

Effects of land use and alternative climatic conditions on functional attributes of subtropical streams

Funcionamiento de arroyos subtropicales:
efectos del uso de la tierra bajo condiciones climáticas alternativas

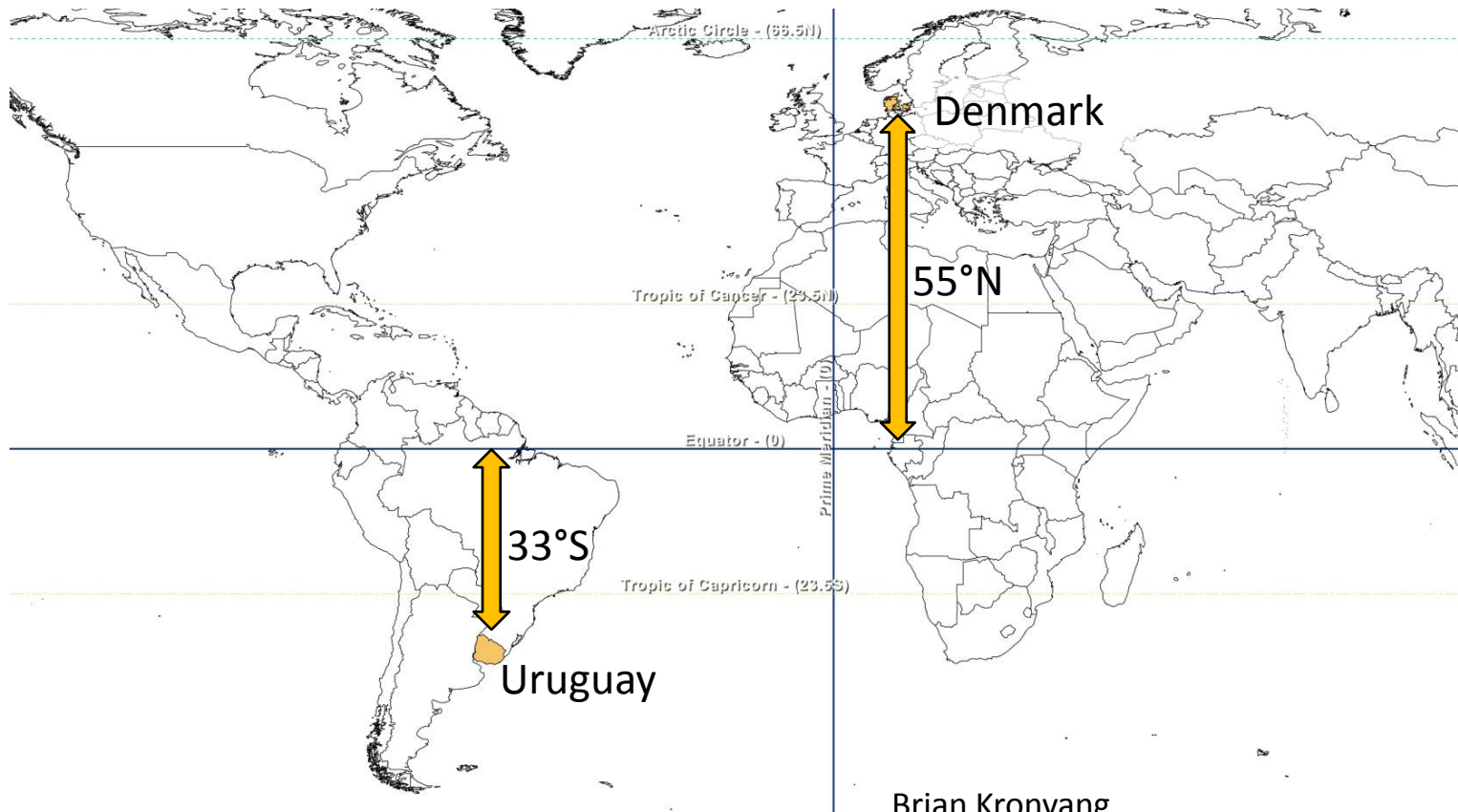


G. Goyenola

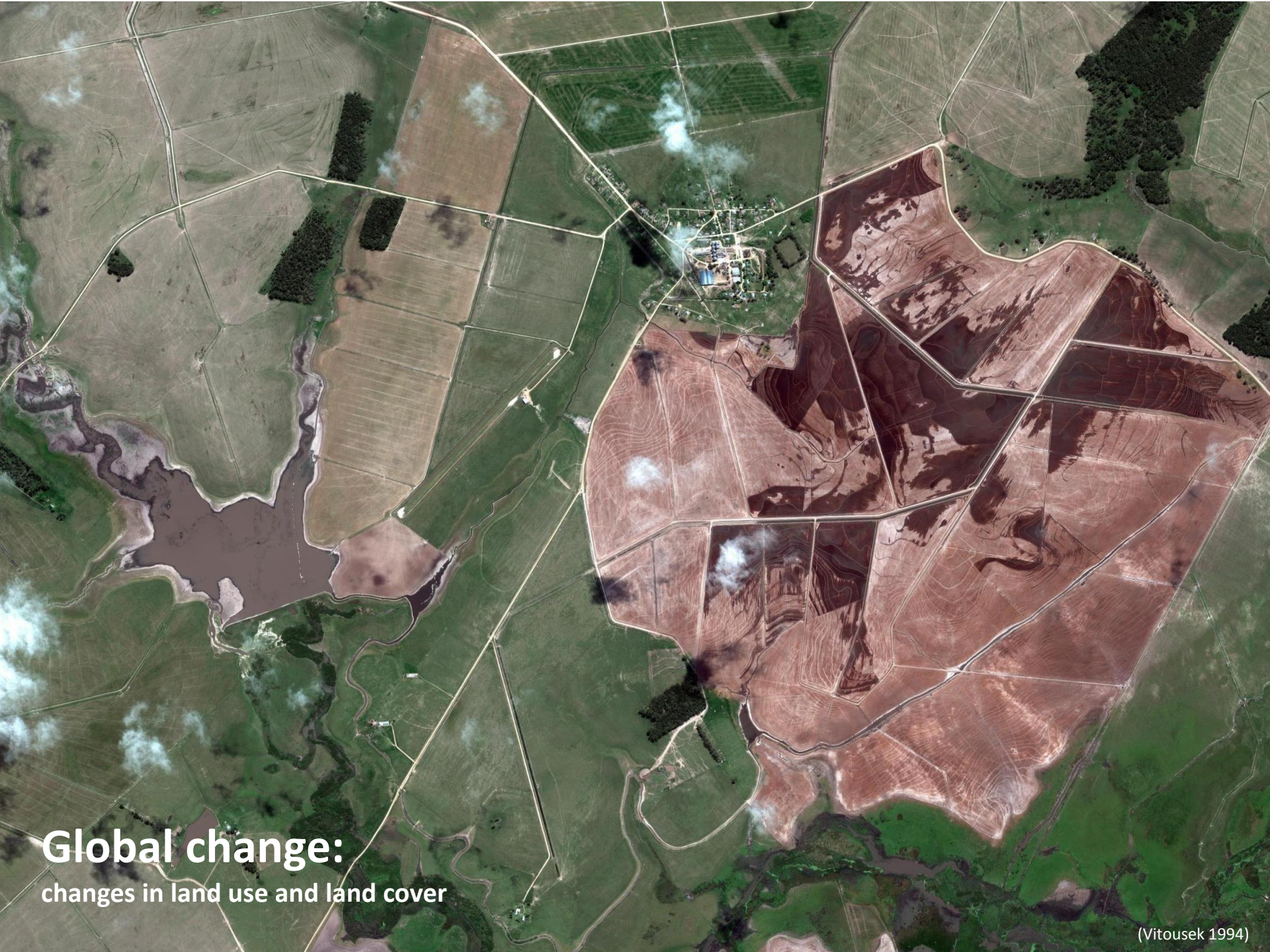
Course: Nutrient Cycling, Modelling and Management from Field to Catchment Scale
14-18/11/2011



Comparative studies of biological interactions and nutrient turnover in temperate and subtropical streams and lakes with different catchment characteristics and nutrient input – a climate change perspective



Brian Kronvang
Erik Jeppesen
Danish Research Agency for the Nature and Universe



Global change:
changes in land use and land cover



Global change:

affectation of patterns of precipitation and the frequency of extreme weather events

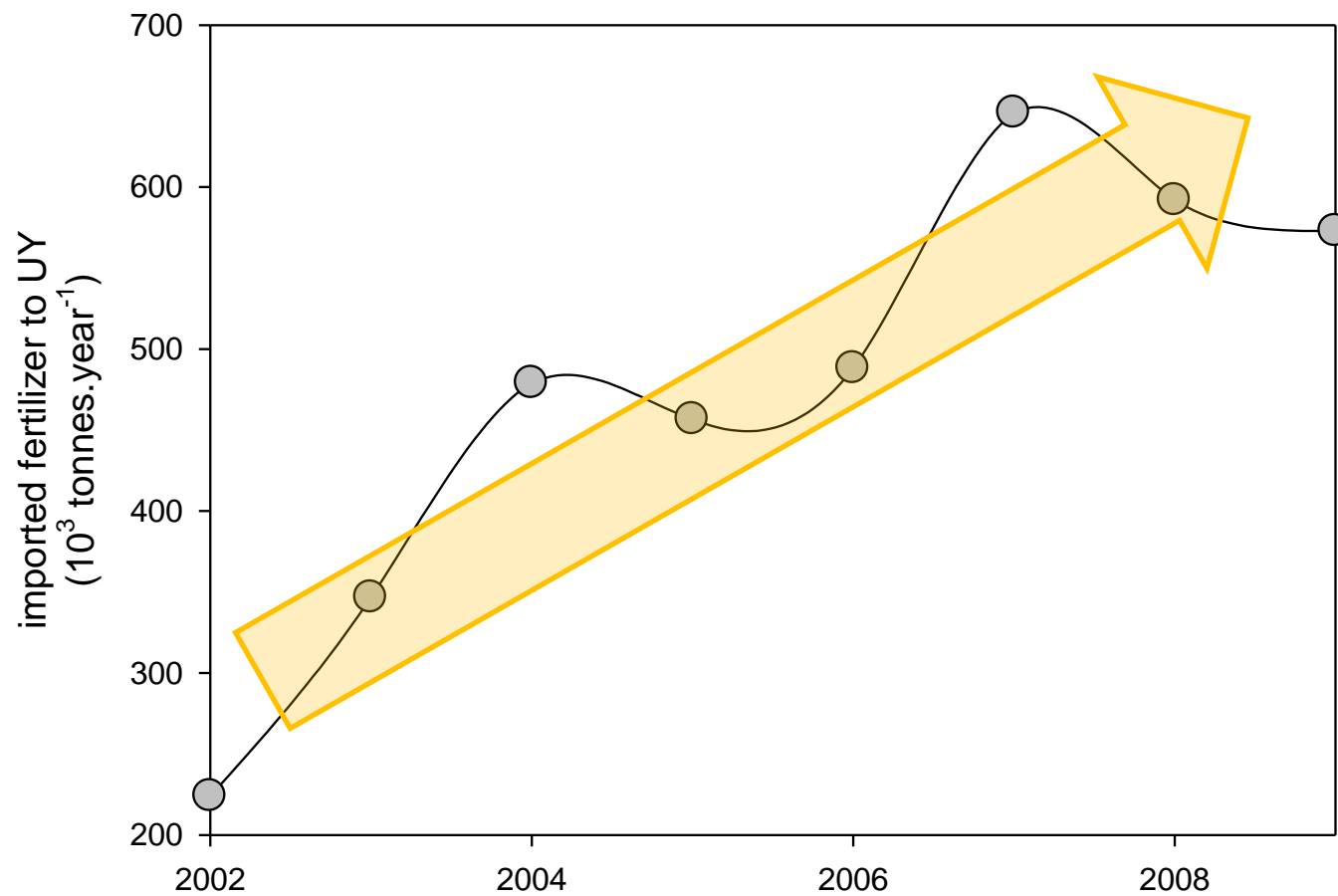


Global change:

in general terms, warming will exacerbate symptoms of eutrophication, and if the input of nutrients increase, the environmental and health risk increases. Loss of ecosystem services.

(Moss et al 2010)

Trend



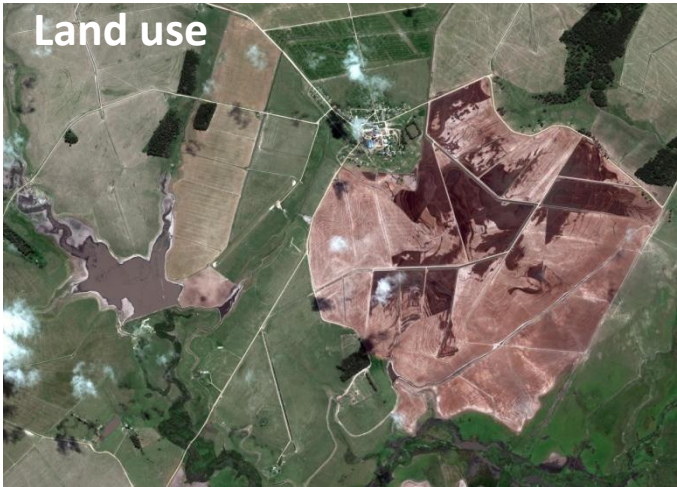
In this context, Uruguay is under a strong intensification process of agriculture.

