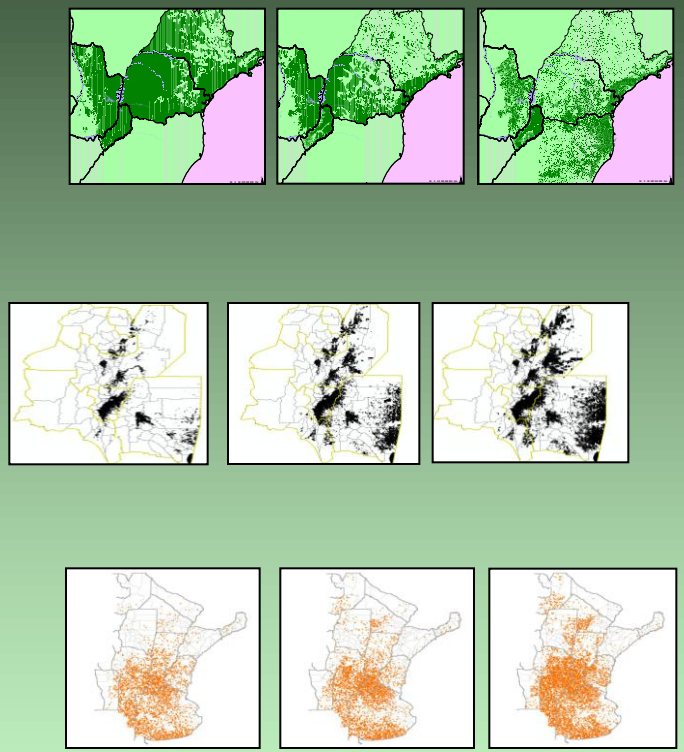
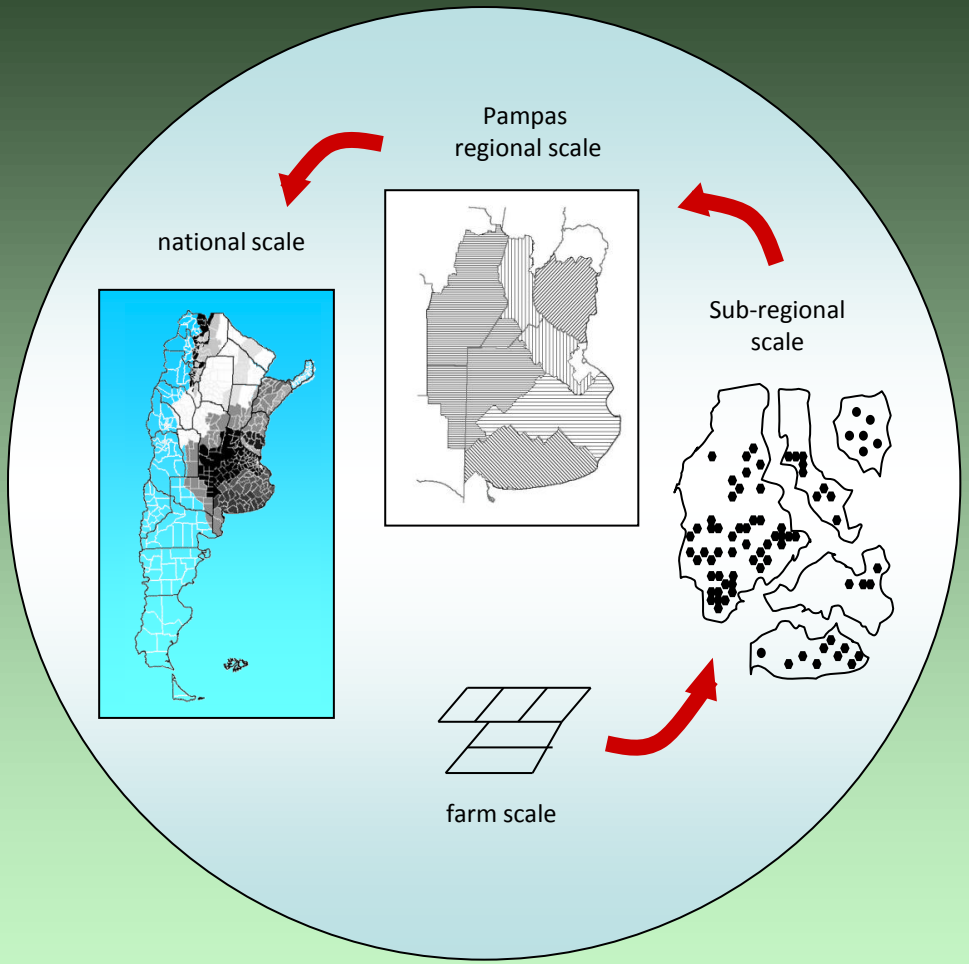
Assessing the environmental impact of agriculture i A 12-year experience in Argentina

