

Ambasciata Argentina in Italia

Organizzazione Internazionale Italo-Latinoamericana (IILA)

Università Roma TRE

Rete di Ricercatori Argentini in Italia (RCAI)

*Interazioni e collaborazioni scientifiche tra
Italia e Argentina*

Maria Laura Carranza (UNIMOL, RCAI, CUIA)

“Ecologia e frammentazione del bosco nativo in Argentina”

Casa Argentina 13 ottobre 2017





La maggior parte delle foreste in Sud America sono minacciate dalla espansione agricola, dal taglio e dagli incendi (Hoekstra, 2005)



LEY DE BOSQUE NATIVO: PER LA GESTIONE SOSTENIBILE

Ley de Presupuestos Mínimos de Protección Ambiental de los Bosques Nativos
(ley 26.331 - 2009)

1

ANALISI DELLA VEGETAZIONE

UNA SINTESI PRINCIPALI TIPOLOGIA DI VEGETAZIONE LEGNOSA -> ANCORA MANCANTE

2

ANALISI DELLA FRAMMENTAZIONE – SECONDO UN APPROCCIO CHE SI CONCENTRA SUI FRAMMENTI RELITTI (PATCH BASED) -> ANALISI NUOVO IN ARGENTINA E CON MOLTI ACCORGIMENTI METODOLOGICI DA TENERE IN MENTE

3

ANALISI DELLA FRAMMENTAZIONE – SECONDO UN APPROCCIO CHE SI CONCENTRA SUL CONTESTO NEL QUALE SI TROVA IL BOSCO





Frammentazione del paesaggio

Processo mediante il quale un habitat naturale (e.g. bosco) che occupa aree vaste in modo omogeneo, viene diviso in frammenti (SHAFFER,1990; REDD *et al.*, 1996), ogni volta piu piccoli e piu distanti (isolati)



Costituisce una delle principali minacce per a biodiversità a scala globale (WILCOVE *et al.*, 1986; WILSON, 1992; DOBSON *et al.*, 1999; HENLE *et al.*, 2004; BATTISTI, 2004)



Il bosco e la sua biodiversità -> FONTE DI BENI PER L'UOMO (energia, sostanze medicinali, cibo, regolazione del acqua e protezione da eventi climatici estremi, senso di appartenenza ai luoghi, spiritualità, ecc)

Garantisce numerosi SERVIZI ECOSISTEMICI



GLOBAL CHANGE DRIVERS
FRAMMENTAZIONE DEI BOSCHI

HUMAN WELL-BEING

Basic materials for a good life
 Freedom of choice and action

~~- BENESSERE UMANO~~

CONSTITUENTS OF WELL-BEING

- SICUREZZA

- PERSONAL SAFETY
- SECURE RESOURCE ACCESS
- SECURITY FROM DISASTERS

- BENI

- ADEQUATE LIVELIHOODS
- SUFFICIENT NUTRITIOUS FOOD
- SHELTER
- ACCESS TO GOODS

- SALUTE

- STRENGTH
- FEELING WELL
- ACCESS TO CLEAN AIR AND WATER

- SOCIETA'

- SOCIAL COHESION
- MUTUAL RESPECT
- ABILITY TO HELP OTHERS

- LIBERTA'

Freedom of choice and action
 OPPORTUNITY TO BE ABLE TO ACHIEVE WHAT AN INDIVIDUAL VALUES DOING AND BEING

- BIODIVERSITA'

Genotypes
 Species
 Functional groups
 Landscape units

Number
 Abundance
 Composition
 Interactions
 Spatial distribution

ECOSYSTEM SERVICES

Sustained production of biomass
 Soil formation and fertility
 Regulation of water
 Provision of habitat
 Pollination and seed dispersal
 Resistance to invasive organisms
 Agricultural pest and disease control

~~- SERVIZI INDIRETTI~~

ECOSYSTEM PROCESSES

Primary and secondary production
 Nutrient cycling

~~- PROCESSI ECOSISTEMICI~~

Food, fiber and fuel
 Genetic resources
 Biochemicals
 Knowledge systems
 Education and inspiration
 Recreation and aesthetic values

~~- SERVIZI DIRETTI~~



MILLENNIUM ECOSYSTEM ASSESSMENT

OPEN ACCESS Freely available online

PLoS BIOLOGY

Essay

Biodiversity Loss Threatens Human Well-Being

Diaz et al, 2006

2 FRAMMENTAZIONE



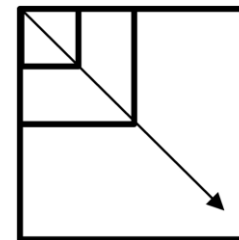
La frammentazione del bosco è dovuta a la perdita di **COPERTURA** (forest loss) ed a cambiamento nella **CONFIGURAZIONE** spaziale (**spatial pattern**), parametri che possono essere misurati da cartografia derivata da immagini telerilevate



