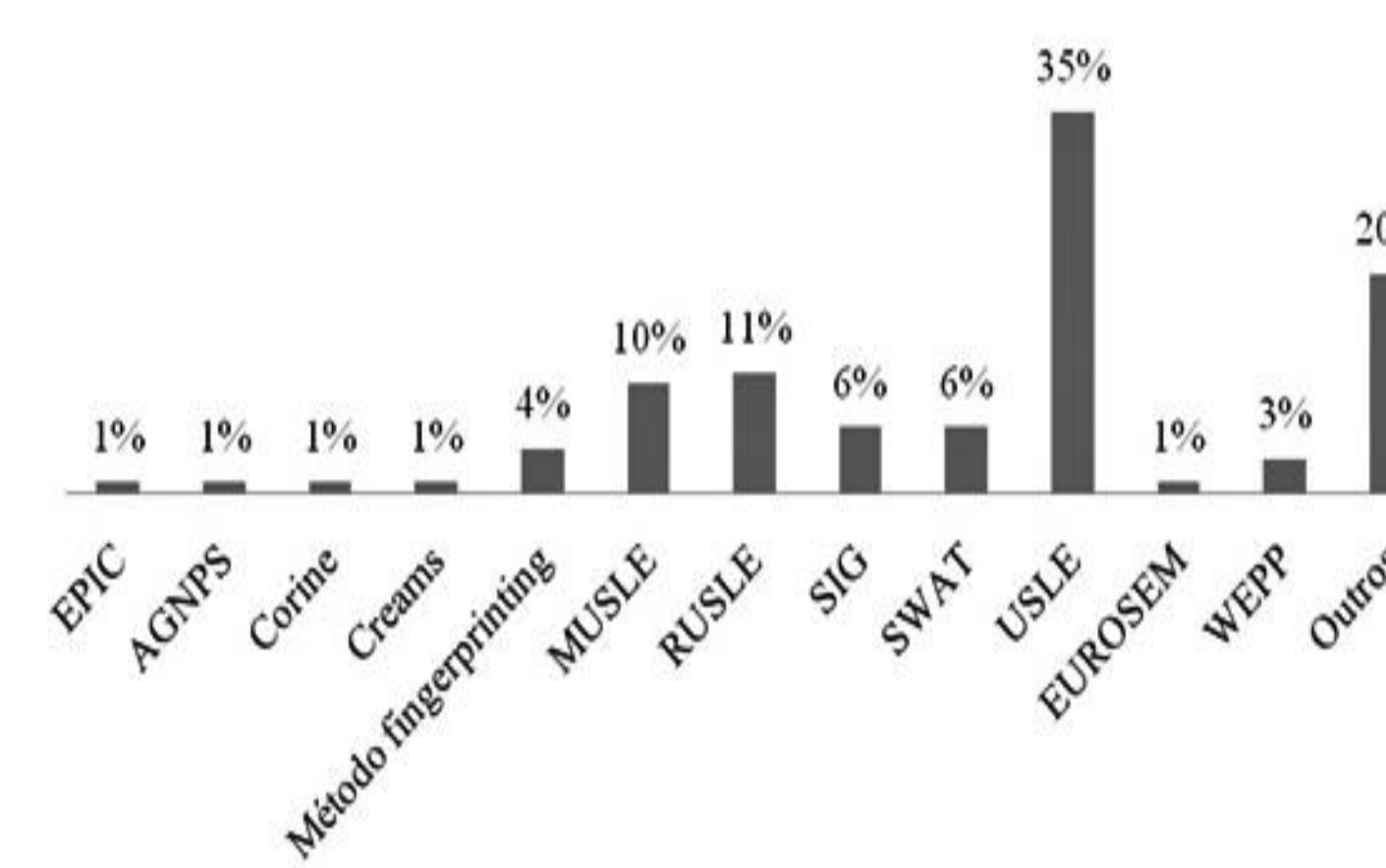
STEP 1: Identification in the scientific literature (1990 to 2016) of the state of the art related to the ecosystem service of water erosion control against conservationist actions available in Latin America;

STEP 2: Exploration and analysis of existing data and metadata for the BHRG related to the loss of the sun to and control of water erosion; and

STEP 3: Selection of parameters and models control evaluation of water erosion obtained in the scientific literature and application potential analysis in BHRG, obtained from the metadata database.