ERNESTO F. VIGLIZZO
INTA-CONICET
ARGENTINA

Land-use / land-cover data



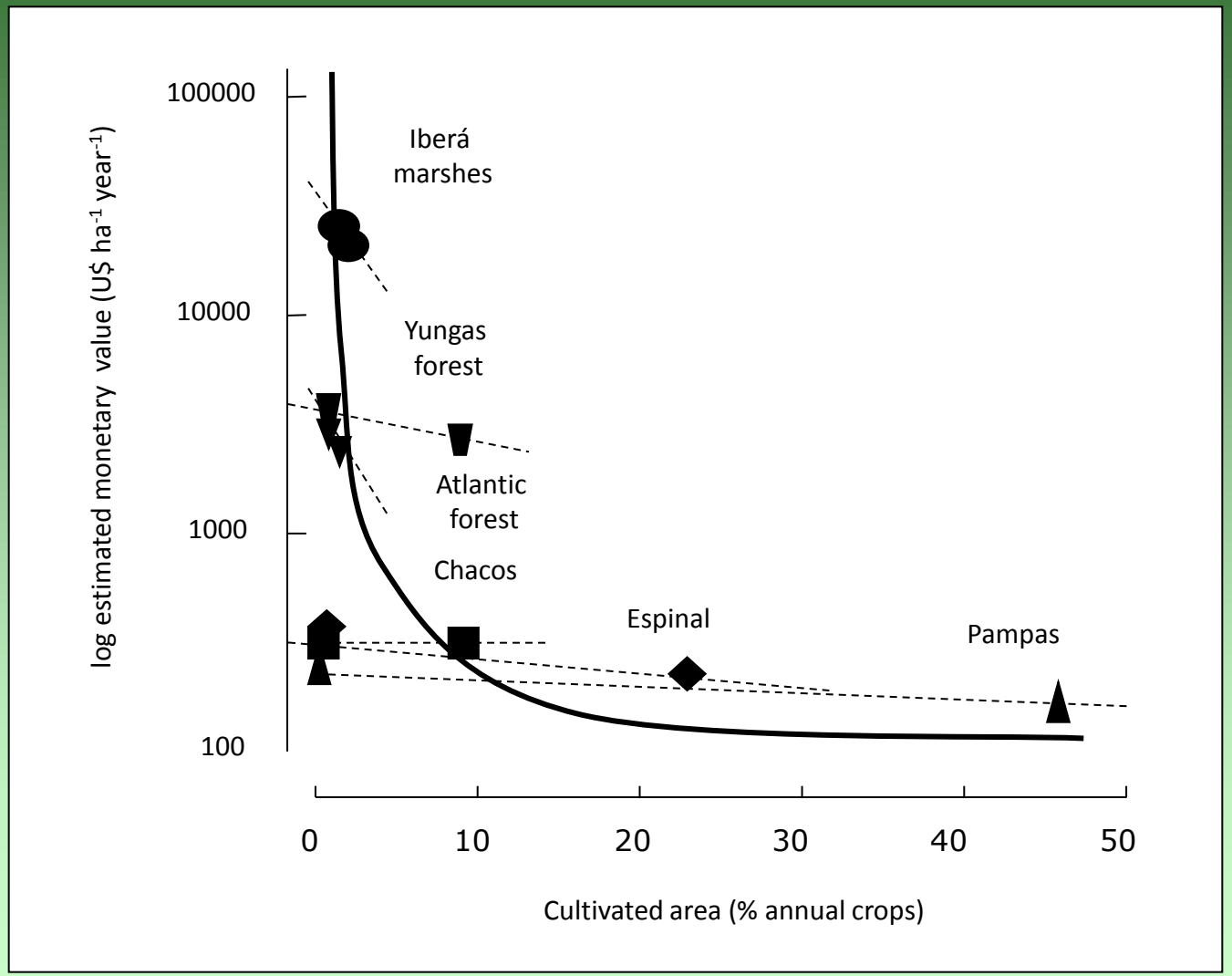
Cross-scale approach



2.33 million km^2, 657 administrative districts and four stages

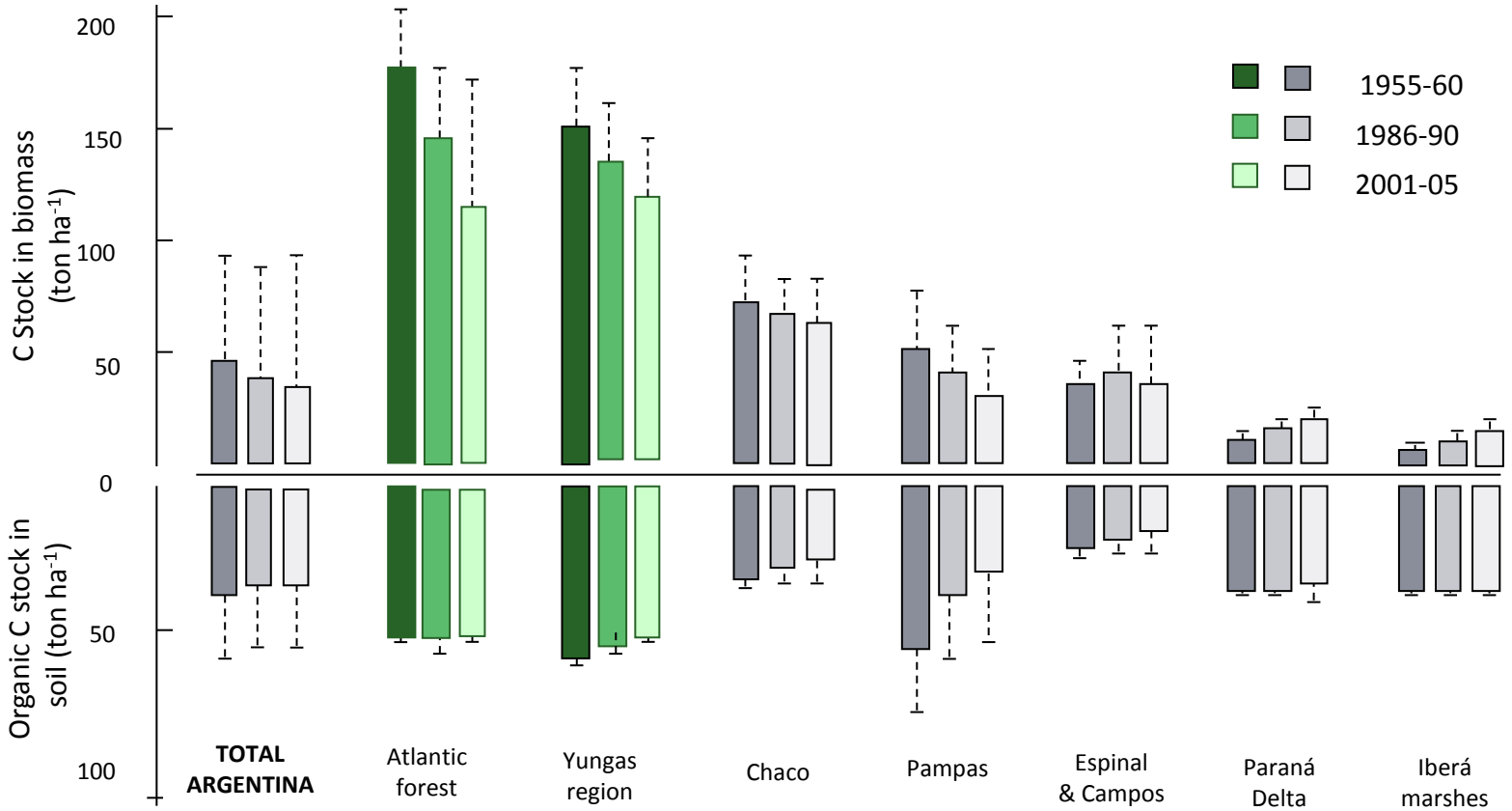
First stage

Monetary valuation (based on values from Costanza et al., 1997)



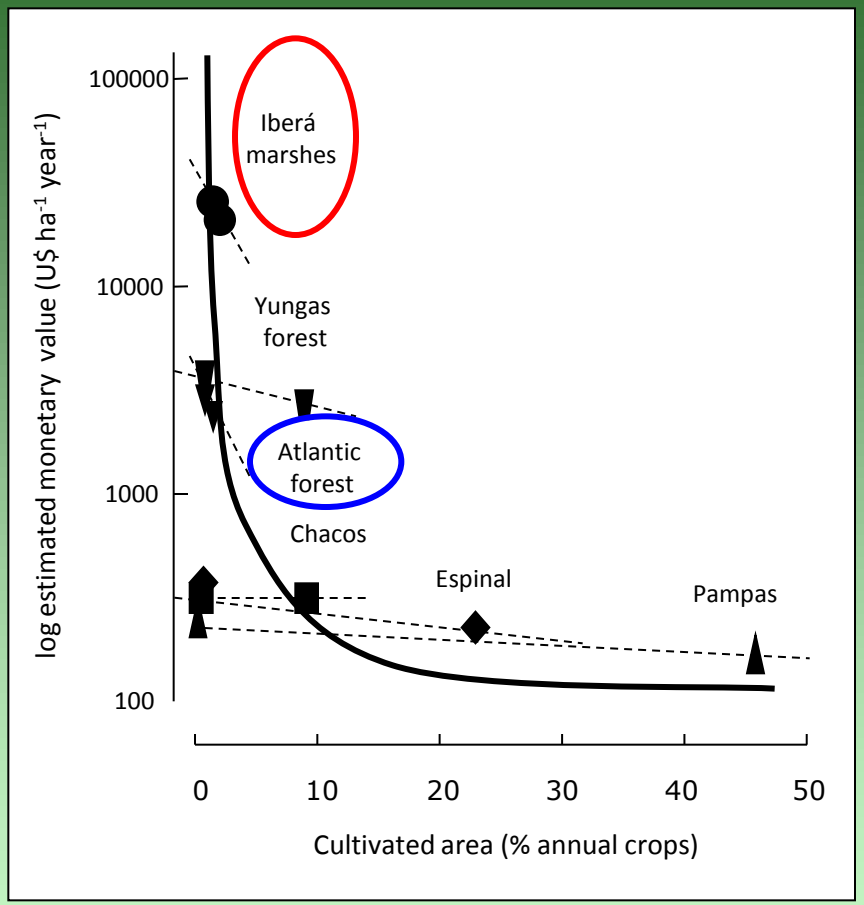
Second Stage

Biophysical valuation: based on changes in carbon stocks and fluxes: above- and below-ground-biomass, NPP, EVI, etc.

