SWAT applications in Brazil: A survey of the past 10 years

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Background and Objectives

- **SWAT** is rapidly being used as a tool **in many studies in Brazilian watersheds**, in different parts of the country.

- Although its use has been growing in Brazil, the studies developed **are still limited** due to the large amount of information needed to describe the **spatial and temporal variability** of natural systems in contrast to the **lack of detailed data**.

- This paper was conducted in order to **identify the studies** developed with SWAT in Brazil, noting their **distribution by states**, **purposes of application** of the model, **identification of research groups** and their publications over the years. Identifying thus the **potential** of the tool in the country, and also the **problems encountered**.

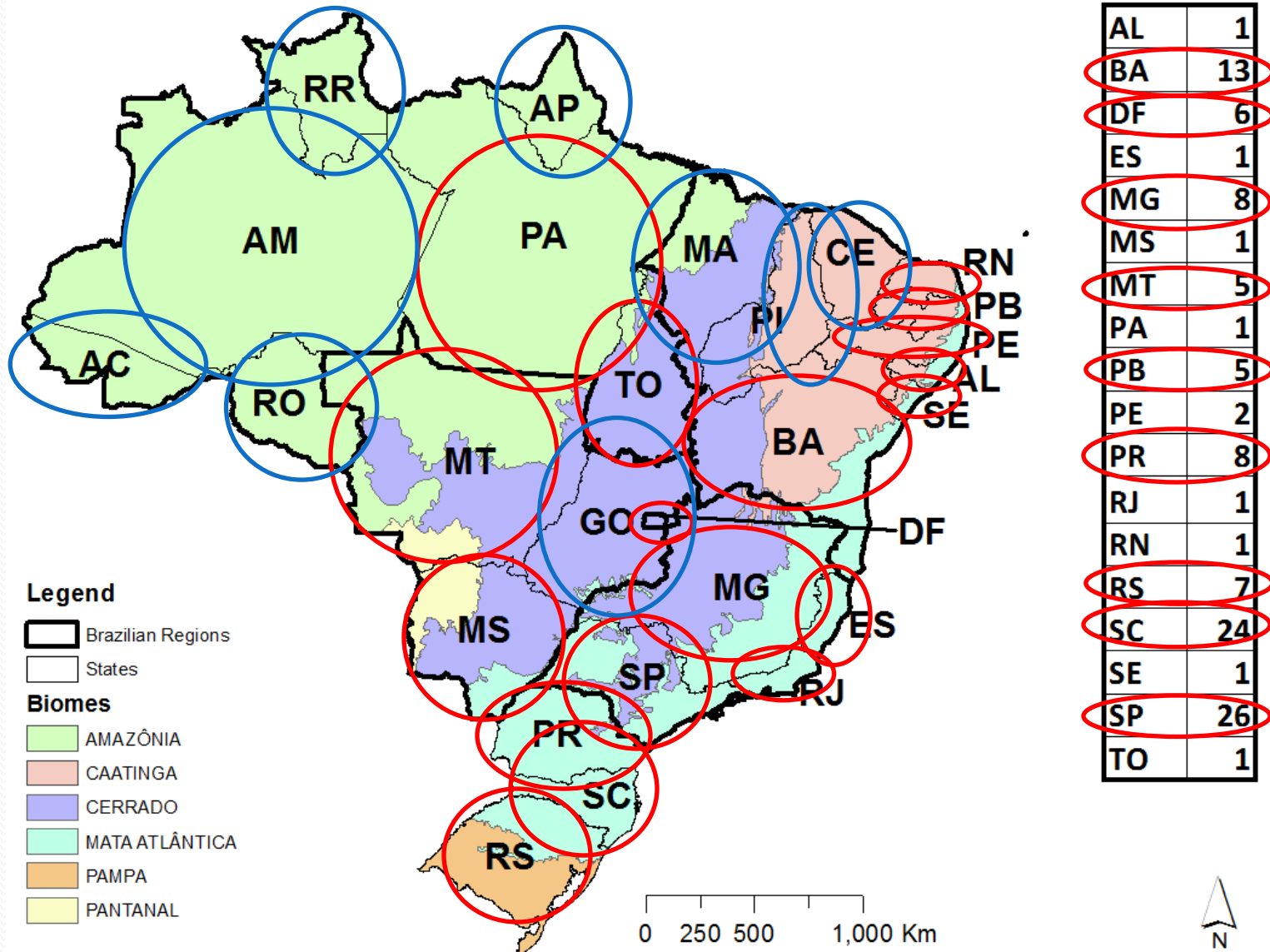- **This study aims to identify, map and discuss the use of SWAT model in Brazil.**