Methodological approach

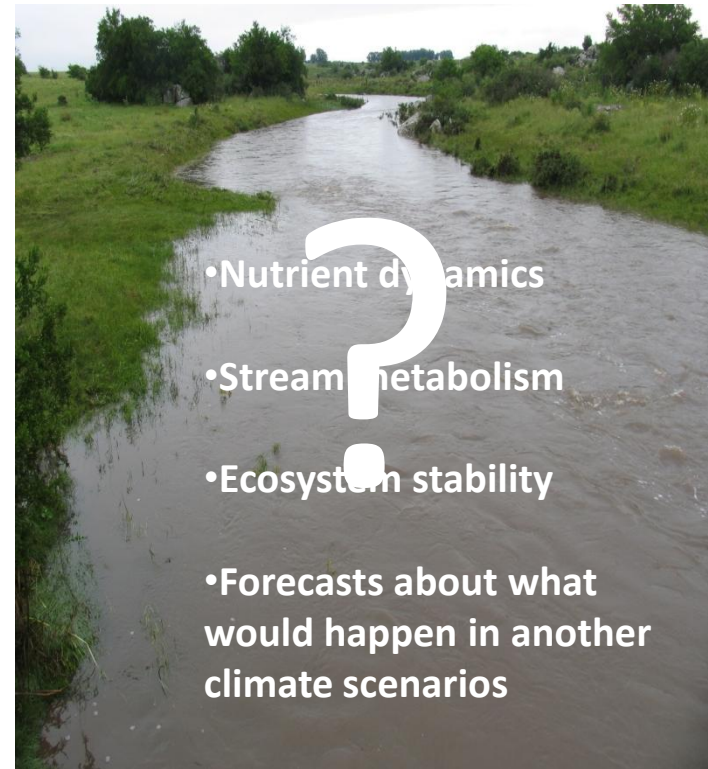
Climate



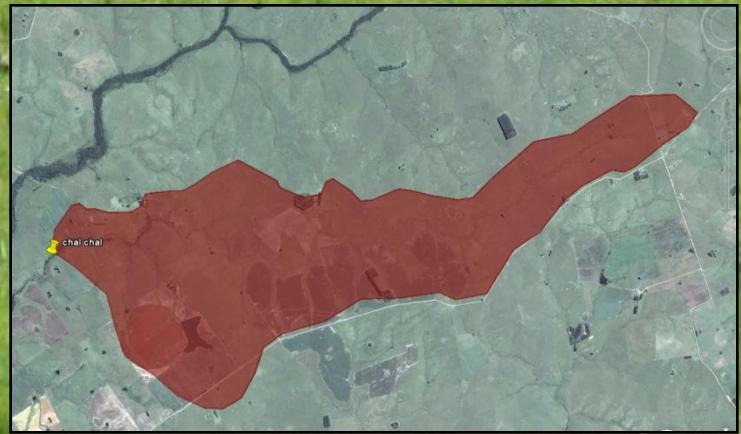
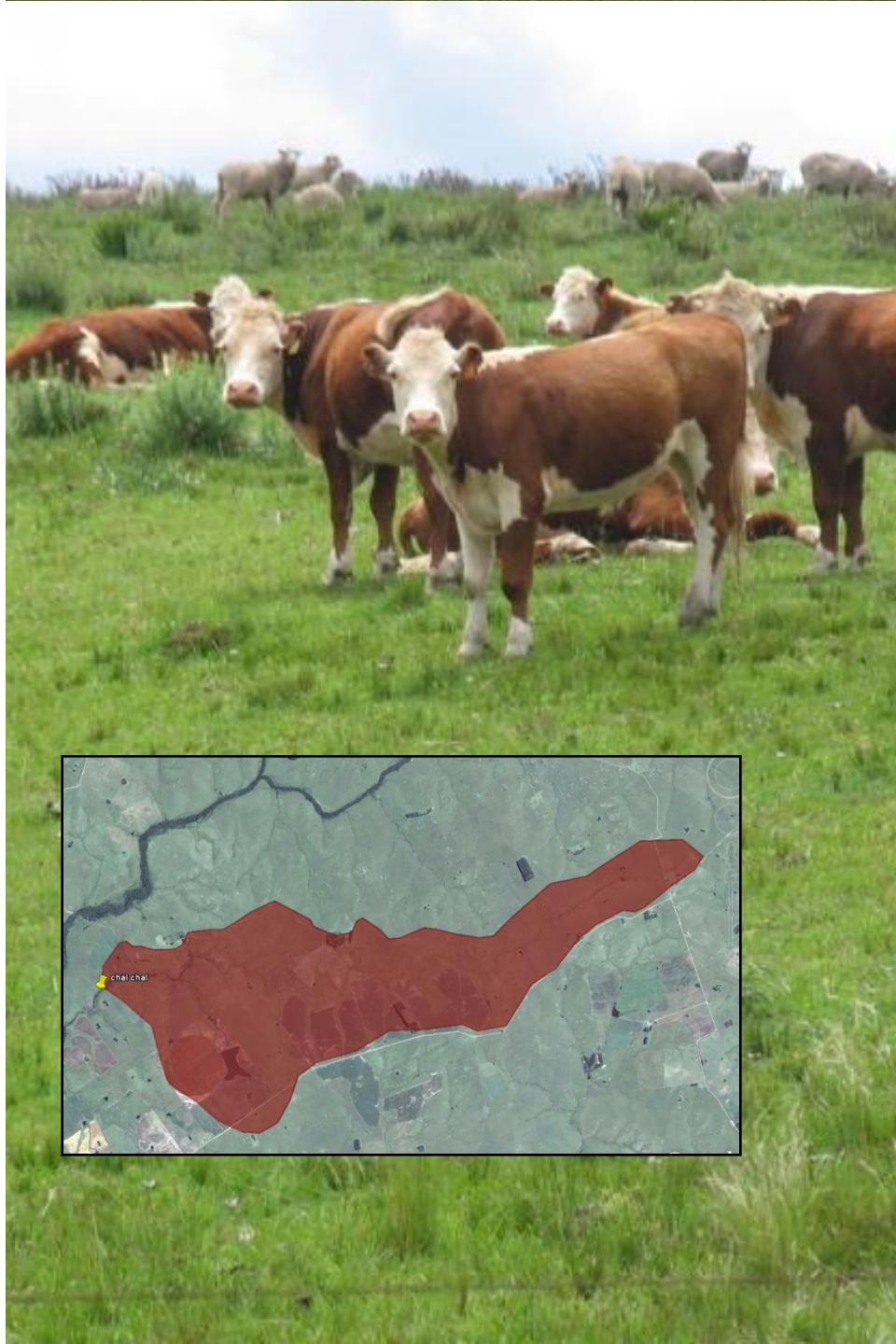
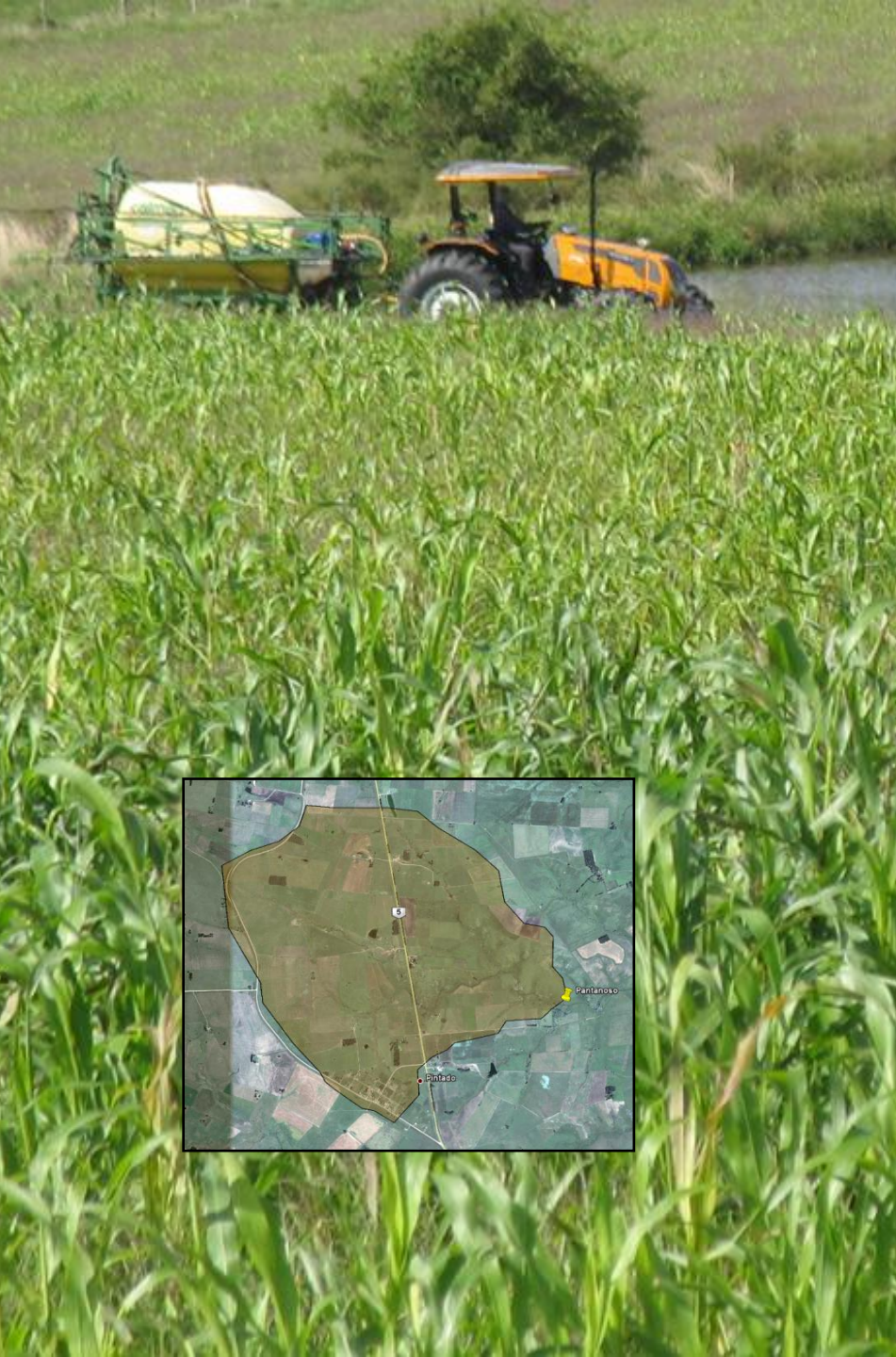
Land use



ecosystem functioning of catchments



- Nutrient dynamics
- Stream metabolism
- Ecosystem stability
- Forecasts about what would happen in another climate scenarios