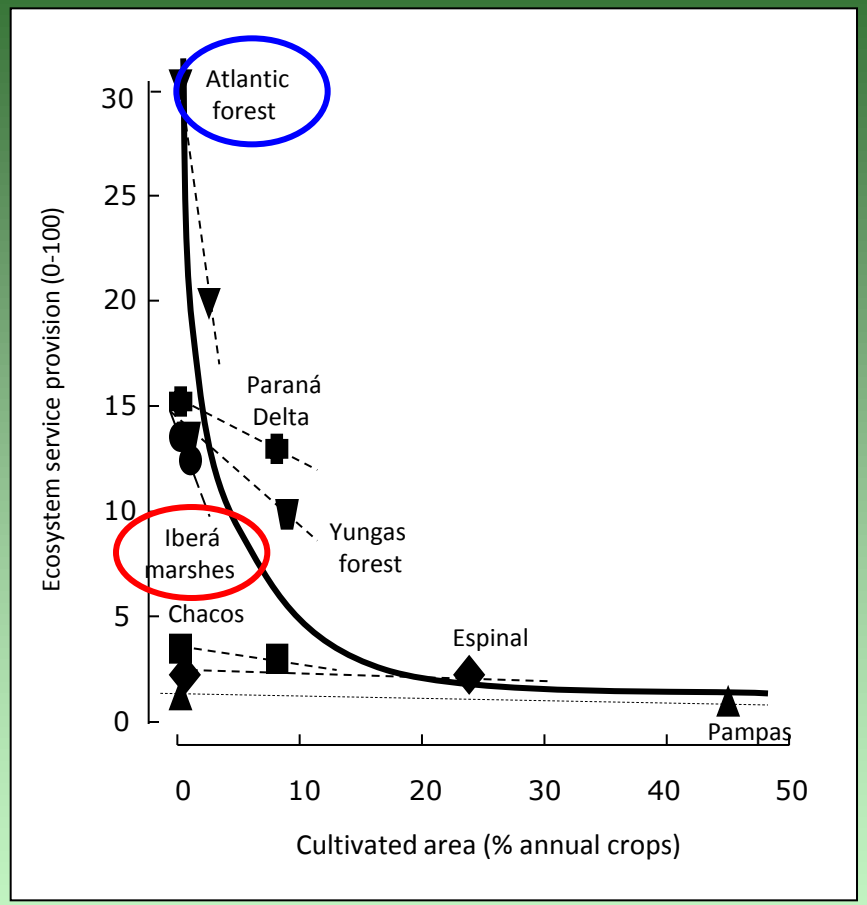


Above- and below-ground carbon stocks in Argentinean ecosystems *(source: Viglizzo et al., 2012).*

Monetary valuation

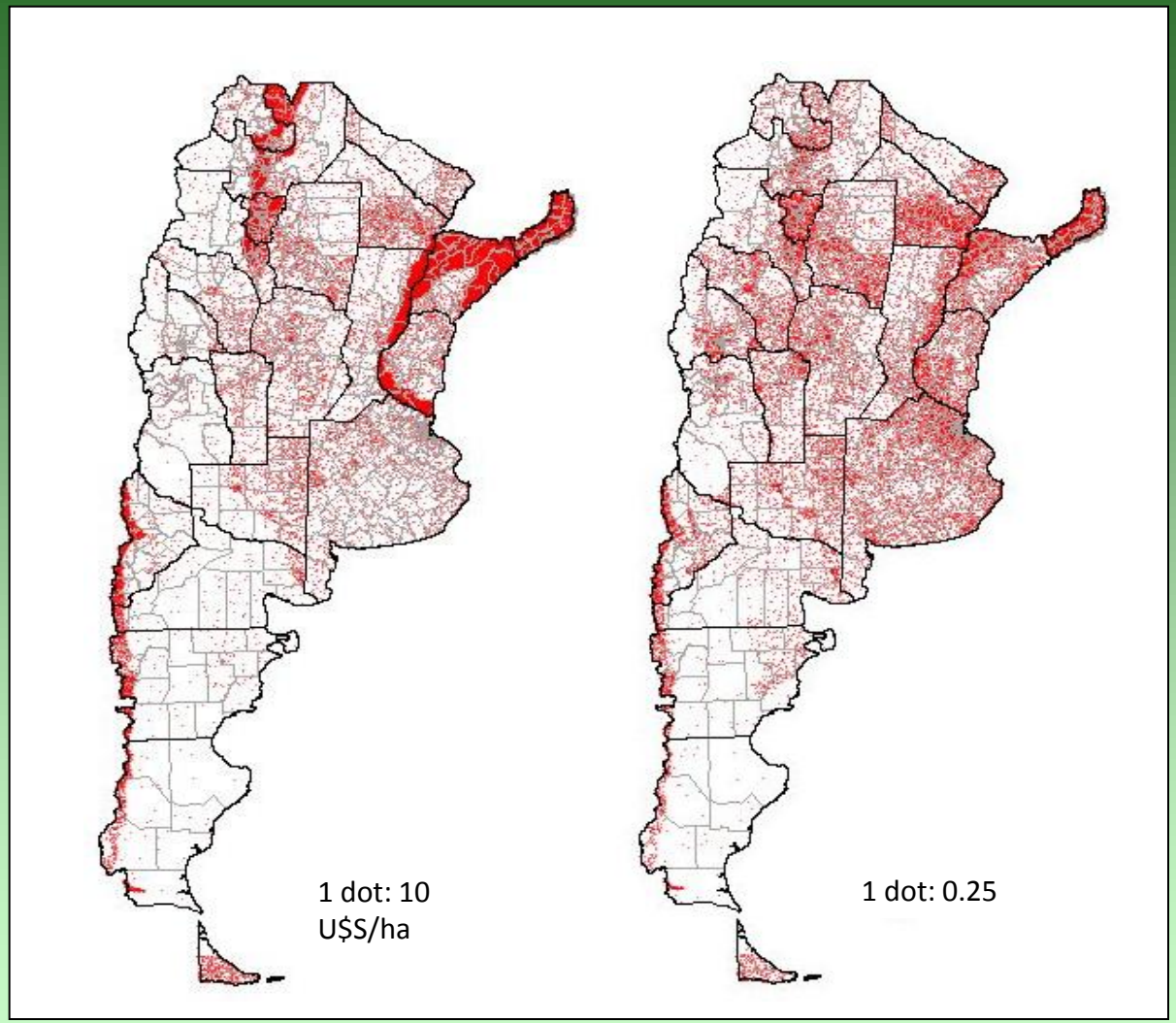


Biophysical valuation



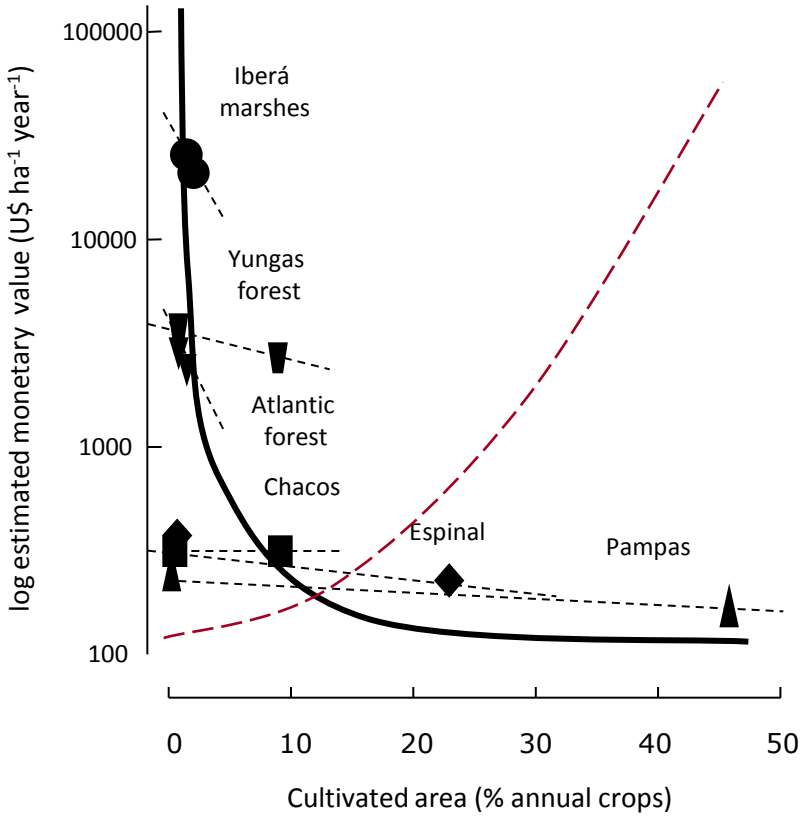
Comparative valuation of ecosystem services