Publications applying SWAT in Brazil

- Publications of the last **10 years** (02/2003 – 02/2013);

- Papers (journals and proceedings), thesis, dissertations and monographs were analyzed;

- Thesis, dissertations and monographs were only accounted for, when no paper was published from the study;

- **112** publications were identified;

Publications applying SWAT in Brazil

- **20%** of the studies aimed to **determine the feasibility** of using SWAT in Brazil;

- The studies applied the model for watersheds with different **sizes, topographies, climates, regions and biomes**;

- The **smallest** basin modeled with SWAT has **0.91 Km²** :
  - Natural vegetation: Caatinga; agricultural crops; semi-arid region; state of Paraíba (Carvalho Neto *et al*, 2011b)

- The **larger** basin modeled has **758,000.00 Km²**:
  - Amazon Rainforest; Pará State (Deus *et al*, 2013)
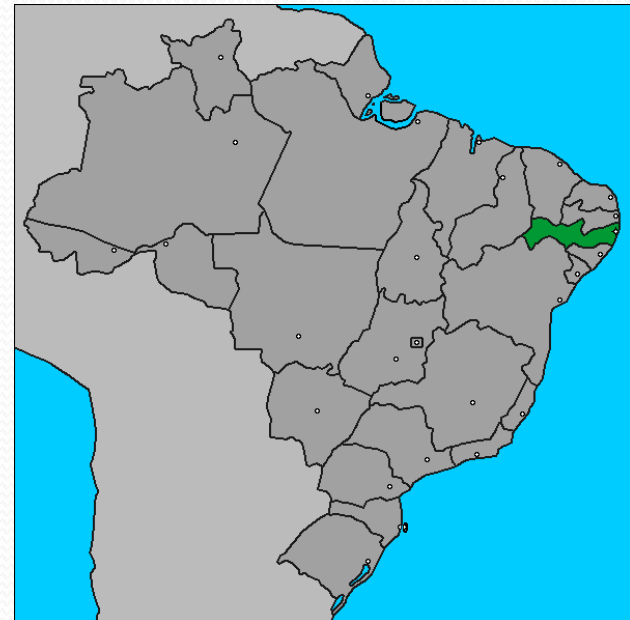
Publications applying SWAT in Brazil

AL	1
BA	13
DF	6
ES	1
MG	8
MS	1
MT	5
PA	1
PB	5
PE	2
PR	8
RJ	1
RN	1
RS	7
SC	24
SE	1
SP	26
TO	1

Legend

Brazilian Regions

States

Biomes

AMAZÔNIA

CAATINGA

CERRADO

MATA ATLÂNTICA

PAMPA

PANTANAL

0 250 500   1,000 Km

N

Publications applying SWAT in Brazil

- Comparing with Garbosa *et al.* (2011) :
- There was an increase of approximately **36% in the last 2 years**.

- One of the reasons for this increase may be the **efforts in conducting SWAT trainings** for users in different parts of Brazil, and establishment of **institutional partnerships**:
  - USP-São Carlos, Southeast (intro and advanced) (Srini & Allan);
  - EPAGRI-Santa Catarina , South (advanced) (Srini & Allan);
  - USP-São Paulo, Southeast (intro and advanced) (Srini & Allan);
  - UnB-Brasília, DF, Midwest (advanced) (Srini & Allan);
  - UFRPE & UFPE- Recife, northeast (intro & advanced) (Srini & Allan);
  - World Bank Project- Natal , northeast (intro) (Danielle).