✘ Scale dependence



- Multiscale analysis
- Scalogramas



✘ No statistical analysis of significance

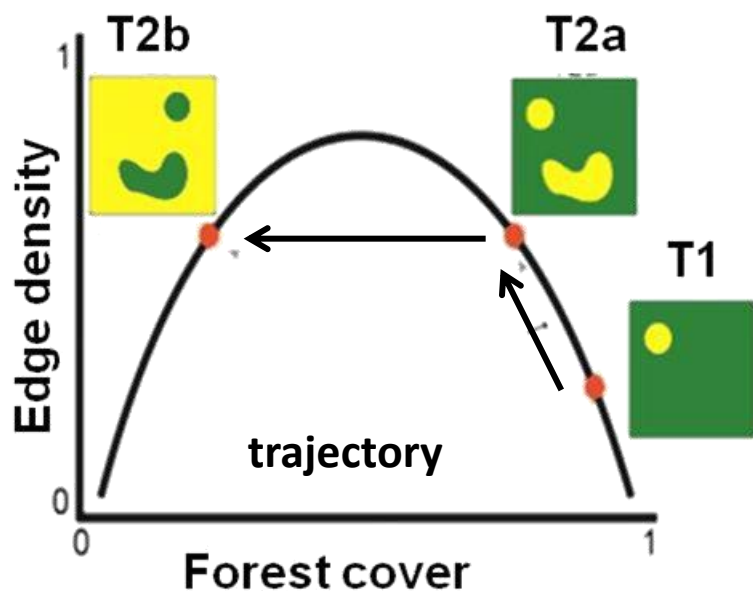


- Simulation models
- Landscape sampling

✘ non-linear relation of landscape composition and configuration



composition vs configuration
relationship SPACES (e.g., Long et al. 2010; Wang et al. 2014)