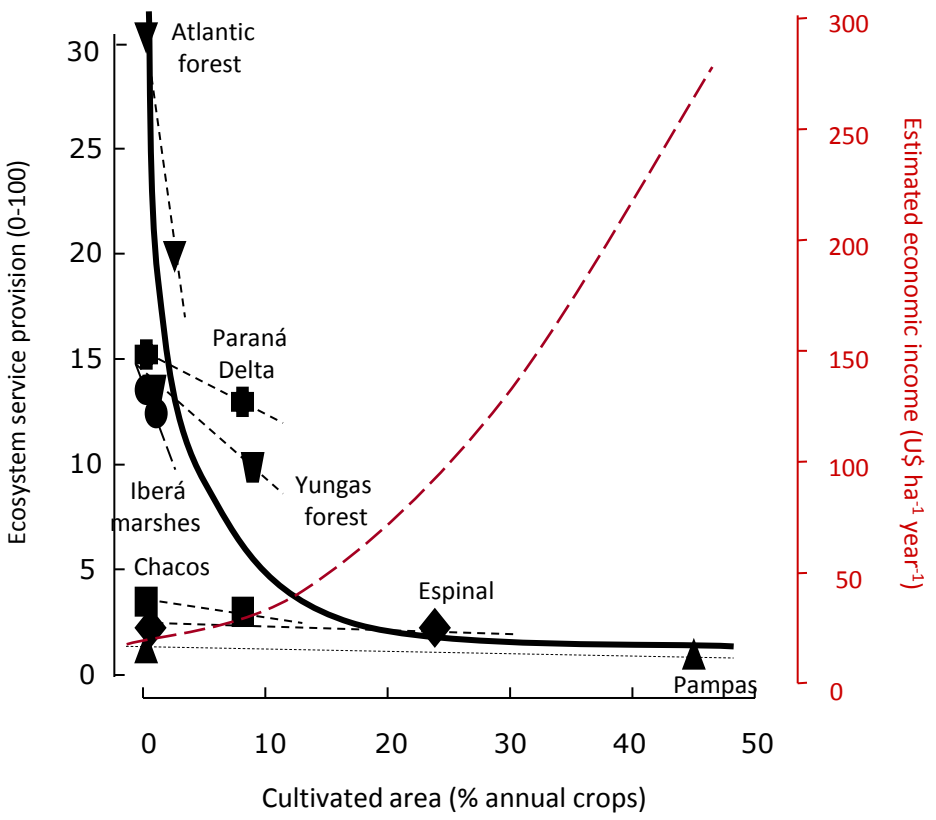
Monetary valuation **Biophysical valuation**



Comparative valuation of ecosystem services (*source: Carreño et al., 2012*).

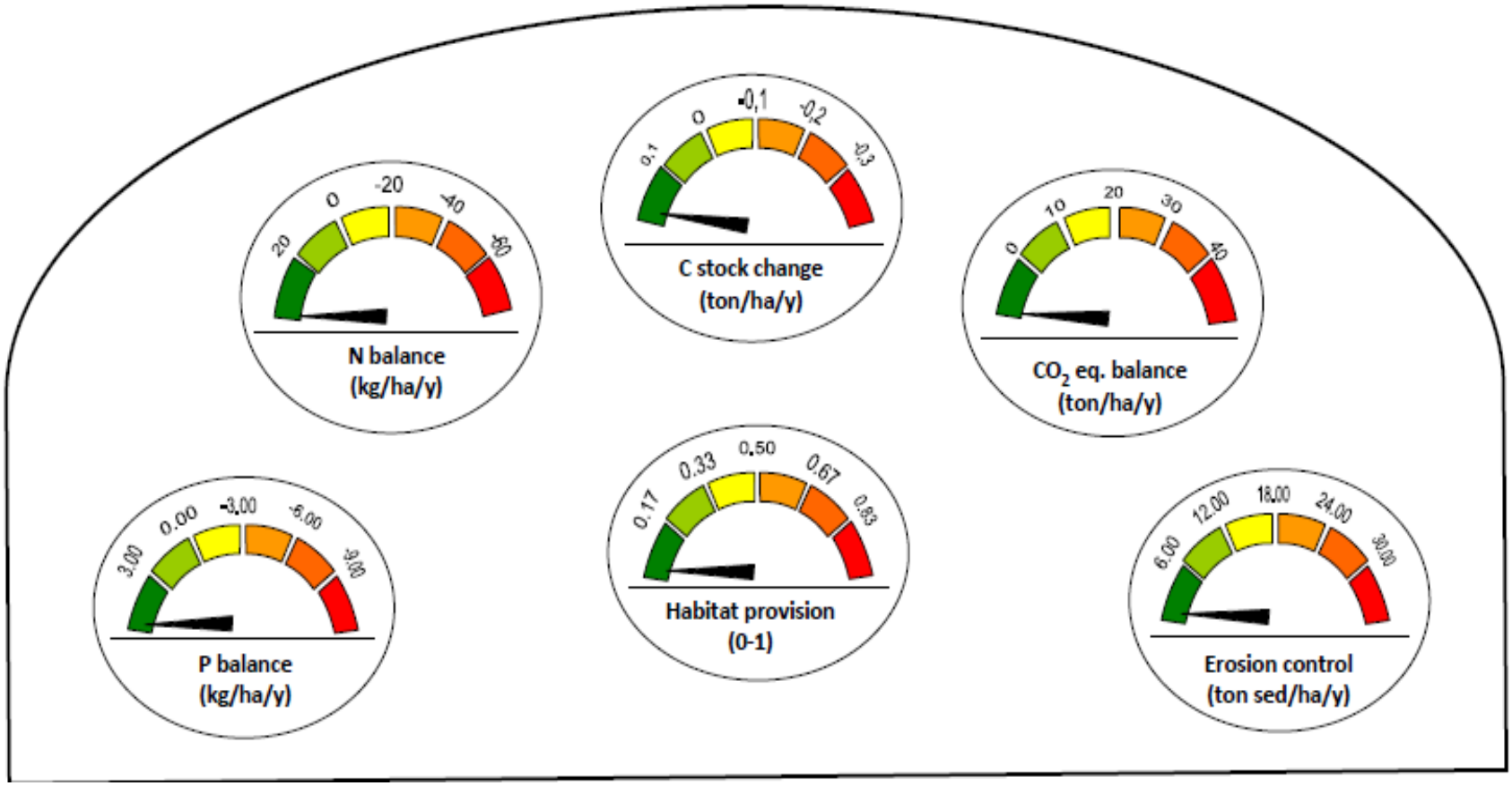
Tradeoffs between ecosystem and economic service provision





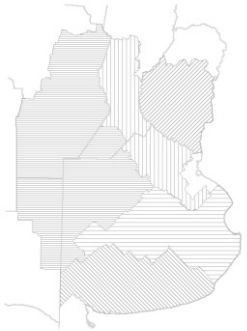
Third stage

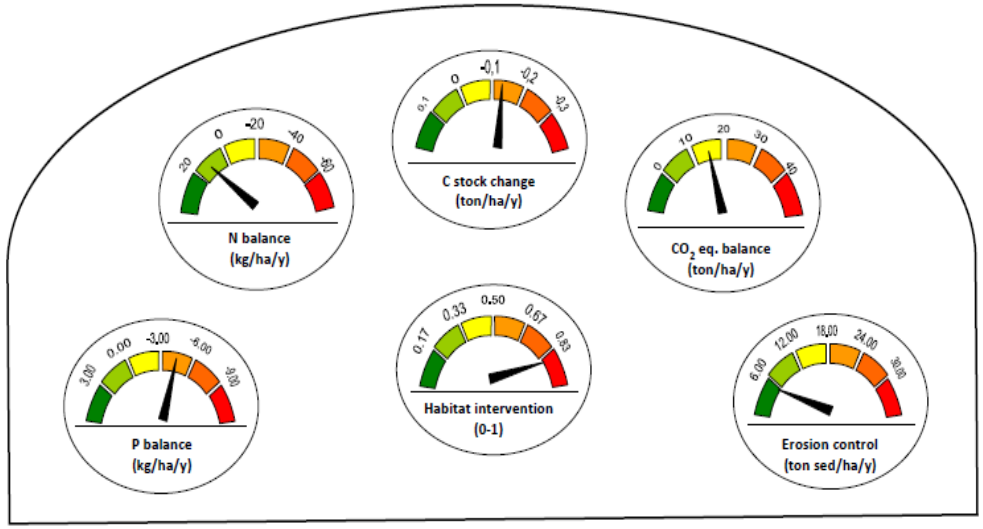
Bio-physical assessment of specific ecosystem services through environmental indicators