- The **Northeast** showed the **greatest growth** (28%) in number of applications compared to the other regions of the country.
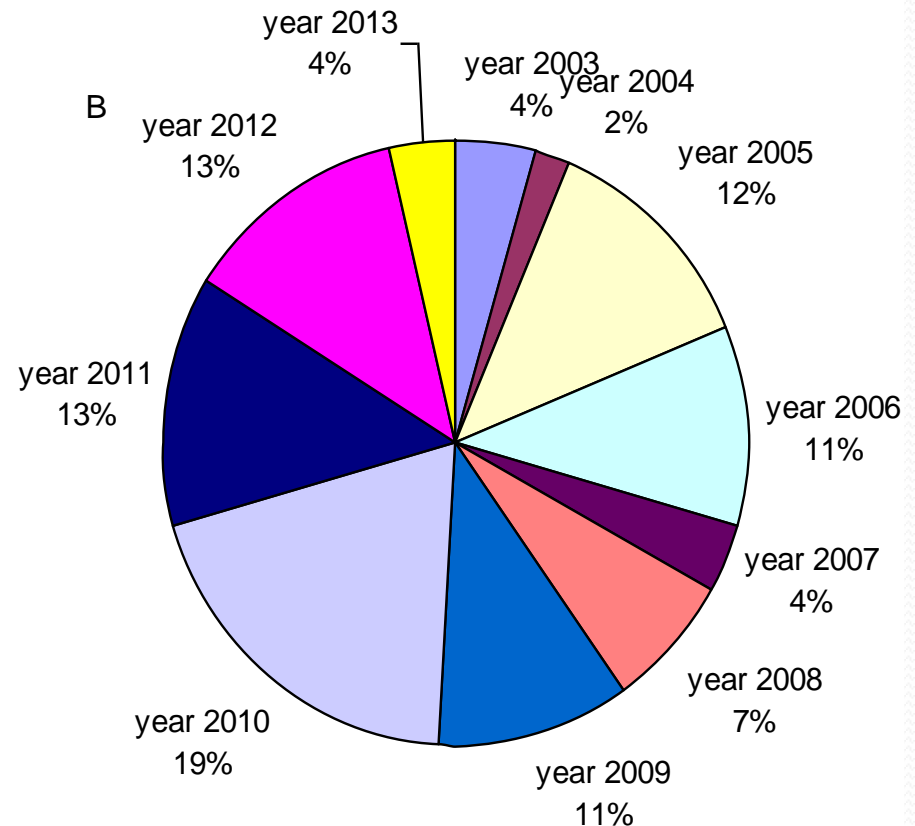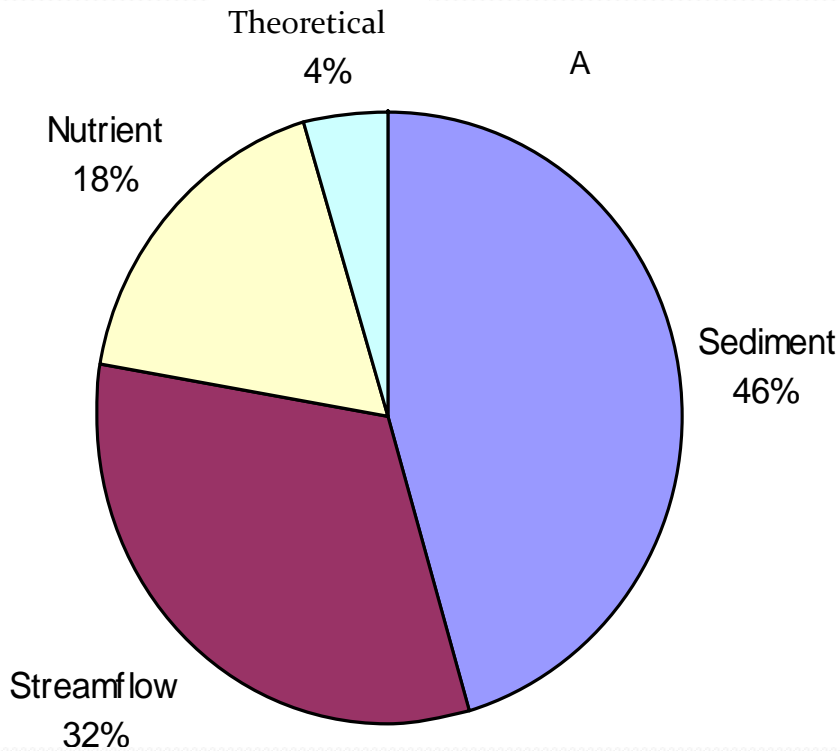
2014 International SWAT Conference

- The **growth of SWAT applications in Brazil** has significant importance, such that the country was chosen to host the International SWAT Conference in 2014.