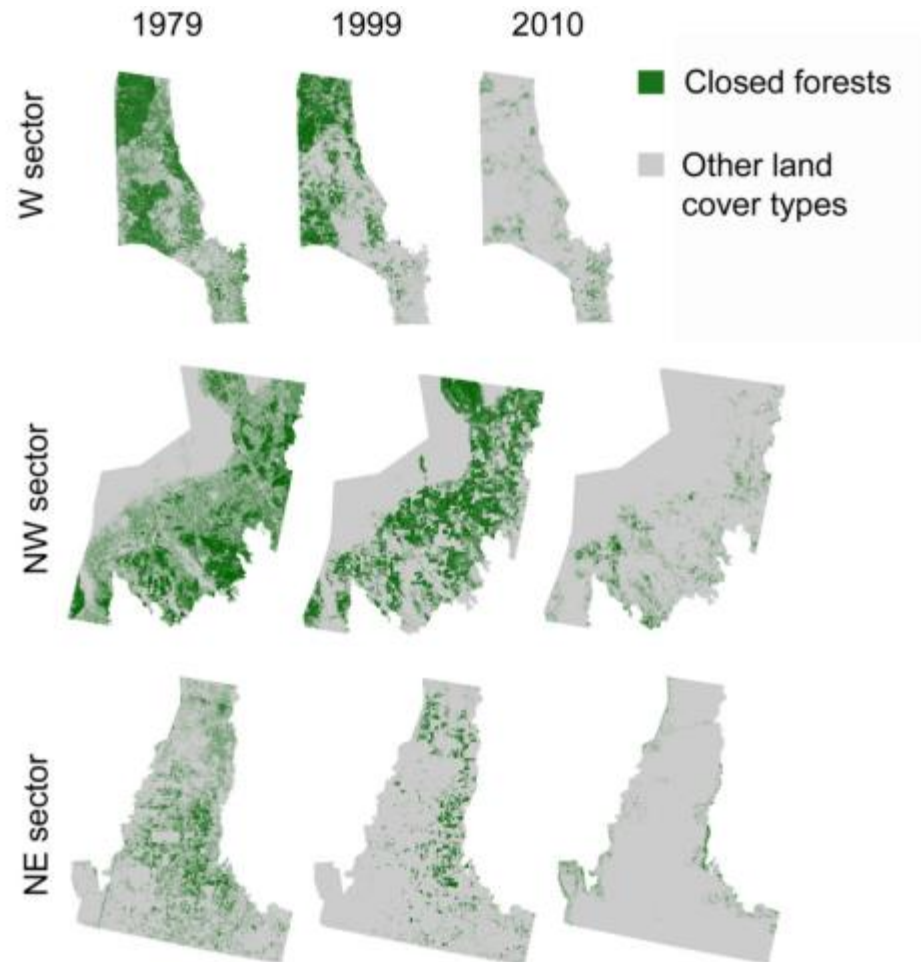
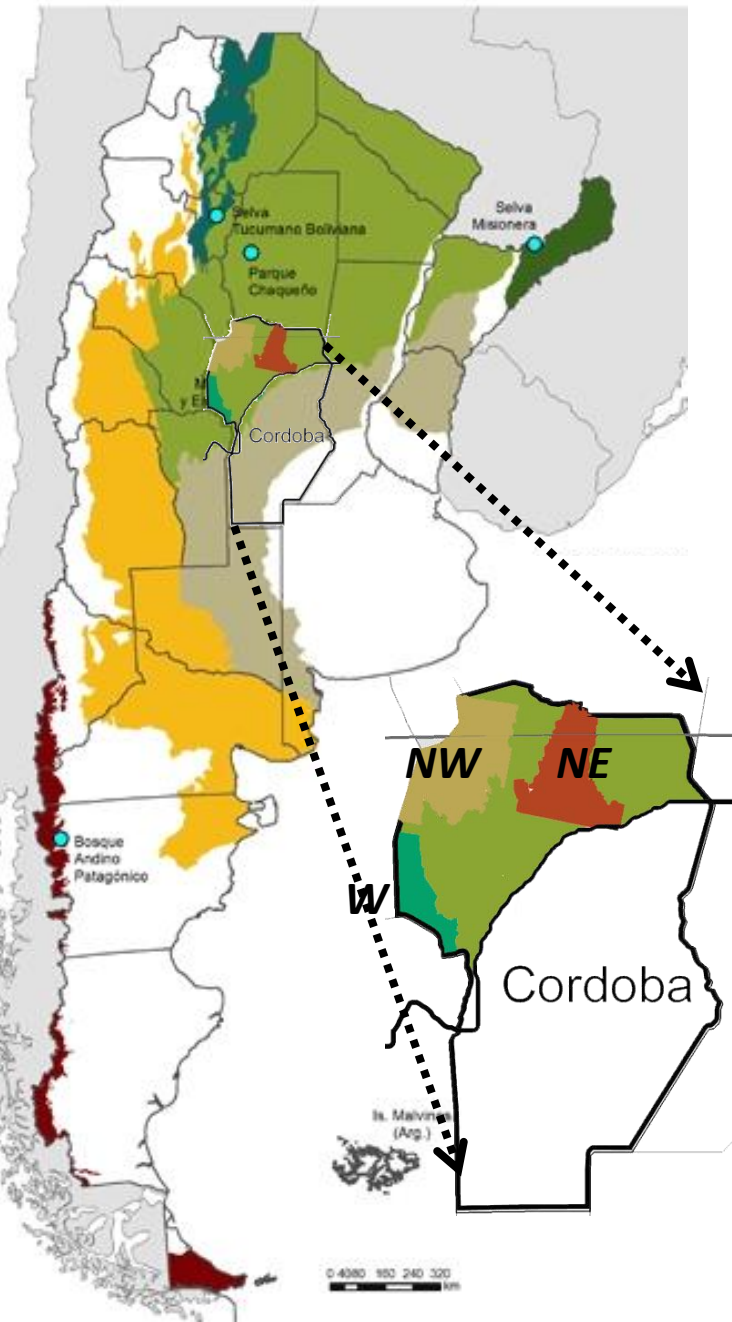


-Analisi della frammentazione nel Gran Chaco in un periodo di 30 anni (1979-2010) tenendo conto di questi accorgimenti





Land cover maps -> from Landsat TM;
 $K=0.87$, spatial resolution 60 m
 Forests non forests 1979, 1999, 2010





RANDOM SAMPLING

3000 plot, of 1km² -> 10% area total

FOREST COVER %

FOREST PATTERN (adequate for sample-based estimations of landscape pattern Hassett, et al 2012)