national scale

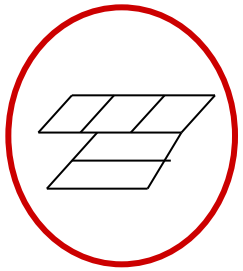
Pampas
regional scale





Sub-regional
scale

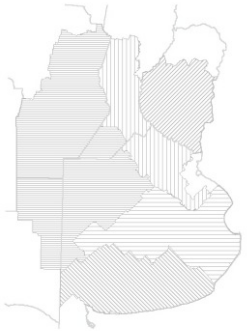
farm scale

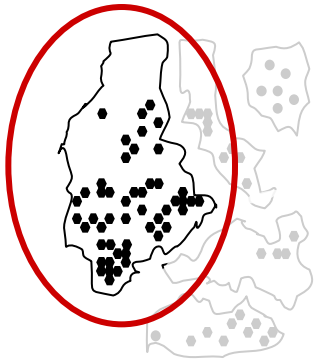


Cross-scale assessment

national scale

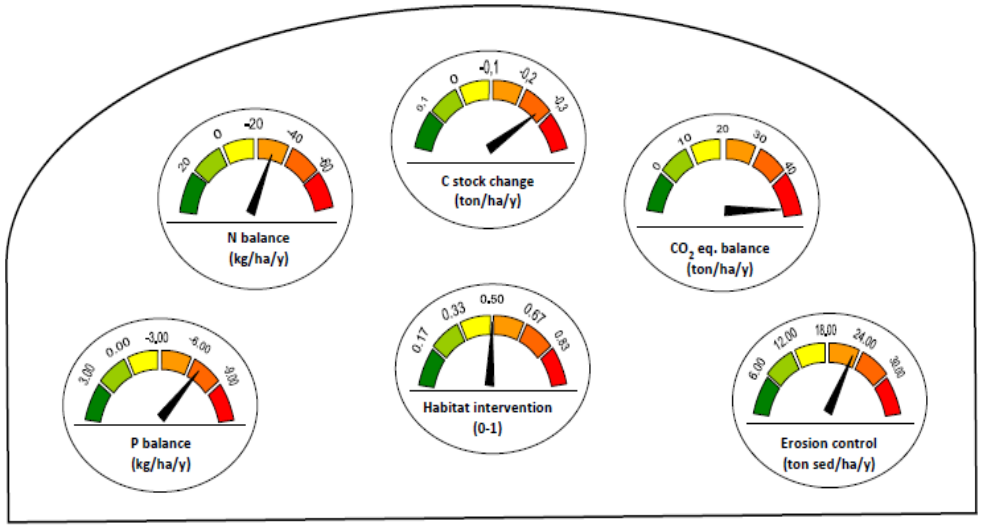
Pampas
regional scale





Sub-regional
scale

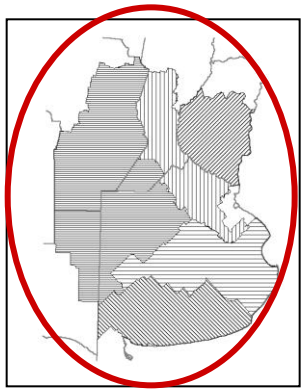
farm scale

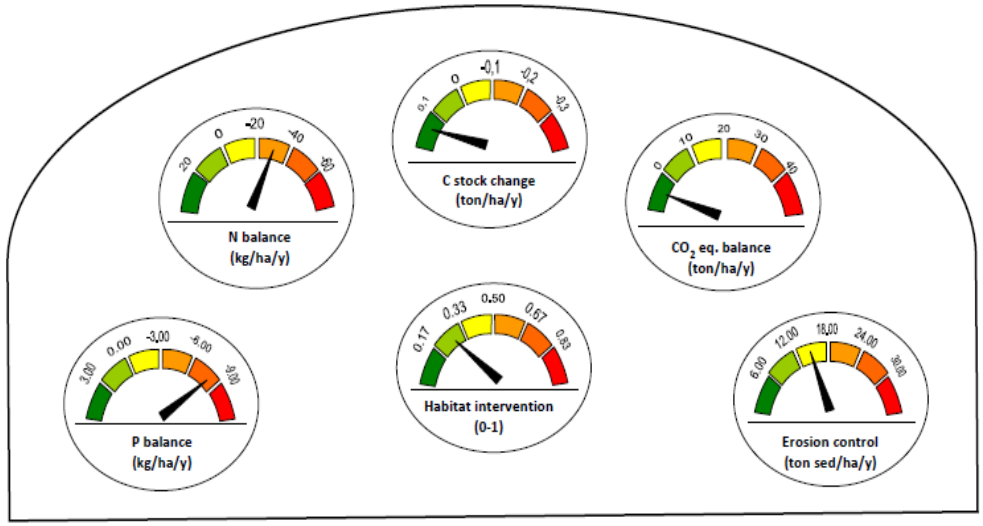


Cross-scale assessment

national scale

Pampas
regional scale



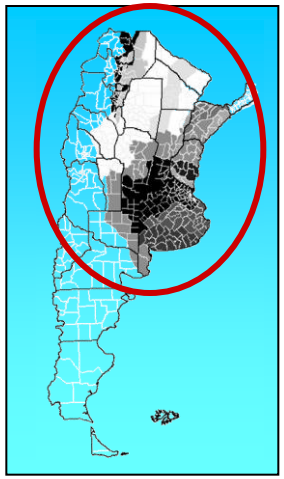


Sub-regional
scale

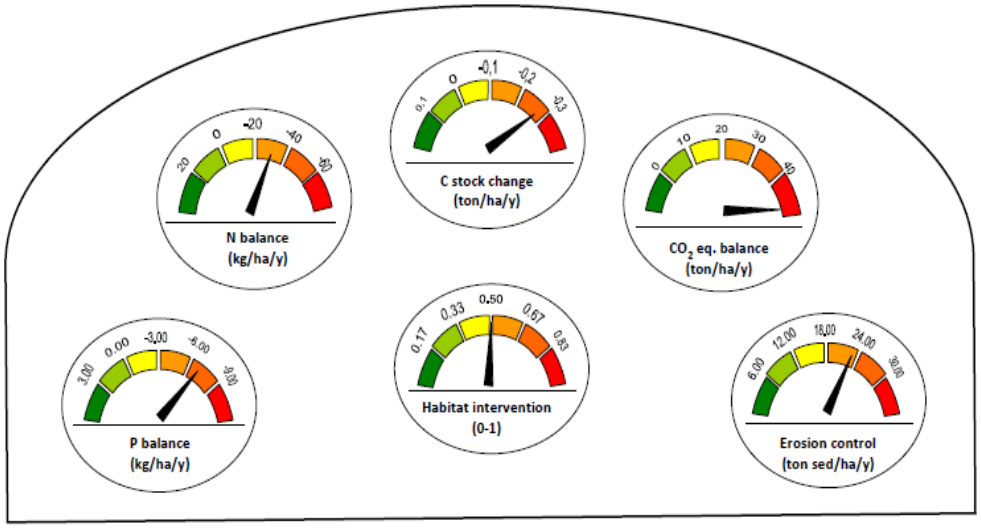
farm scale

Cross-scale assessment

national scale



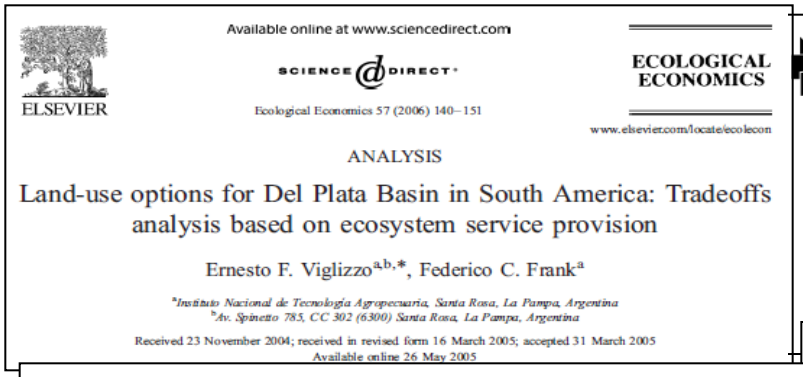
Pampas
regional scale



Sub-regional
scale

farm scale

Cross-scale assessment



Available online at www.sciencedirect.com

SCIENCE DIRECT

ELSEVIER

ECOLOGICAL ECONOMICS

Ecological Economics 57 (2006) 140–151

www.elsevier.com/locate/ecolecon

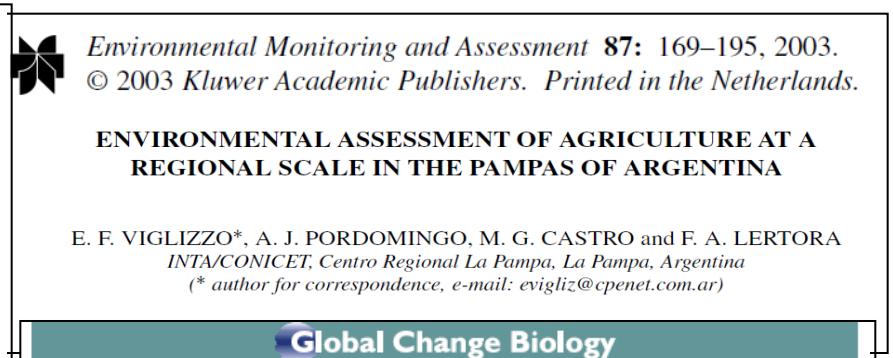
ANALYSIS

Land-use options for Del Plata Basin in South America: Tradeoffs analysis based on ecosystem service provision