Percentage of publications using SWAT by Region (A) and by state (B)
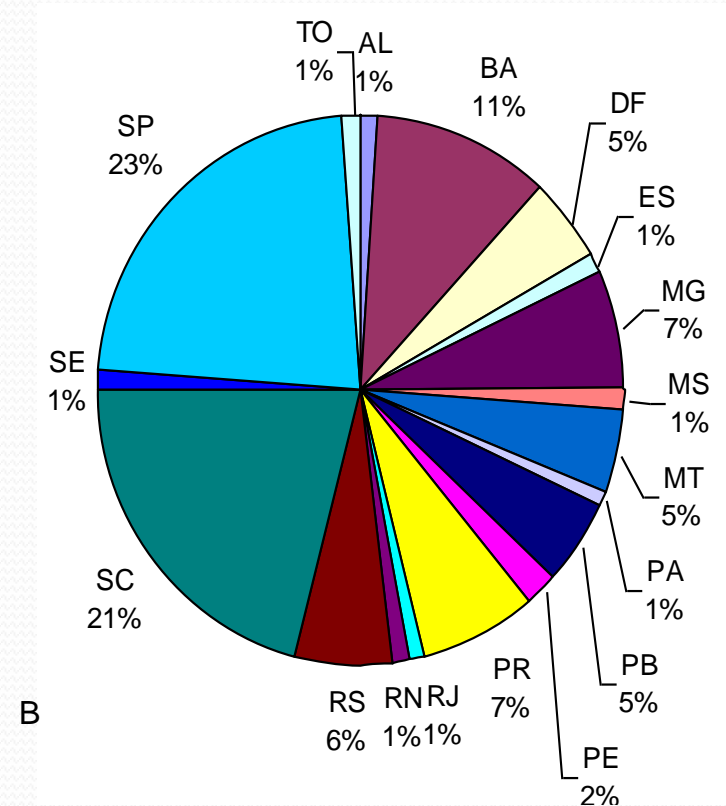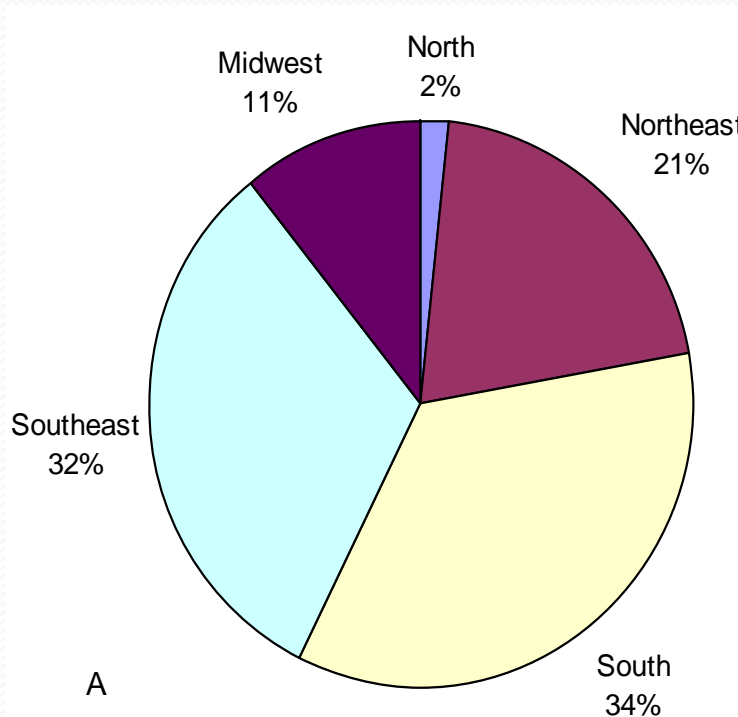
Studies by categories (A); Publications per year in Brazil (B)

A few publications using SWAT in the Brazilian basins

N°	Author	Year	Watershed	Biome	Area km²	State
1	Bonumá *et al.*	2009	Arroio Lino	Pampa	3.20	RS
2	Gilbertoni *et al.*	2009	Antonina Bay	Mata Atlântica	1,597.00	PR
8	Xavier	2009	Manso river	Cerrado	10,553.00	MT
13	Fontes *et al.*	2010	Jacuípe river	Caatinga	1,895	BA
23	Souza *et al.*	2010	Tocantins-Araguaia sub-watershed	Cerrado/Amazônia	ni	TO
45	Lessa *et al.*	2012	Pardo river	Cerrado/Mata Atlântica	8,993.00	SP
55	Deus *et al.*	2013	Lake Tucurui	Amazônia	758,000.00	PA

Brazilian Databases for SWAT applications

- **ANA - National Water Agency**

> The necessary data, from the Brazilian institutions, to model with SWAT are not in a central **database, nor organized** to facilitate the implementation of the model.
> The information has to be **gathered from various sources, with a wide variety of formats and resolutions.**
> This diversity of data and sources, as well as the **lack of proper format and resolution**, are identified as a **main issue** in the researches studied in this paper.
>
> There is a necessity **for more detailed information with greater precision, quality and spatialization.**

- **INPE - National Institute of Space Research**

Conclusions

- The use of SWAT has grown significantly in Brazil in recent years with the **consolidation of research**, giving **regularity in publications**.

- A large number of studies (41 publications) **identified the potential of the SWAT model** for different Brazilian regions, and for different watershed sizes, climate and environmental conditions.

- The major problems presented in the published studies are the **difficulty on obtaining data and on the construction of the databases necessary for modeling with SWAT**, which has limited its use in some regions of Brazil.

Thank you very much!

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