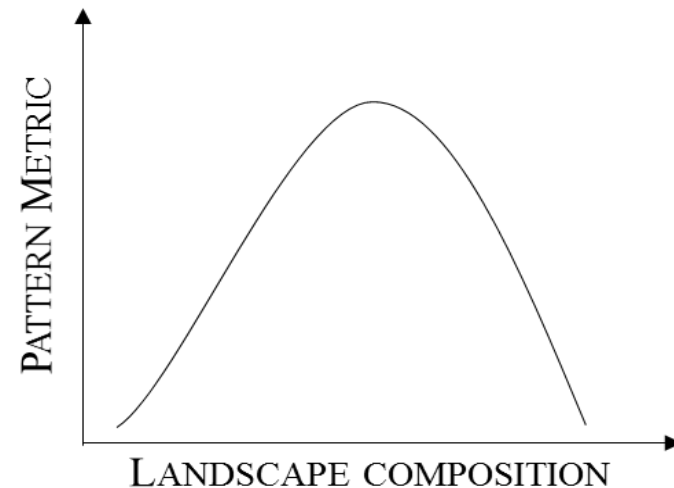
- **MPS (Mean Patch Size)**

- **PD (Patch Density)**

- **ED (Edge Density)**

-based on plot values we built specific **RELATIONSHIP SPACES** in which analyze **landscape trajectories**

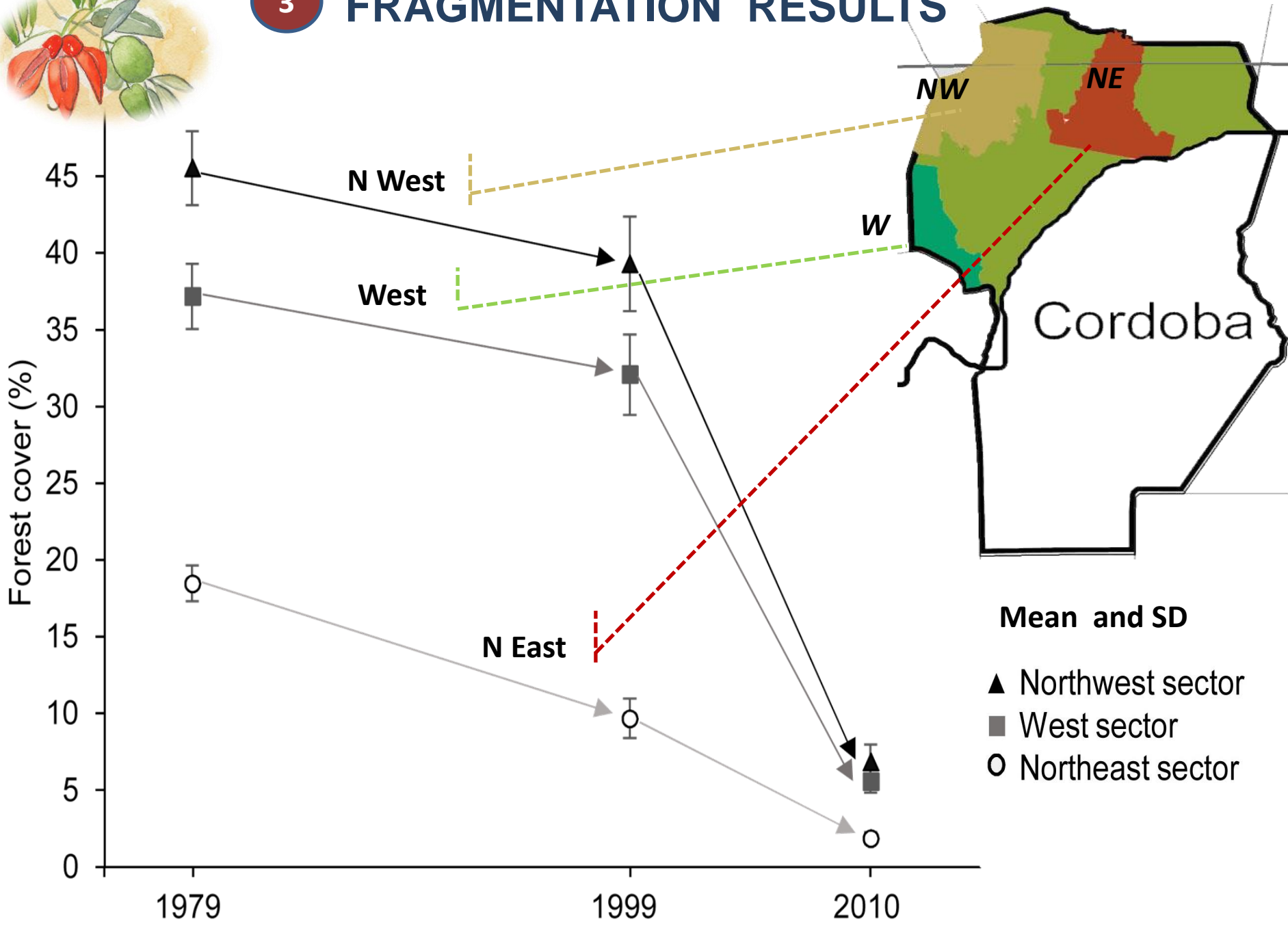
- **STATISTICAL COMPARISON:** PI estimators (Hassett et al 2012) and a bootstrapped 95% confidence intervals (Fortin et al 2012).