Ernesto F. Viglizzo[a,b,*], Federico C. Frank[a]

[a]Instituto Nacional de Tecnología Agropecuaria, Santa Rosa, La Pampa, Argentina
[b]Av. Spinetto 785, CC 302 (6300) Santa Rosa, La Pampa, Argentina

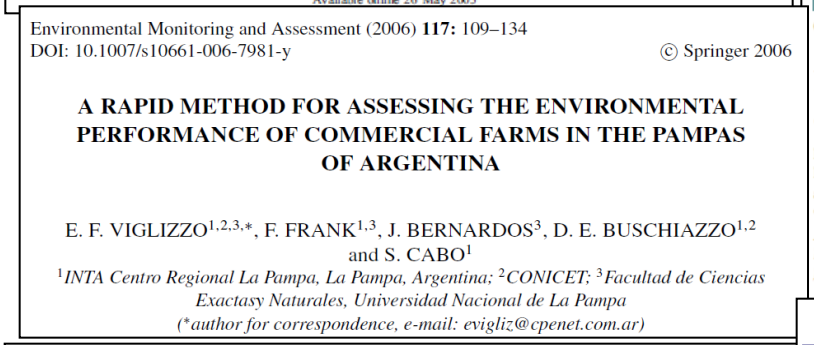
Received 23 November 2004; received in revised form 16 March 2005; accepted 31 March 2005
Available online 26 May 2005



Environmental Monitoring and Assessment **87:** 169–195, 2003.
© 2003 *Kluwer Academic Publishers. Printed in the Netherlands.*

ENVIRONMENTAL ASSESSMENT OF AGRICULTURE AT A REGIONAL SCALE IN THE PAMPAS OF ARGENTINA

E. F. VIGLIZZO*, A. J. PORDOMINGO, M. G. CASTRO and F. A. LERTORA
INTA/CONICET, Centro Regional La Pampa, La Pampa, Argentina
(author for correspondence, e-mail: evigliz@cpenet.com.ar)*



Environmental Monitoring and Assessment (2006) **117:** 109–134
DOI: 10.1007/s10661-006-7981-y

© Springer 2006

A RAPID METHOD FOR ASSESSING THE ENVIRONMENTAL PERFORMANCE OF COMMERCIAL FARMS IN THE PAMPAS OF ARGENTINA

E. F. VIGLIZZO[1,2,3,*], F. FRANK[1,3], J. BERNARDOS[3], D. E. BUSCHIAZZO[1,2] and S. CABO[1]

[1]*INTA Centro Regional La Pampa, La Pampa, Argentina;* [2]*CONICET;* [3]*Facultad de Ciencias Exactasy Naturales, Universidad Nacional de La Pampa*
*(*author for correspondence, e-mail: evigliz@cpenet.com.ar)*

Global Change Biology

Global Change Biology (2011) **17**, 959–973, doi: 10.1111/j.1365-2486.2010.02293.x

Ecological and environmental footprint of 50 years of agricultural expansion in Argentina

ERNESTO F. VIGLIZZO*†‡, FEDERICO C. FRANK*‡, LORENA V. CARREÑO*, ESTEBAN G. JOBBÁGY§, HERNÁN PEREYRA*, JONATHAN CLATT‡, DANIEL PINCÉN‡ and M. FLORENCIA RICARD‡

INTA, EEA Anguil, Grupo de Investigaciones en Gestión Ambiental (GIGA), Av. Spinetto 785, 6300 Santa Rosa, La Pampa, Argentina, †INCITAP-CONICET, Ruta 35, km 335, 6300 Santa Rosa, La Pampa, Argentina, ‡UNLPam, Facultad de Ciencias Exactas y Naturales, Av. Uruguay 151, 6300 Santa Rosa, La Pampa, Argentina, §Grupo de Estudios Ambientales IMASL-CONICET, Ejército de los Andes 950, 5700 San Luis, San Luis, Argentina

Agriculture, Ecosystems and Environment 154 (2012) 78–84

Contents lists available at ScienceDirect

Agriculture, Ecosystems and Environment

journal homepage: www.elsevier.com/locate/agee

ELSEVIER

Ecosystem service evaluation to support land-use policy

E.F. Viglizzo[a,b,c,*], J.M. Paruelo[d], P. Laterra[e,f], E.G. Jobbágy[g]

[a] INTA, EEA Anguil, Grupo de Investigaciones en Gestión Ambiental (GIGA), Av. Spinetto 785, 6300 Santa Rosa, La Pampa, Argentina
[b] INCITAP-CONICET, Ruta 35, km 335, 6300 Santa Rosa, La Pampa, Argentina
[c] UNLPam, Facultad de Ciencias Exactas y Naturales, Av. Uruguay 151, 6300 Santa Rosa, La Pampa, Argentina
[d] Laboratorio de Análisis Regional y Teledetección, Departamento de Métodos Cuantitativos Sistemas de información, Facultad de Agronomía and IFEVA, Universidad de Buenos Aires and CONICET, Avda. San Martín, 4453 Buenos Aires, 1417, Argentina
[e] Unidad Integrada Balcarce: EEA Balcarce, Instituto Nacional de Tecnología Agropecuaria, Facultad de Ciencias Agrarias, Universidad Nacional de Mar del Plata, CC 276, 7620 Balcarce, Argentina
[f] CONICET, Andes 950, 5700, San Luis, San Luis, Argentina
[g] Grupo de Estudios Ambientales IMASL, Ejército de los, Andes 950, 5700, San Luis, San Luis, Argentina

Agriculture, Ecosystems and Environment 154 (2012) 68–77

Contents lists available at ScienceDirect

Agriculture, Ecosystems and Environment

journal homepage: www.elsevier.com/locate/agee

ELSEVIER

Tradeoffs between economic and ecosystem services in Argentina during 50 years of land-use change