Results

Step 1: ProknowC Methodology



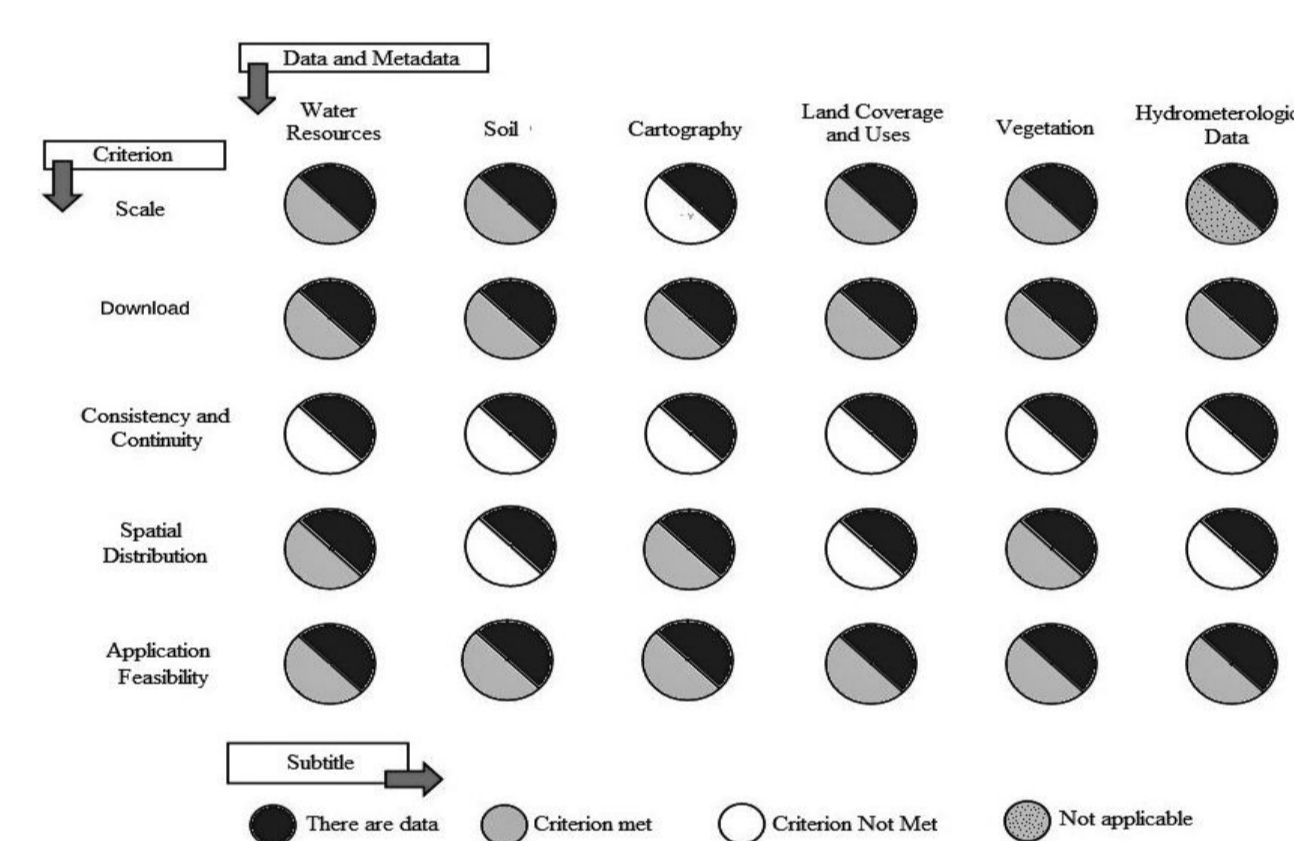
Source: SCOPUS & WEB of SCIENCE (2017).