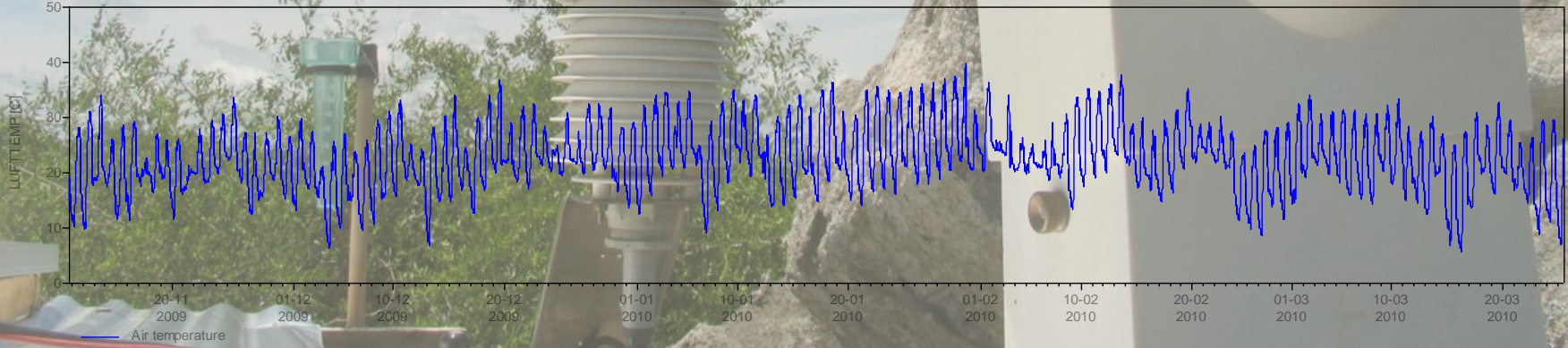
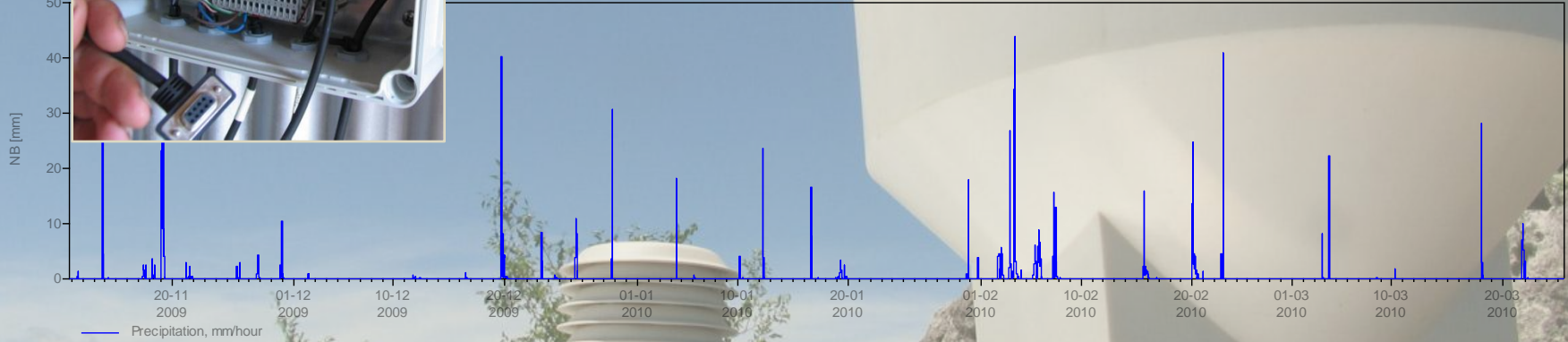
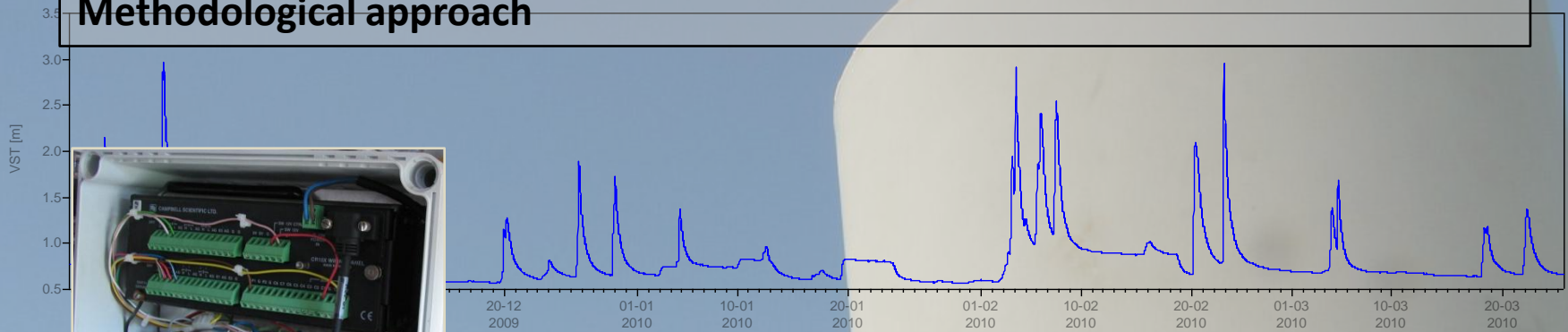
Methodological approach



Methodological approach



Methodological approach



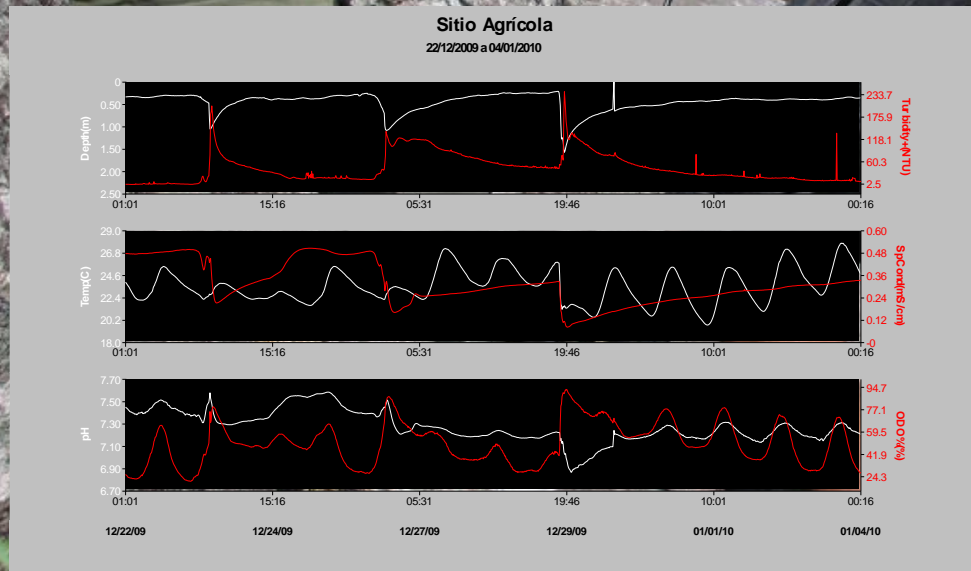
Methodological approach



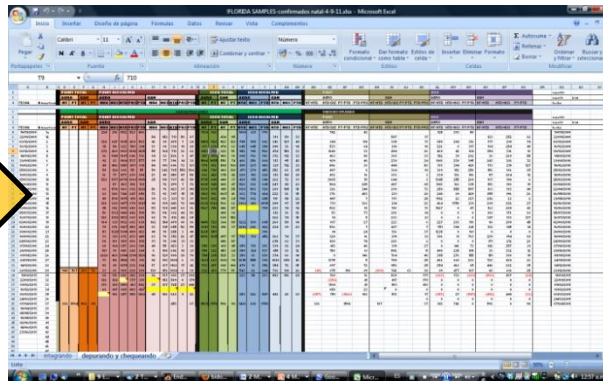
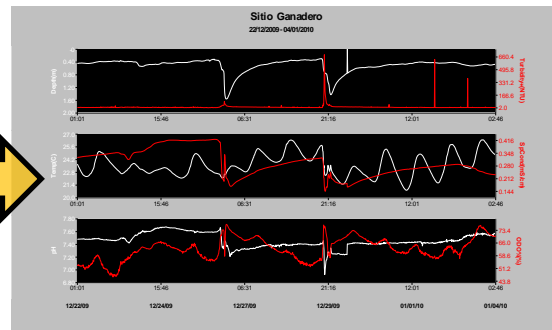
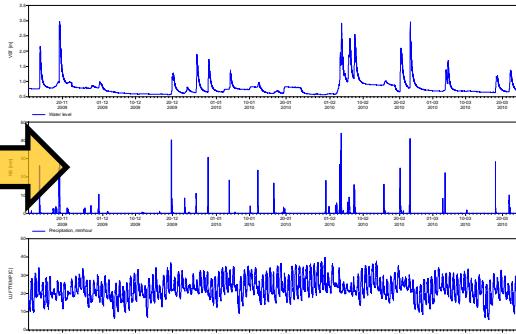
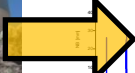
Methodological approach



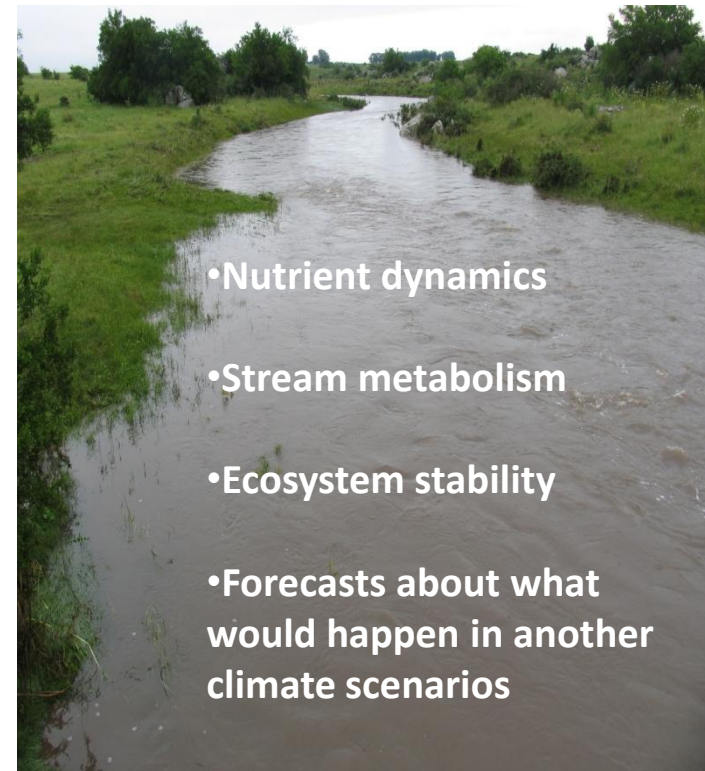
Methodological approach



Methodological approach



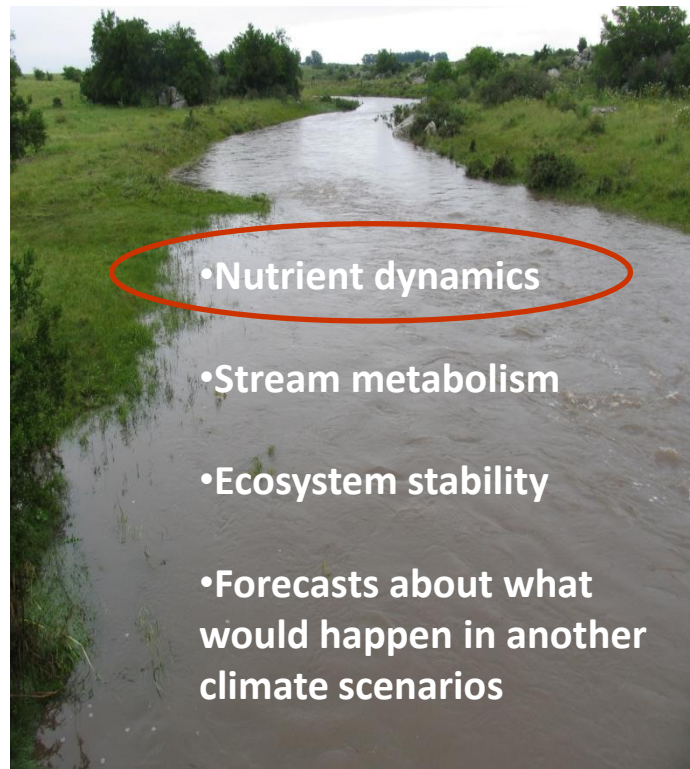
ecosystem functioning
of catchments



- Nutrient dynamics
- Stream metabolism
- Ecosystem stability
- Forecasts about what would happen in another climate scenarios