L. Carreño[a,*], F.C. Frank[a,b], E.F. Viglizzo[a,b,c]

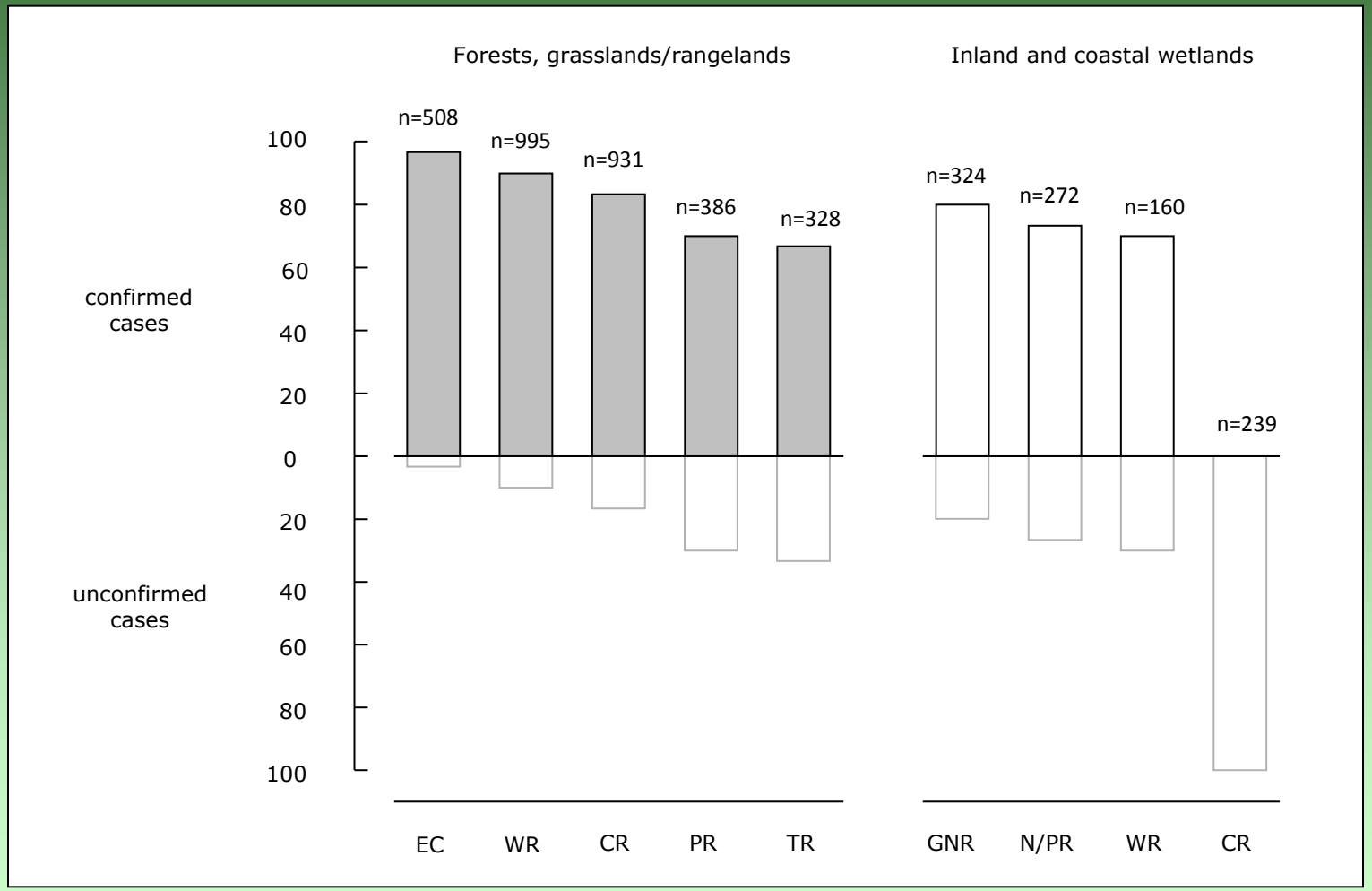
[a] INTA, EEA Anguil, Grupo de Investigaciones en Gestión Ambiental (GIGA), Av. Spinetto 785, 6300 Santa Rosa, La Pampa, Argentina
[b] UNLPam, Facultad de Ciencias Exactas y Naturales, Av. Uruguay 151, 6300 Santa Rosa, La Pampa, Argentina
[c] INCITAP-CONICET, Ruta 35, km 335, 6300 Santa Rosa, La Pampa, Argentina

Supporting literature

Fourth stage

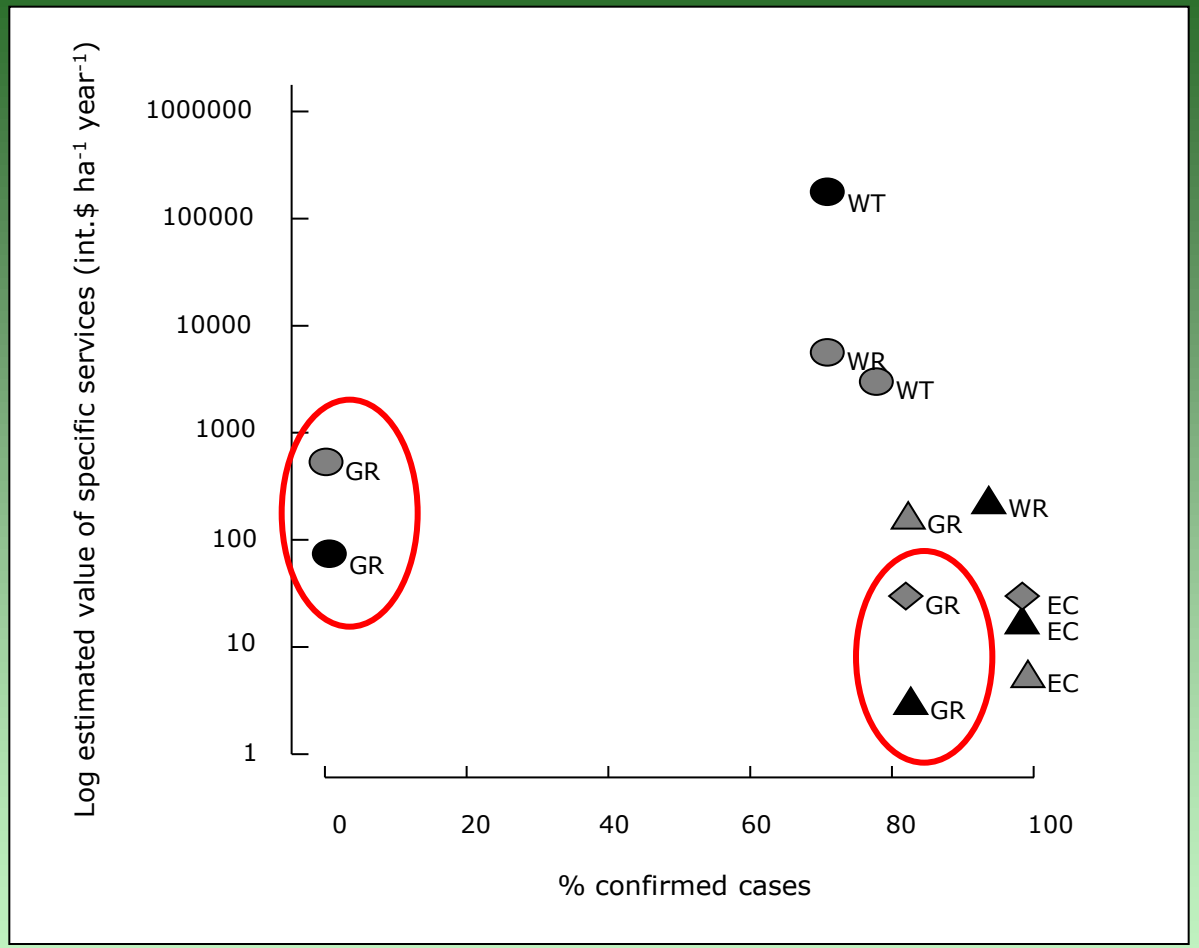
Are all ecosystem services well supported by science?

More than 4000 cases in total provided by
29 meta-analysis and 23 review articles



References: EC. Erosion control , WR. water flow regulation, CR. Climate regulation, PR. precipitation regulation, TR. Temperature regulation. GNR. gaseous N removal, N/PR. Nitrogen and phosphorus retention by riparian plants.

Is monetary valuation scientifically sound?



Relationships among scientifically confirmed cases and the average economic value (2007 price levels) of specific services according to data by De Groot et al. (2012). References: EC. Erosion control , WR. water flow regulation, GR. Gases regulation, PR. precipitation regulation, TR. Temperature regulation. GNR. gaseous N removal, N/PR. Nitrogen and phosphorus retention by riparian plants

What have we learned after 12 years of assessing ecosystems services in Argentina?

Four conclusions

The value of some essential ecosystem services can differ substantially when they are assessed through monetary or biophysical methods.