Step 2: Metadata: BHRG

Metadata Compilation						
Institution	Water Resources	Soil	Cartography	Biodiversity and Protected Areas	Land Coverage and Uses	Hydrometeorological Data
ANA - HIDROWEB	Yes	s.d.	s.d.	s.d.	s.d.	Yes
SIGA GUANDU	Yes	Yes	Yes	Yes	Yes	Yes
CPRM	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.
DRM	s.d.	Yes	Yes	s.d.	Yes	s.d.
GEOINEA	Yes	Yes	Yes	Yes	Yes	s.d.
INDE	Yes	Yes	Yes	Yes	Yes	s.d.
EMBRAPA SOLOS	s.d.	Yes	s.d.	Yes	Yes	s.d.
IBGE	Yes	Yes	Yes	Yes	Yes	s.d.
TNC	Yes	Yes	s.d.	s.d.	s.d.	Yes

Author, (2018).

Step 3: Intersection of Steps 1 and 2



Author, (2018).

Methods	Required Variables					
USLE Data and Metadata	Rain	Soil	Topographic Factor	Vegetation	Land Use and Management	Infiltration
RUSLE Data and Metadata	Rain	Soil	Topographic Factor	Vegetation	Land Use and Management	Infiltration
MUSLE Data and Metadata	Surface Runoff	Soil	Topographic Factor	Vegetation	Land Use and Management	Infiltration
SWAT Data and Metadata	Rain	Soil	Surface Runoff	Vegetation	Land Use and Management	Climate
FINGERPRINTING Data and Metadata	Topography	Soil	Nutrients	Vegetation	Land Use and Management	Infiltration
WEPP Data and Metadata	Rain	Soil	Topographic Factor	Vegetation	Land Use and Management	Climate
EUROSEM Data and Metadata	Rain	Soil	Topographic Factor	Vegetation	Land Use and Management	Surface Runoff
CREAMS Data and Metadata	Rain	Soil	Nutrients	Vegetation	Land Use and Management	Climate
CORINE Data and Metadata	Land Use and Management	Soil	Topographic Factor	Vegetation	Land Use and Management	Climate
AGNPS Data and Metadata	Nutrients	Soil	Topographic Factor	Vegetation	Land Use and Management	Surface Runoff
EPIC Data and Metadata	Rain	Soil	Nutrients	Vegetation	Land Use and Management	Surface Runoff

Author, (2018).

Conclusions

It was observed non-linearity of the academic production in relation to mathematical models, used to predict erosion and sedimentation in Brazil and Latin America. However, it was found that the USLE equations and their variations RULE and MUSLE were the most replicated, compared to the other methodologies observed, due to their easy applicability and quick understanding of the results, with reasonable accuracy.

The major limitation of the application of erosion and sedimentation estimation methods is the difficulty of obtaining necessary, sufficient, quality and representative input data.

For BHRG it was found that thematic data and metadata were collected from various sources synergizing with the prospected models.

However, they had gaps and lacked continuity, consistency, representativeness and connectivity, hindering the achievement of more accurate results that considerably subsidized the stages of environmental planning, focusing on ecosystem services to control water erosion and sedimentation, making coherent decision making impossible.

The research methodology applied in the present study proved to be efficient in the survey, organization and analysis of data and metadata to support future studies aimed at evaluating the impacts of conservation actions, for example, in the context of water PSA, in the erosion control ecosystem service, among others, both in the state of Rio de Janeiro and in Brazil.

References

COMITÊ GUANDU - INEA (2012) - *Guandu, Guarda and Guandu-Mirim River Basin. Experiences for water resource management*. Available at: < <http://www.comiteguandu.org.br/conteudo/ivrogandu2013.pdf> >, 2018. (Portuguese)

SCOPUS & WEB of SCIENCE Available at: < <https://www.scopus.com/home.uri> > and < <https://login.webofknowledge.com/webofscience> >, 2017. (English)