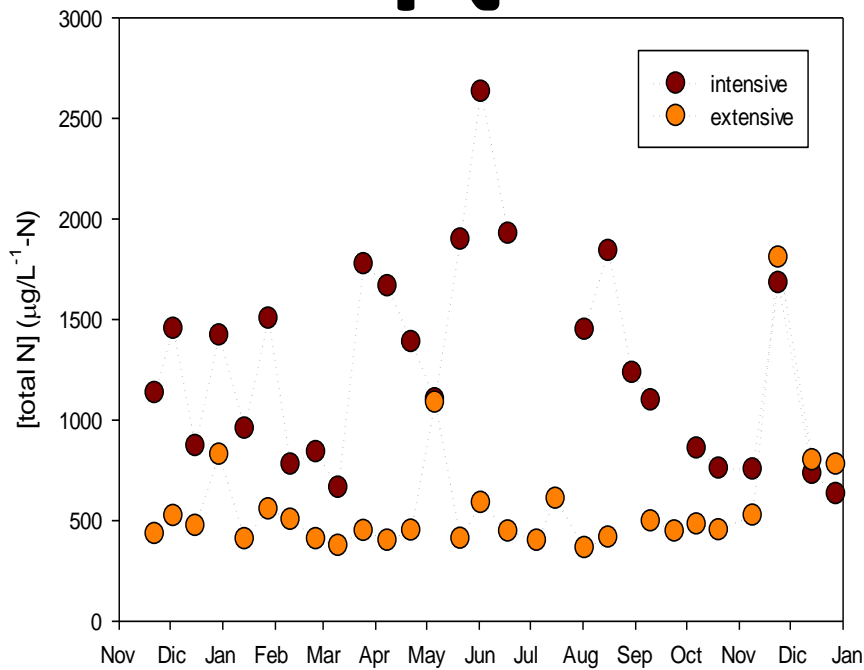
Methodological approach

ecosystem functioning
of catchments

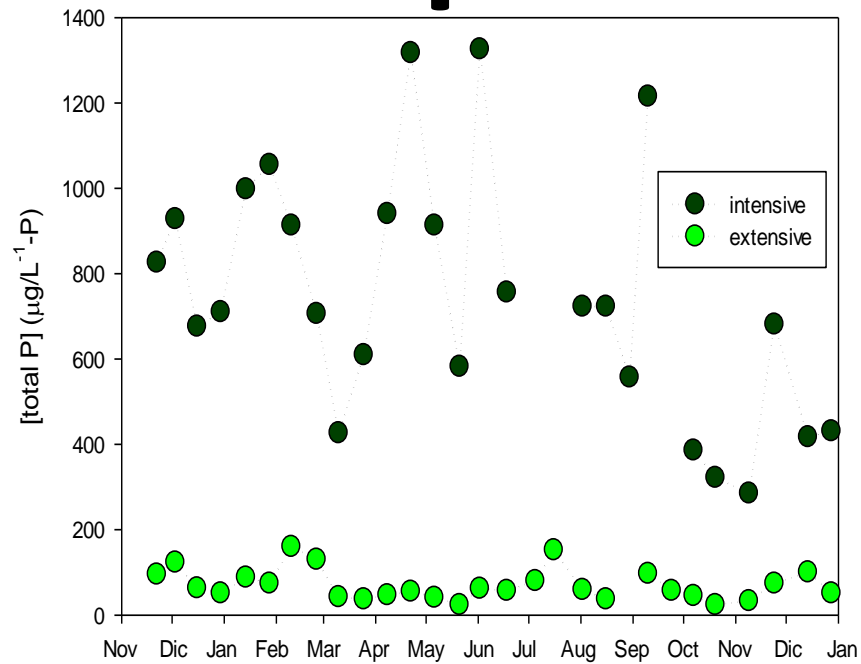


First results

N



P



Temporal variation of **total Nitrogen** and **Phosphorus** concentration, from 14 days integrated samples.
The export is expressed $\mu\text{g}\cdot\text{L}^{-1}$.

Averages:

$$[\text{TN}]_{\text{intensive}} = 1282 \mu\text{g}\cdot\text{L}^{-1}\text{-N}$$

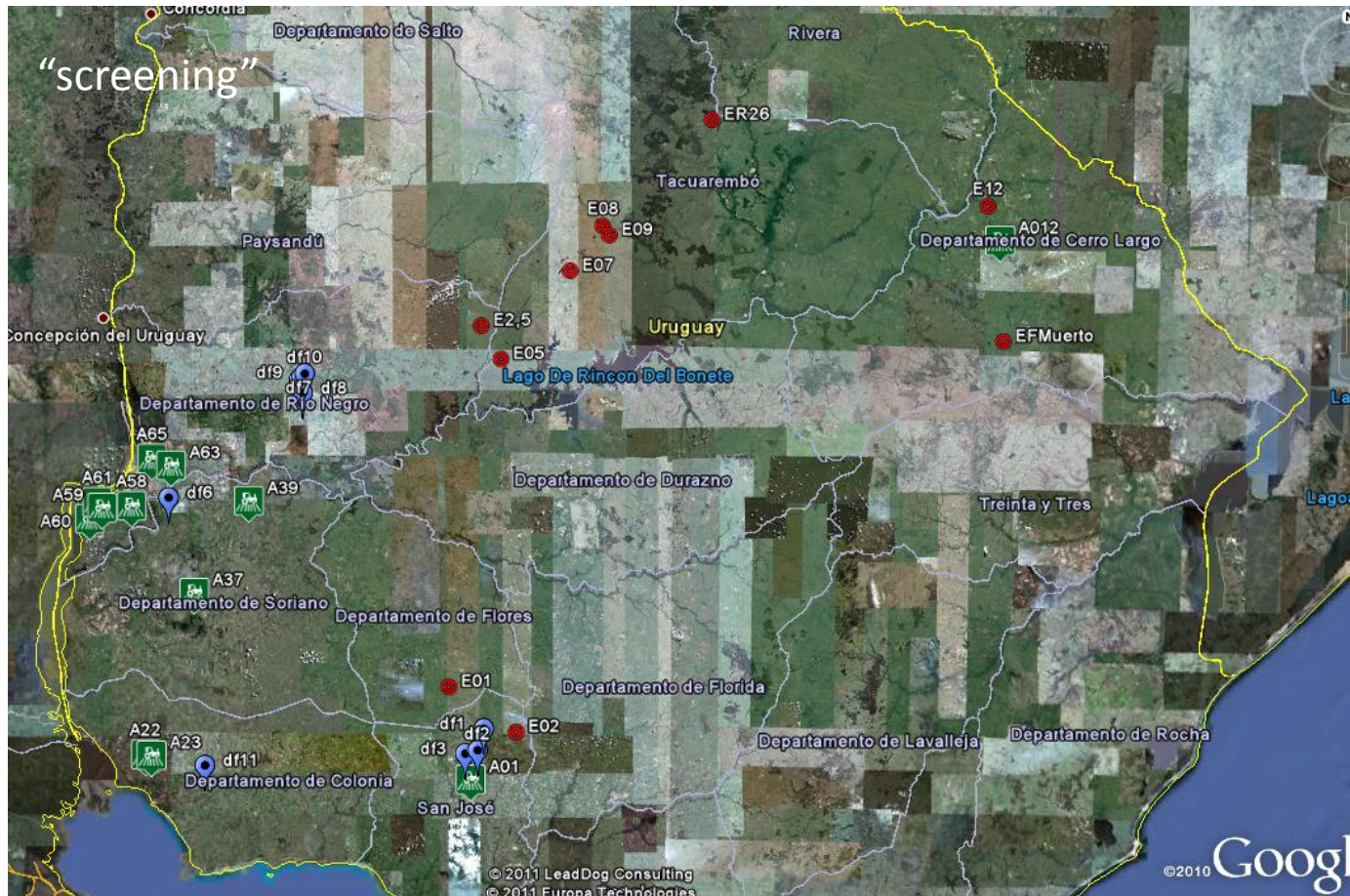
$$[\text{TN}]_{\text{extensive}} = 569 \mu\text{g}\cdot\text{L}^{-1}\text{-N}$$

Averages:

$$[\text{TP}]_{\text{intensive}} = 747 \mu\text{g}\cdot\text{L}^{-1}\text{-P}$$

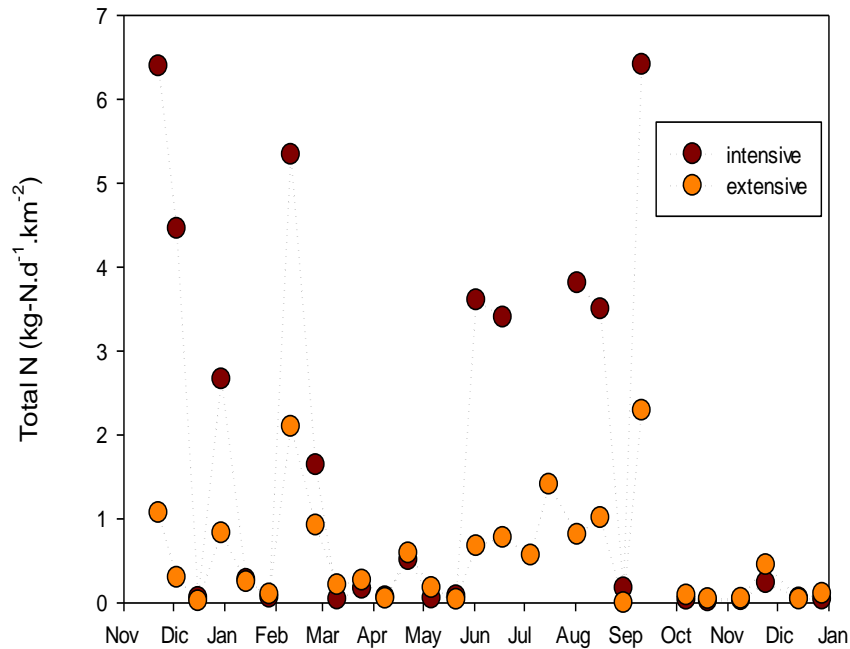
$$[\text{TP}]_{\text{extensive}} = 71 \mu\text{g}\cdot\text{L}^{-1}\text{-P}$$

Methodological approach

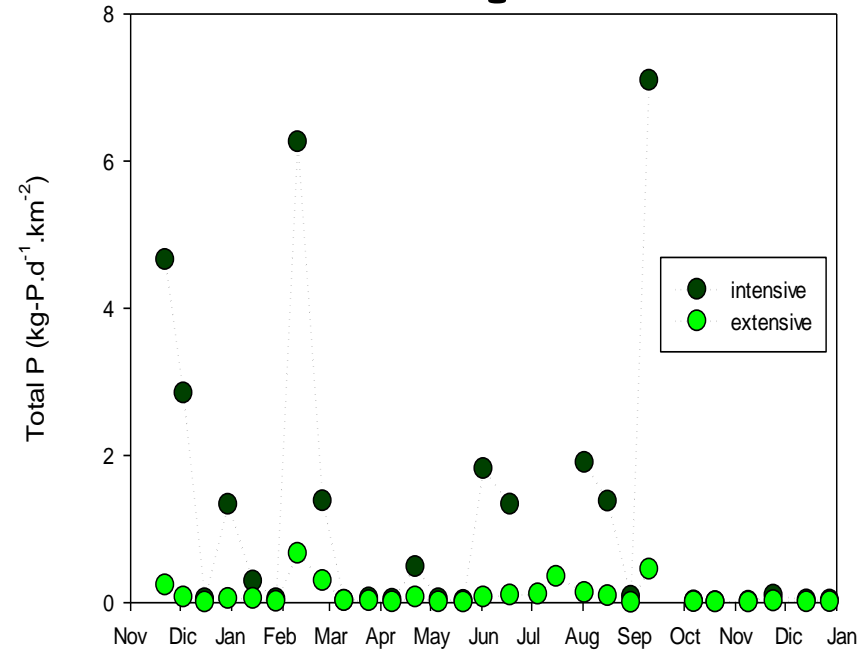


First results

N



P



Temporal variation of **total Nitrogen and Phosphorus** exported by the streams, from 14 days integrated samples.
The export is expressed per day and km² (annualized averages).

Averages:

TN exported_{intensive} = 620.5 kg-N. km⁻².year⁻¹

TN exported_{extensive} = 182.5 kg-N. km⁻².year⁻¹

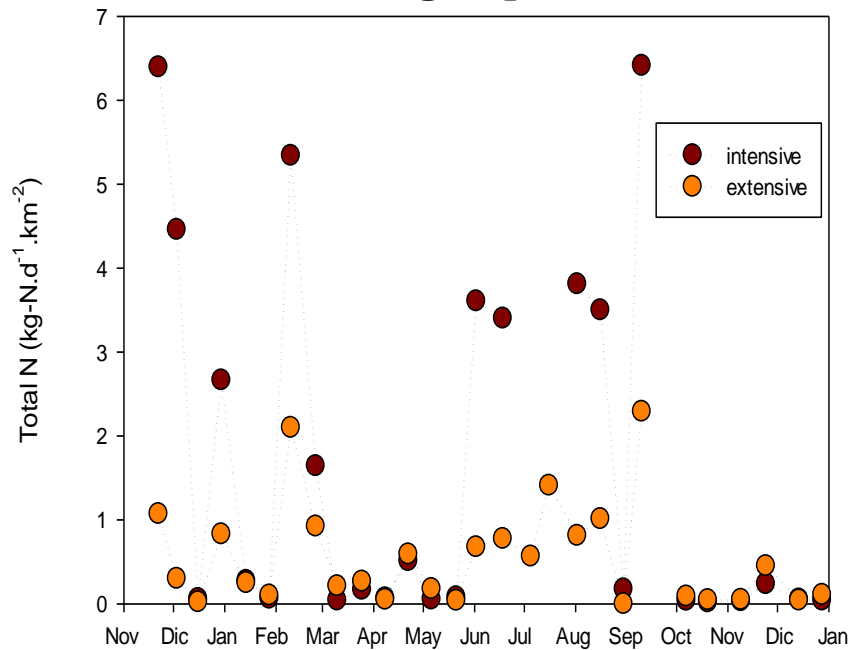
Averages:

TP exported_{intensive} = 438 kg-P.km⁻².year⁻¹

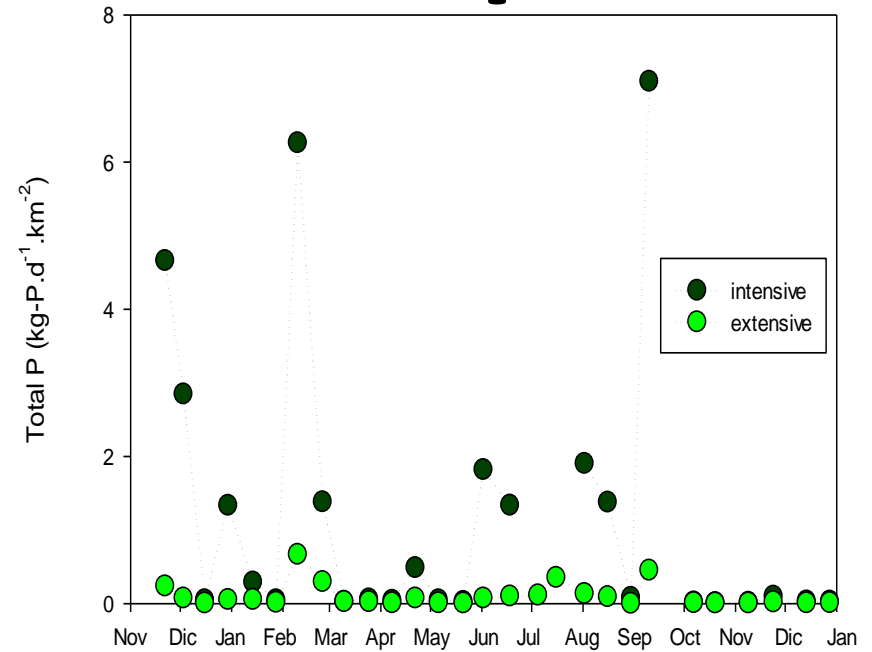
TP exported_{extensive} = 36.5 kg-P.km⁻².year⁻¹

First results

N



P



Temporal variation of **total Nitrogen and Phosphorus** exported by the streams, from 14 days integrated samples.
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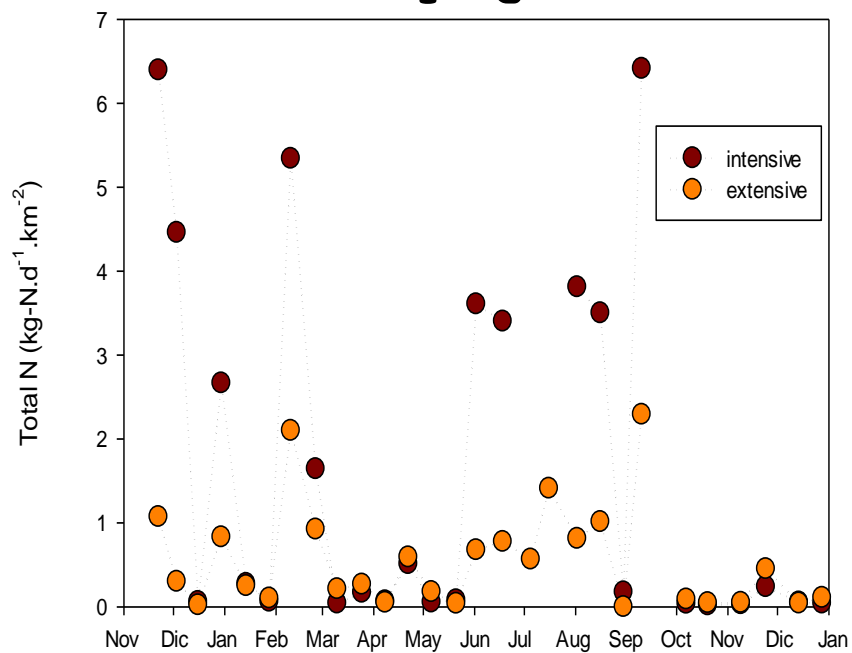
Averages:

TP exported_{intensive} = 438 kg-P.km⁻².year⁻¹

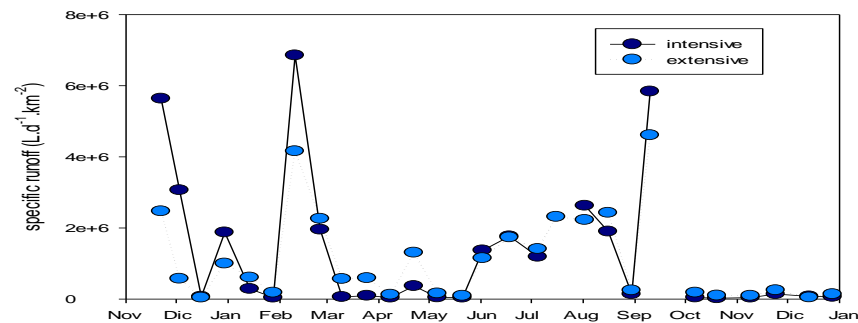
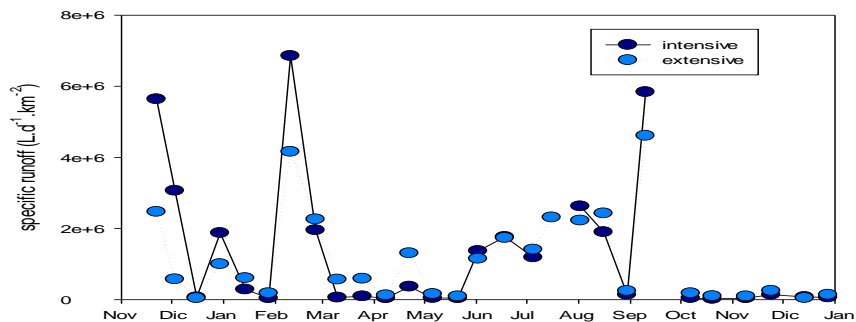
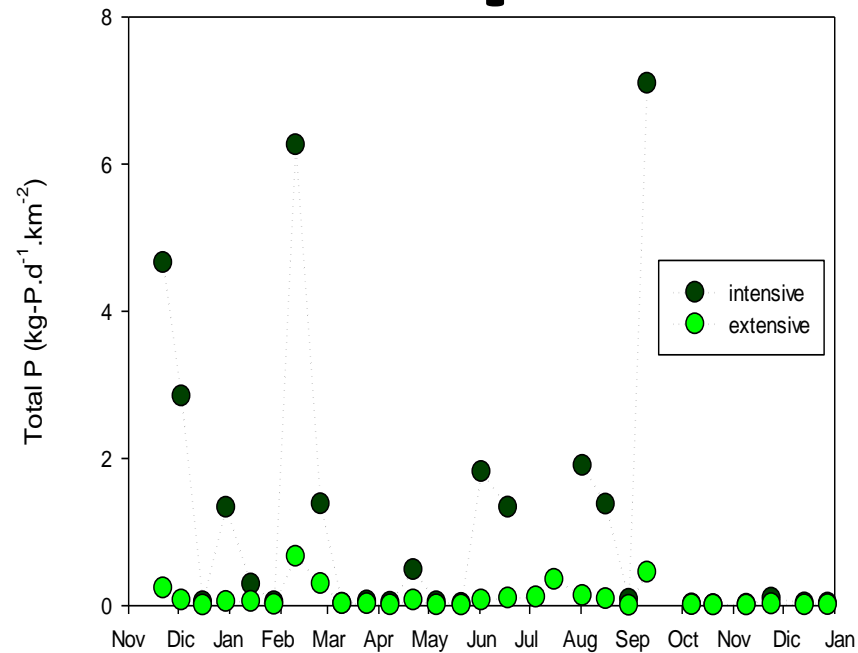
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First results

N



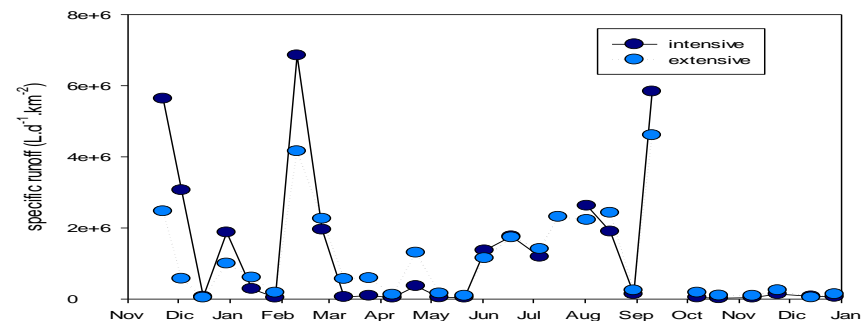
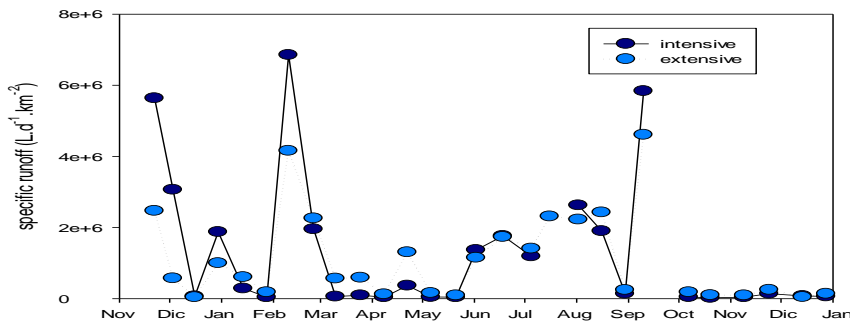
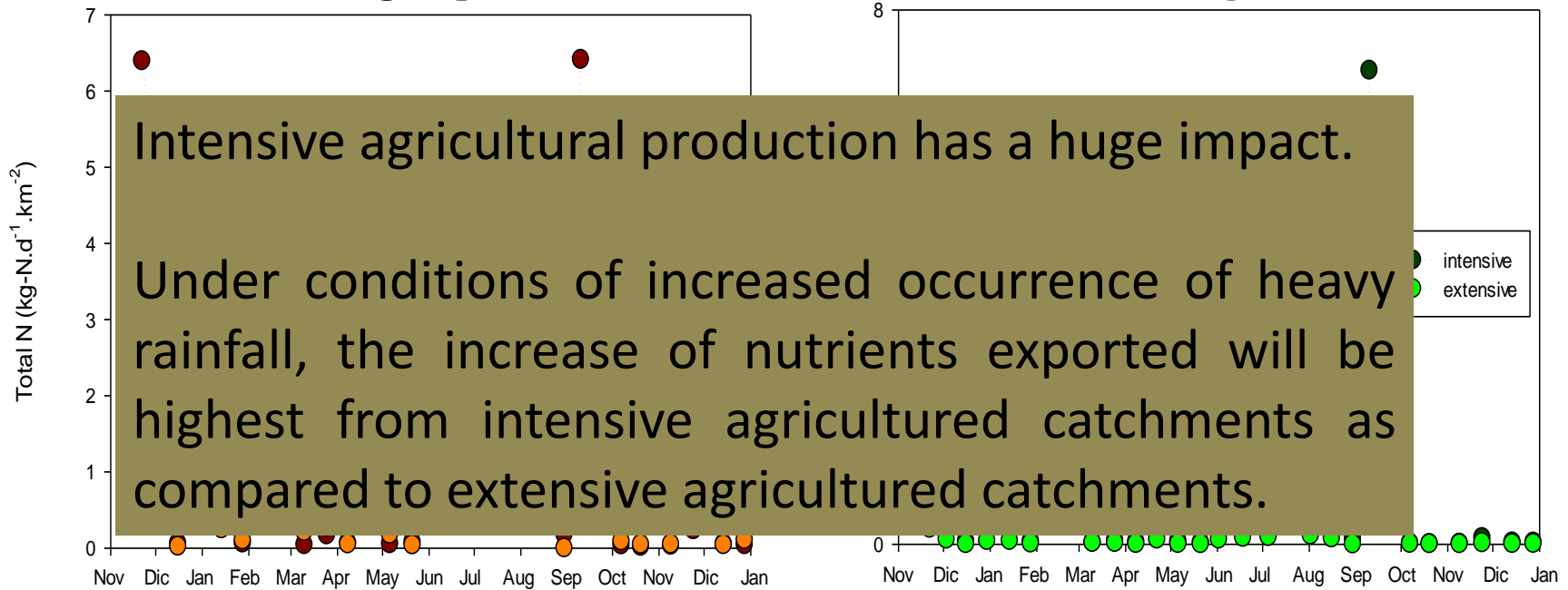
P