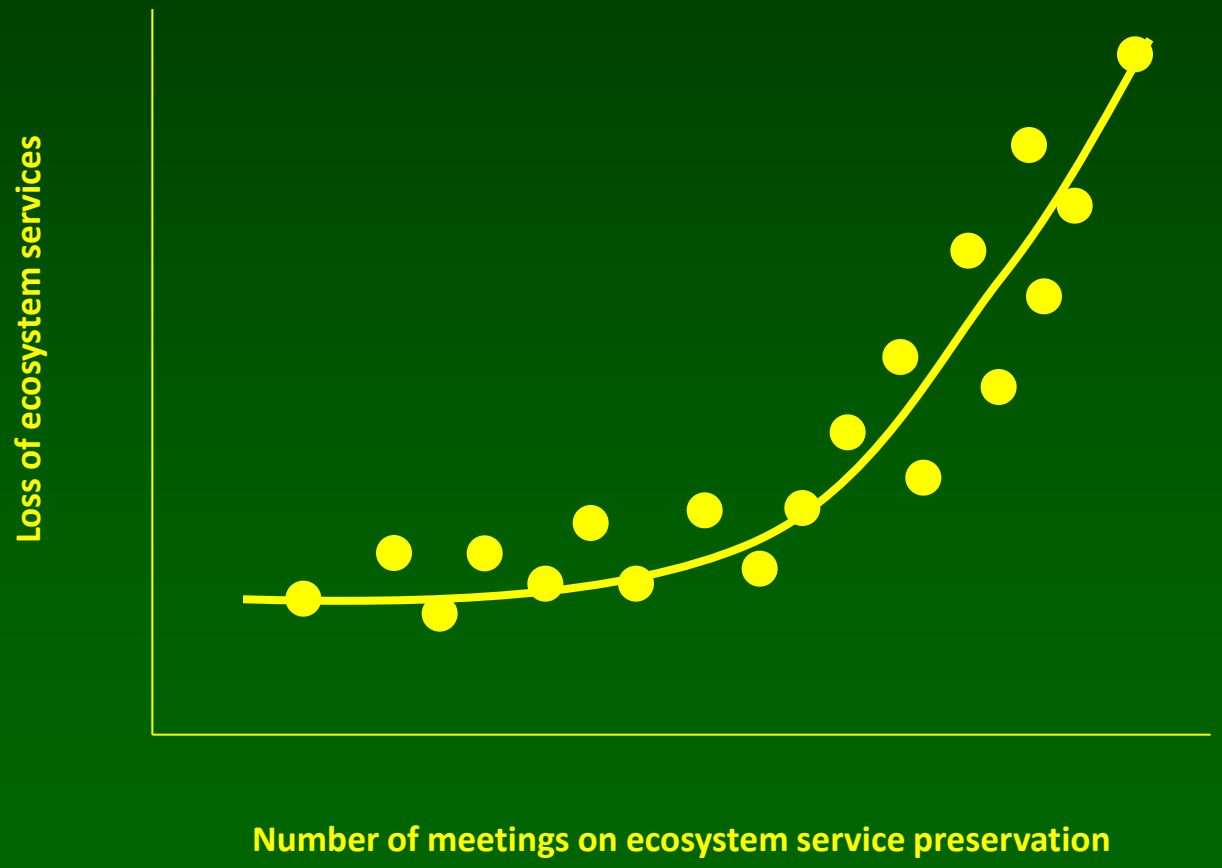
Some ecological principles that lie behind the notion of ecosystem service are not fully supported by scientific knowledge.

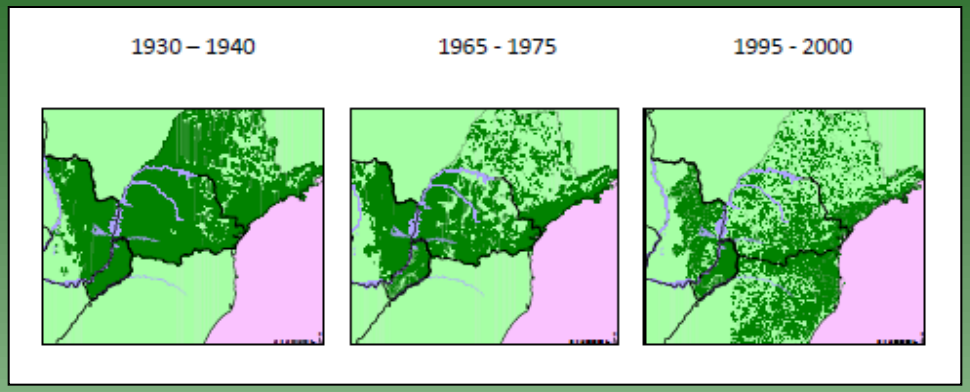
Not always the results of the monetary valuation of ecosystem services are supported by sound scientific evidence.

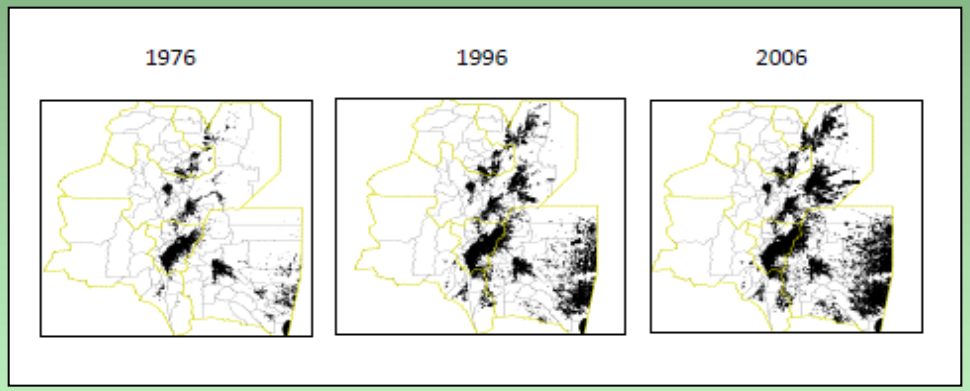
In general, private organizations in Argentina paid more attention to our outcomes than governmental agencies.

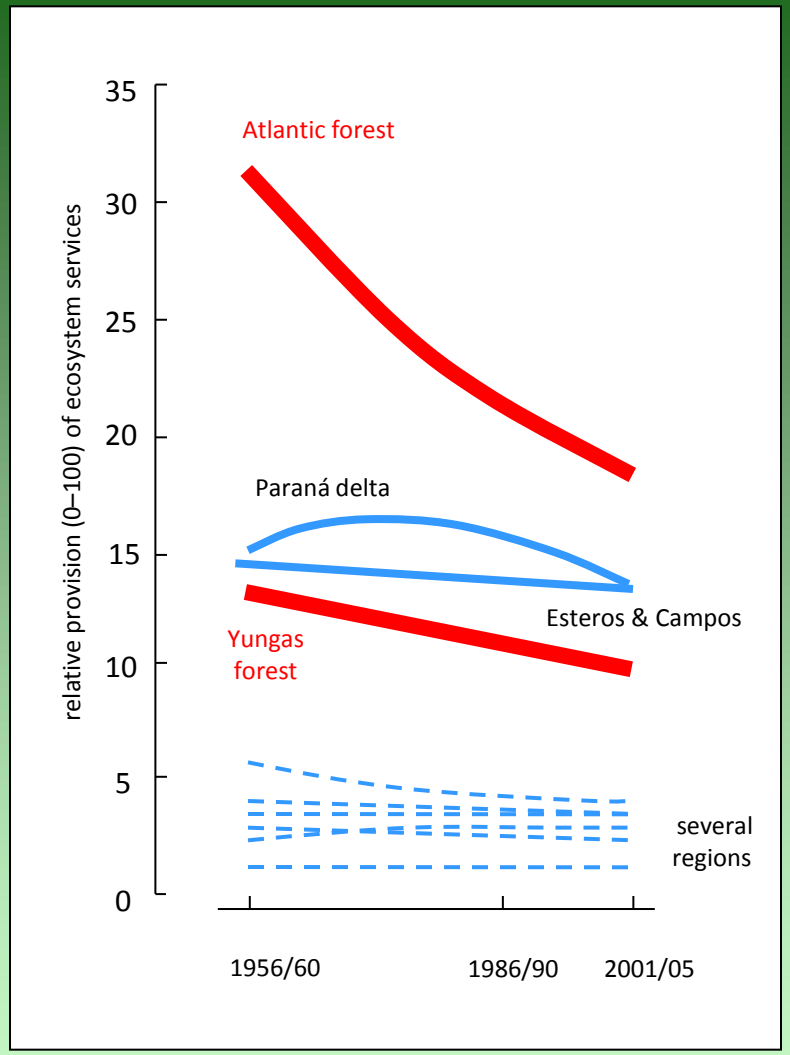
One hypothesis to be tested in Argentina

In Argentina, the annual number of meetings on ecosystem service preservation and the loss of ecosystem services are highly correlated.









Deforestation and loss of ecosystem service in Argentina

(*Sources: Holtz & Placci, 2003; Carreño et al., 2012, Volante et al., 2012*)