First results

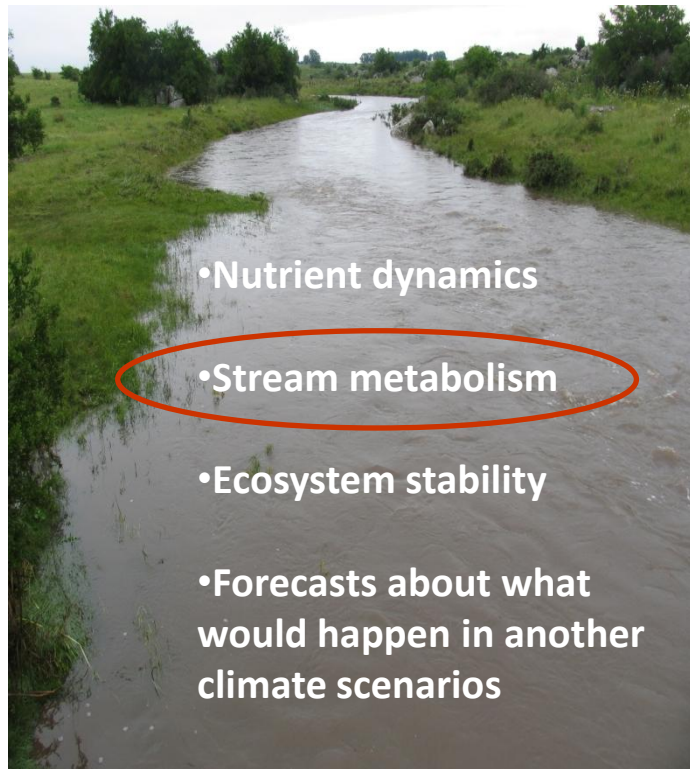
N

P



Methodological approach

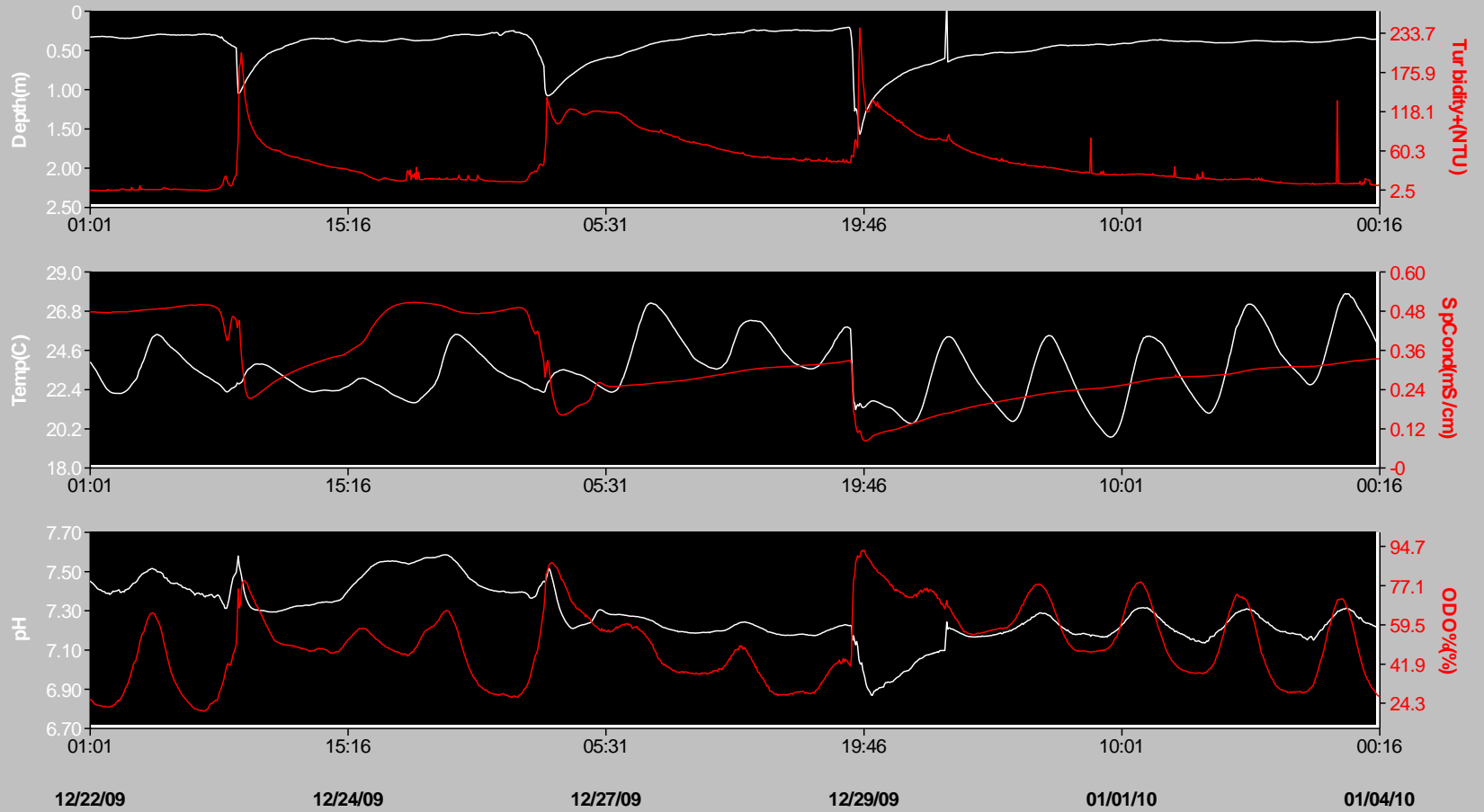
ecosystem functioning
of catchments



Methodological approach

Sitio Agrícola

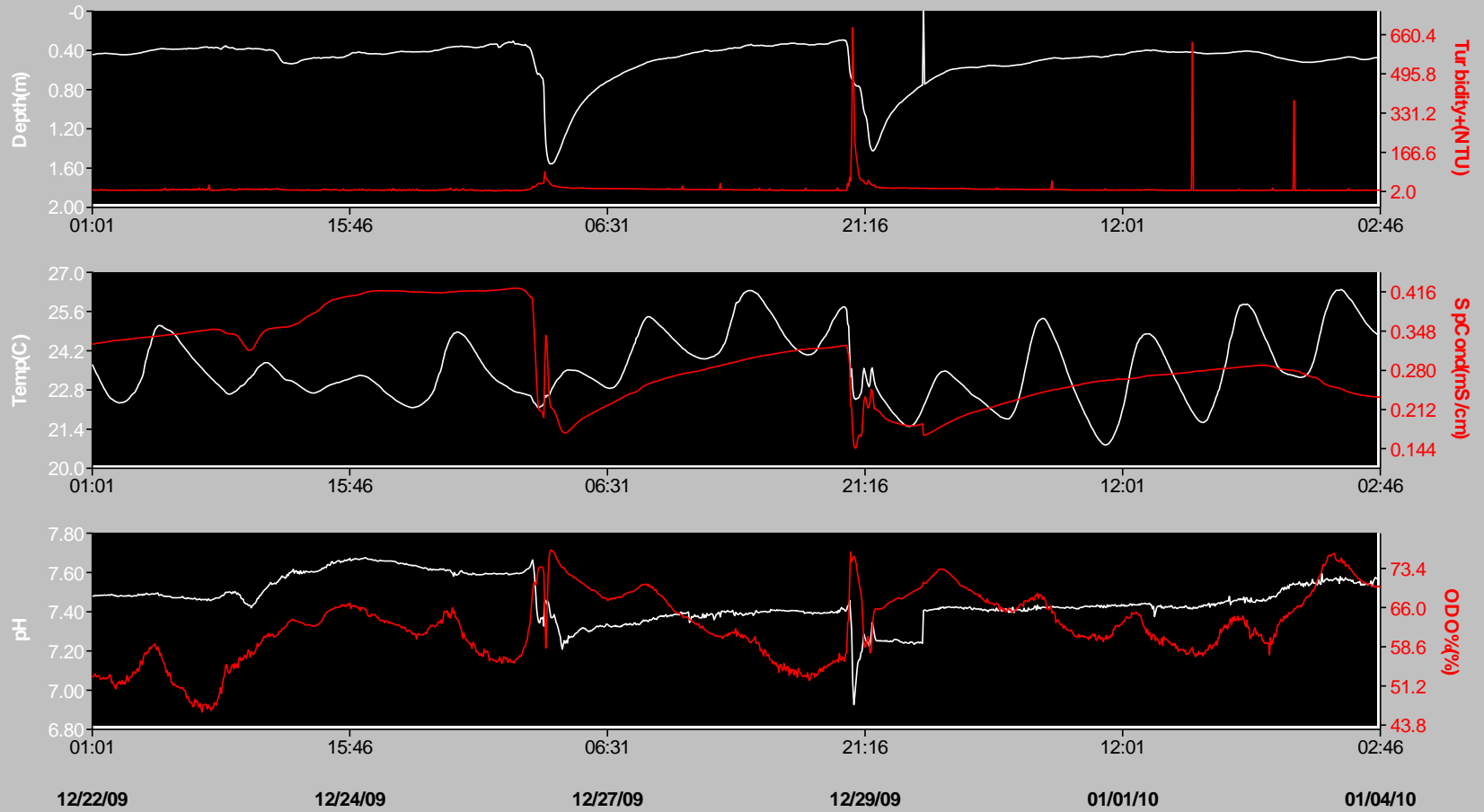
22/12/2009 a 04/01/2010



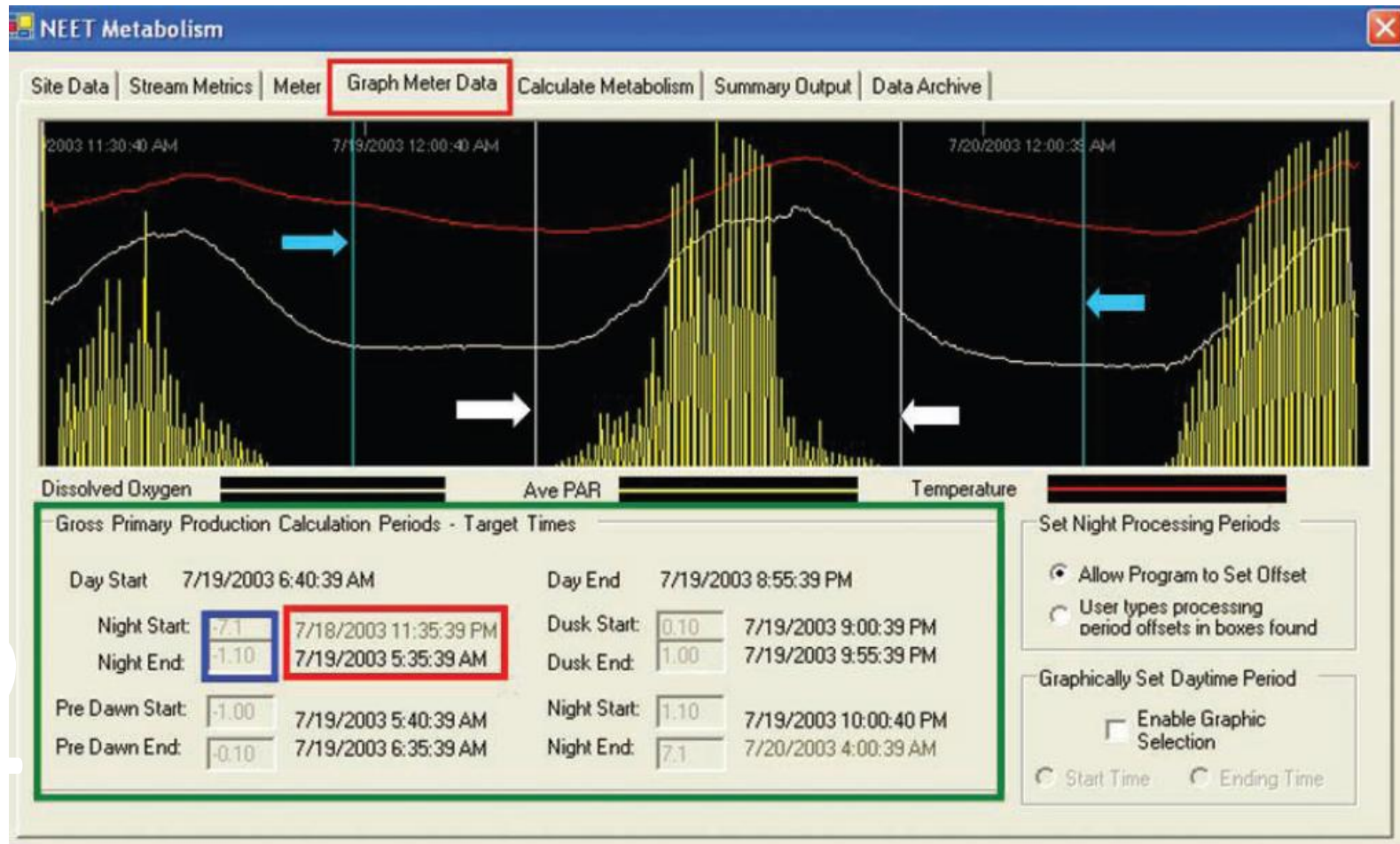
Methodological approach

Sitio Ganadero

22/12/2009 - 04/01/2010

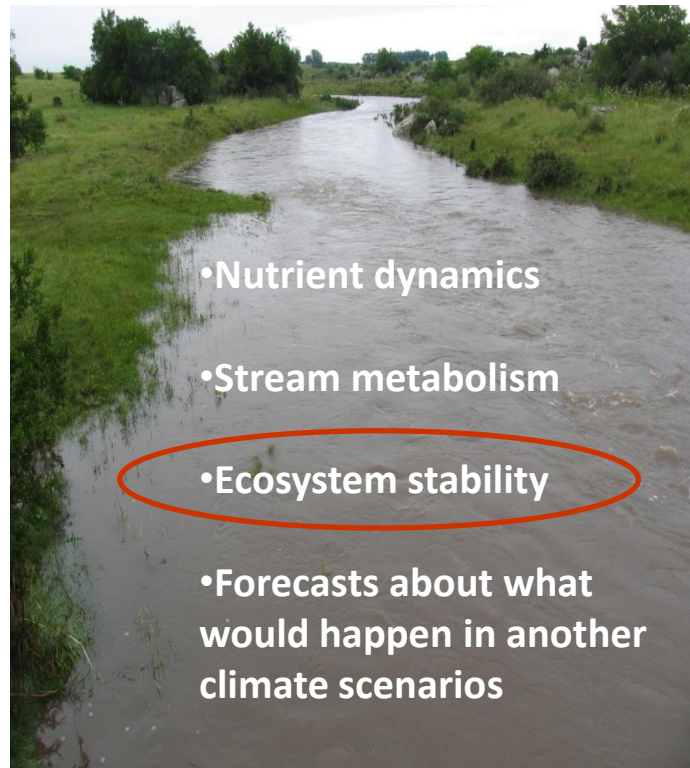


Methodological approach

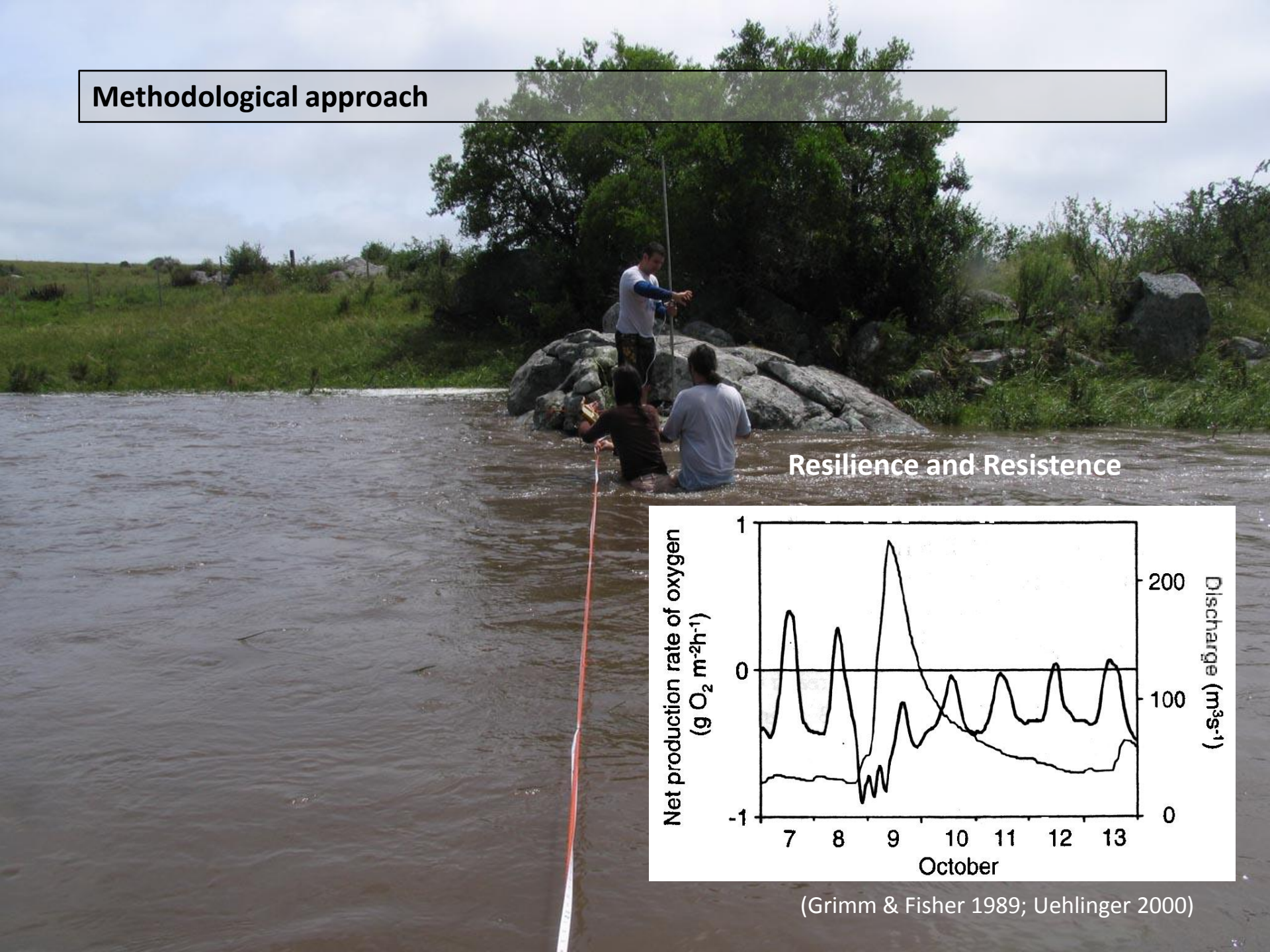


Methodological approach

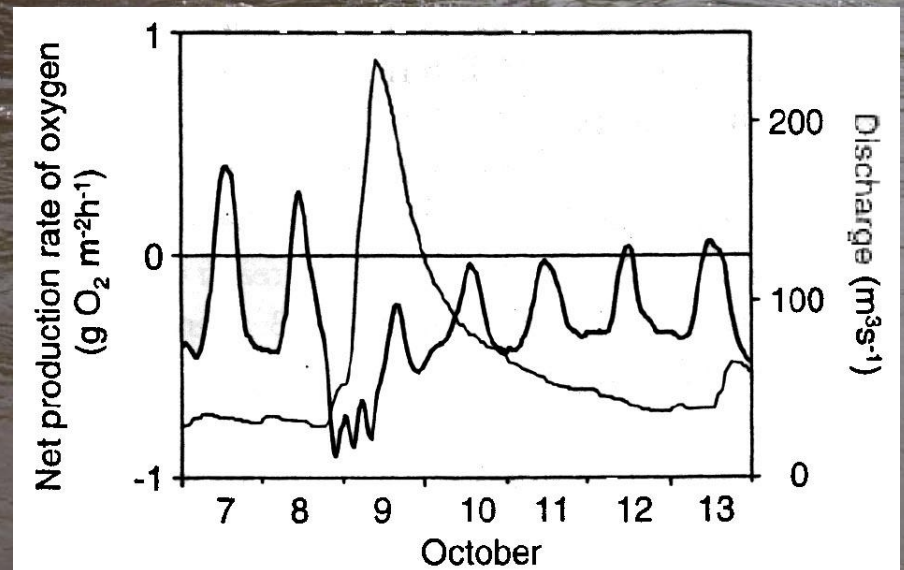
ecosystem functioning
of catchments



Methodological approach



Resilience and Resistance

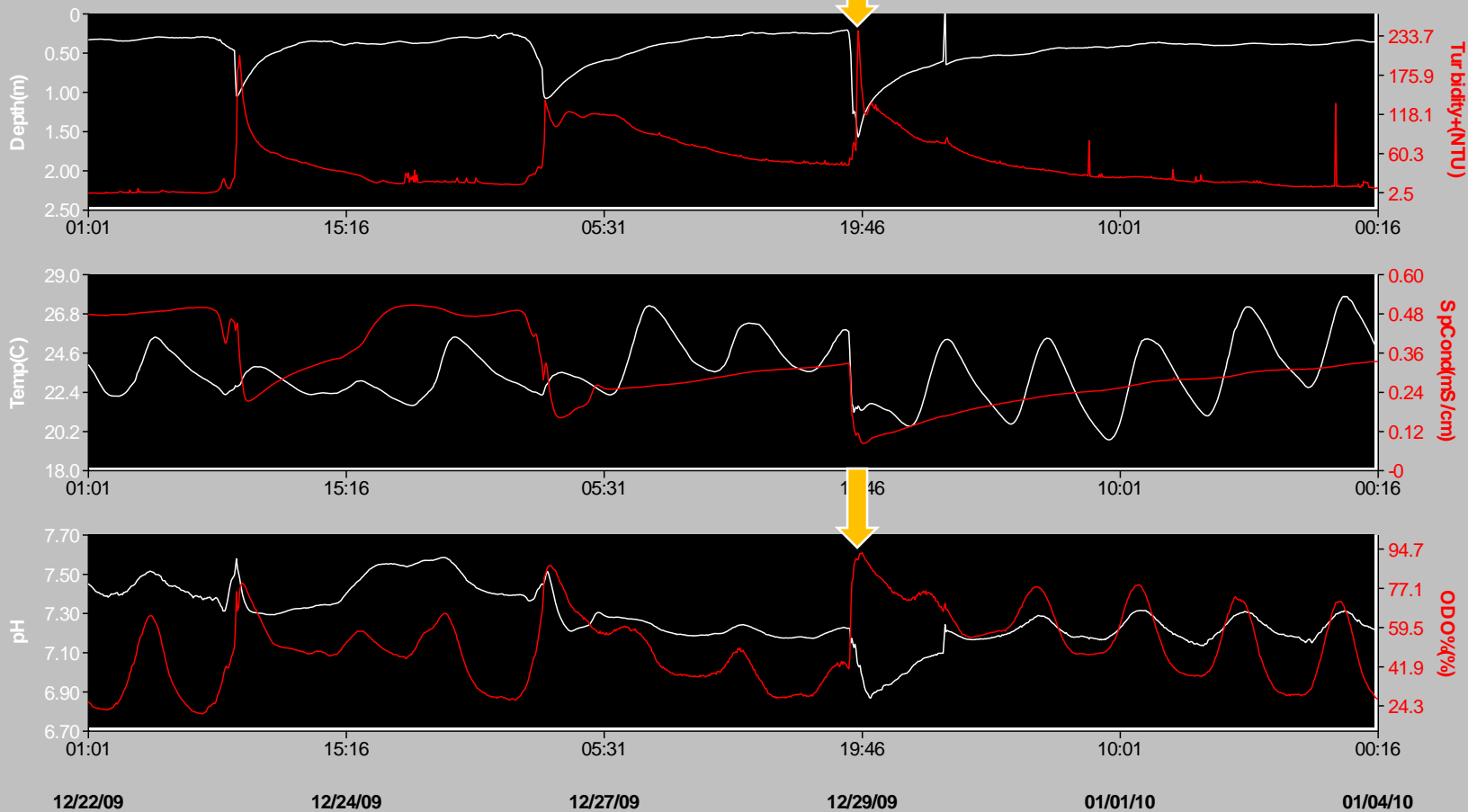


(Grimm & Fisher 1989; Uehlinger 2000)

Methodological approach

Sitio Agrícola

22/12/2009 a 04/01/2010



Methodological approach



Nutrients



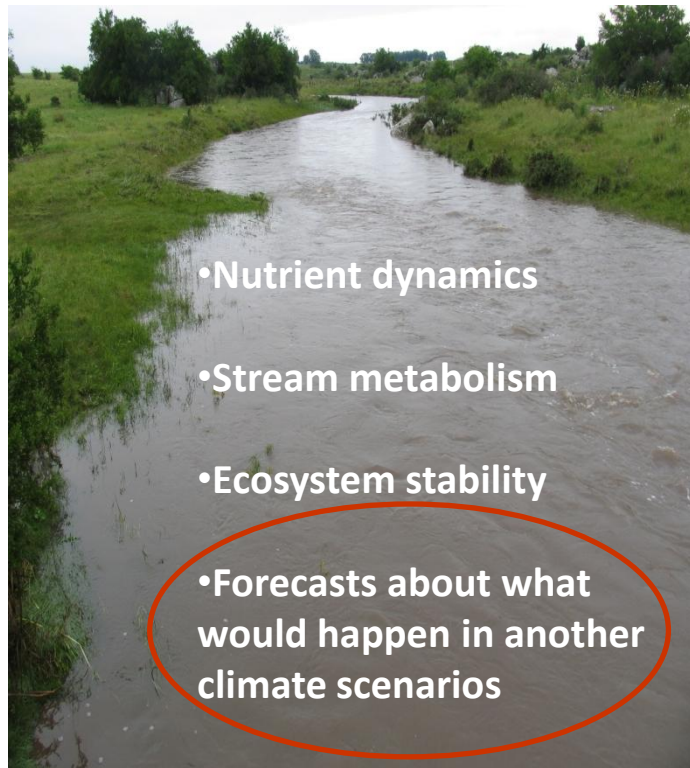
Conservative solute

Spiraling length
Uptake length

(Payn et al 2005)

Methodological approach

ecosystem functioning
of catchments



Methodological approach

- Forecasts about what would happen in another climate scenarios



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DEC 5-9,
2011

[SWAT Workshops, College Station, TX](#)

SWAT for Beginners
Advanced Data Processing for ArcSWAT
SWAT for Advanced Users

MAY 26-31,
2012

[Watershed Technology Conference and Workshop](#)

Improving Water Quality and the Environment
Bari, Italy

JUL 16-20,
2012

[2012 International SWAT Conference](#)

Indian Institute of Technology
New Delhi, India

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Software Updates

[ArcSWAT 2009.93.7b](#) Sep. 9, 2011

For SWAT 2009 and ArcGIS 9.3 SP2
NOTE: [Supplement mdb available](#) if you are experiencing errors updating input files

[SWAT Check](#)  July 22, 2011

Helps to identify POTENTIAL model input parameters issues

[WGN Excel Macro](#)  - [Download Manual](#) 

Used to calculate the weather station statistics needed to create user weather station files for SWAT

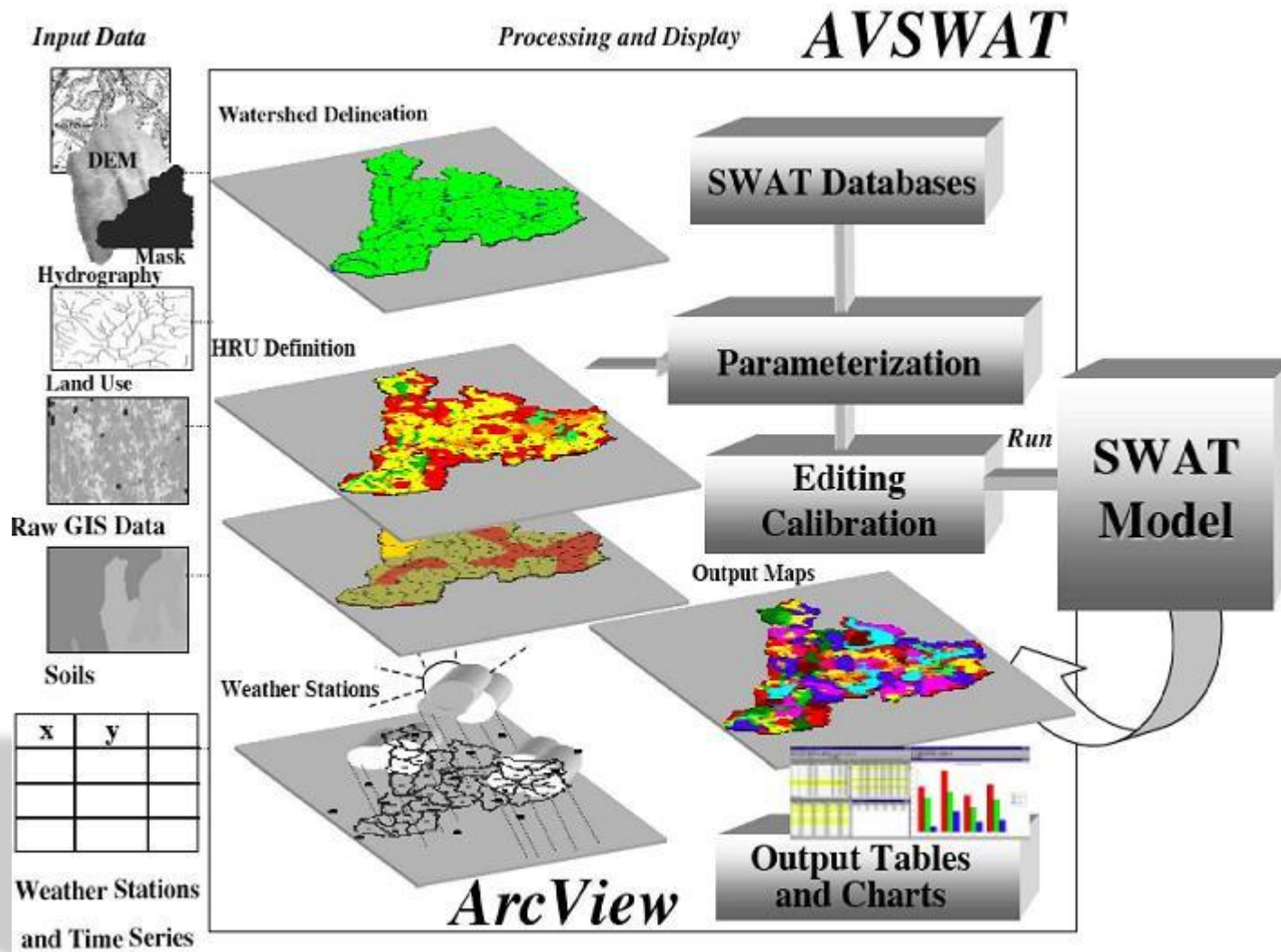
[SWATeditor 2009.93.7a](#) June 19, 2011

Companion to ArcSWAT

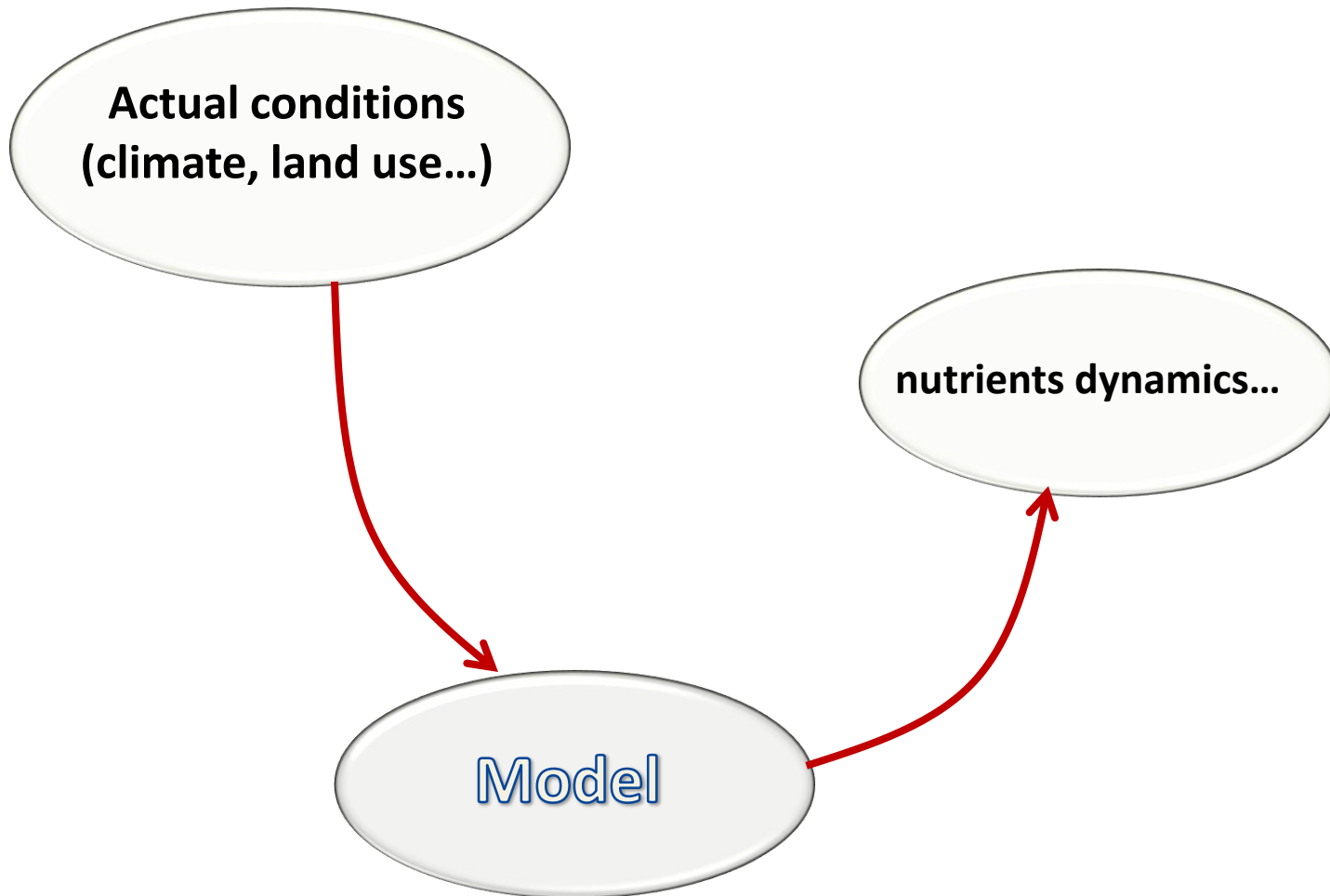
[SWAT2009 rev. 477](#) April 19, 2011

Methodological approach

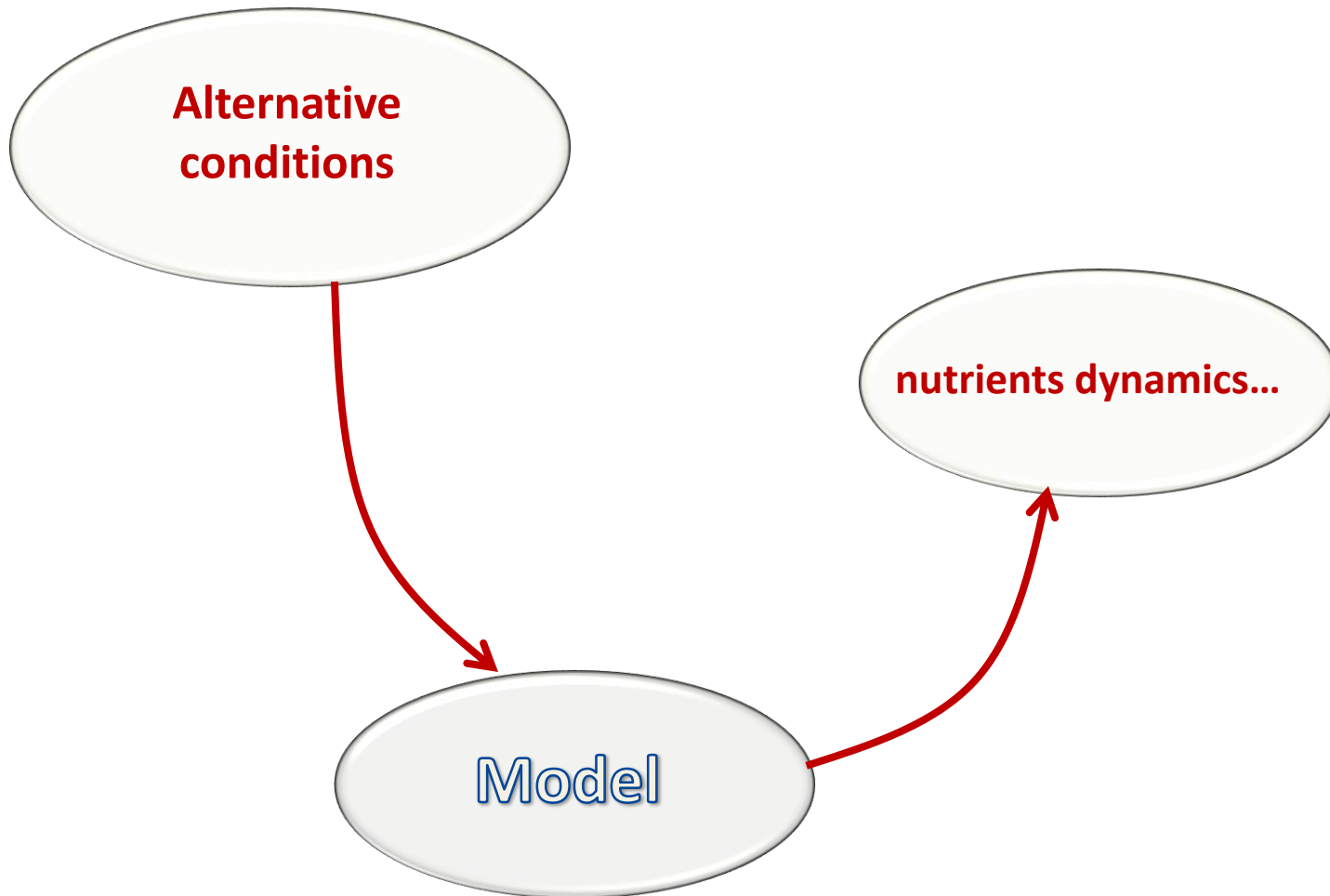
- Forecasts about what would happen in another climate scenarios



First results – nutrients dynamics



First results – nutrients dynamics





iGracias! Thank you!