3

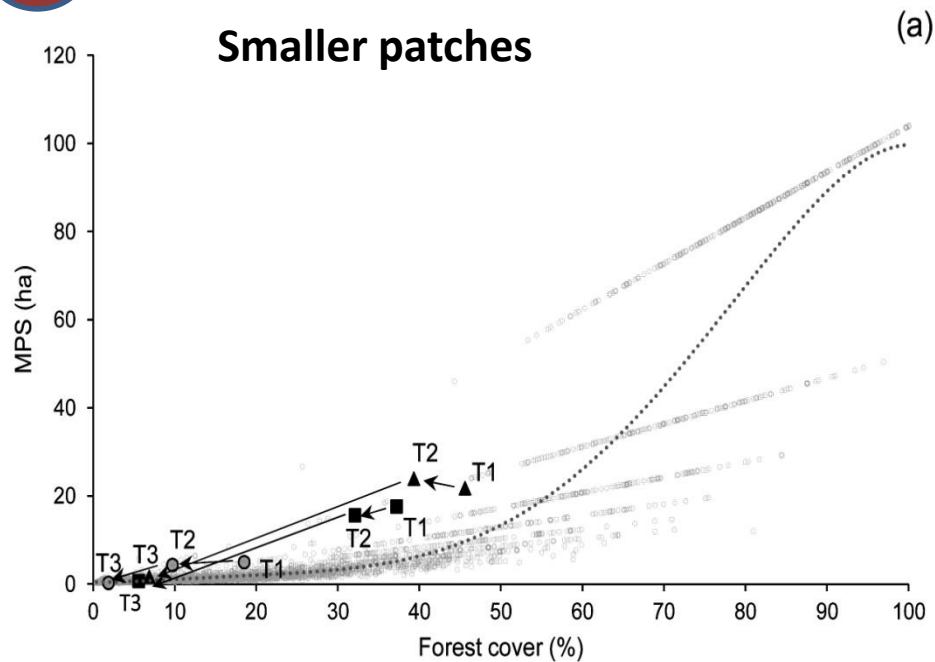
FRAGMENTATION RESULTS



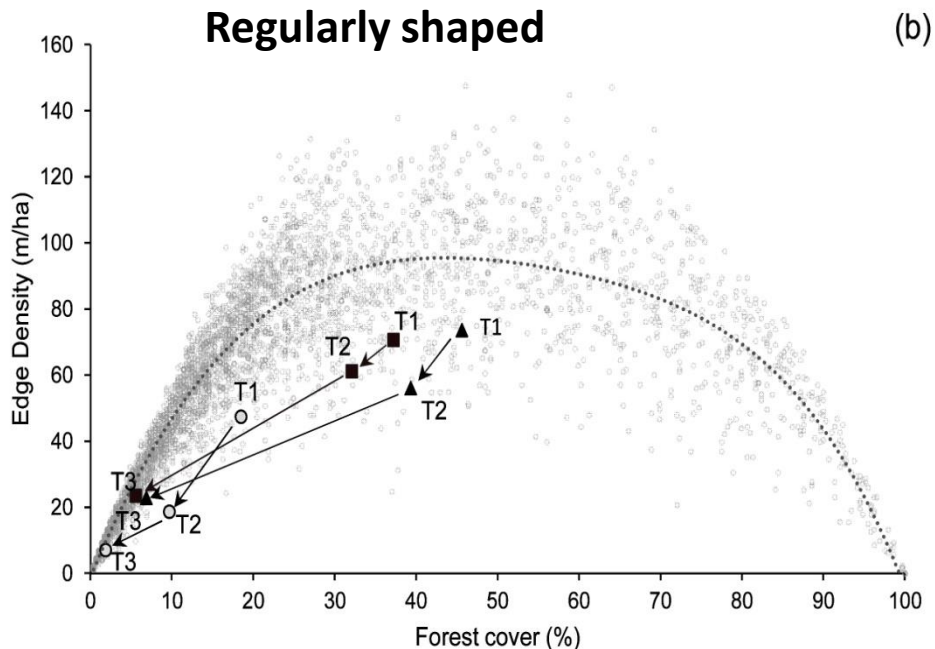
Mean and SD
▲ Northwest sector
■ West sector
○ Northeast sector

FRAGMENTATION – RESULTS

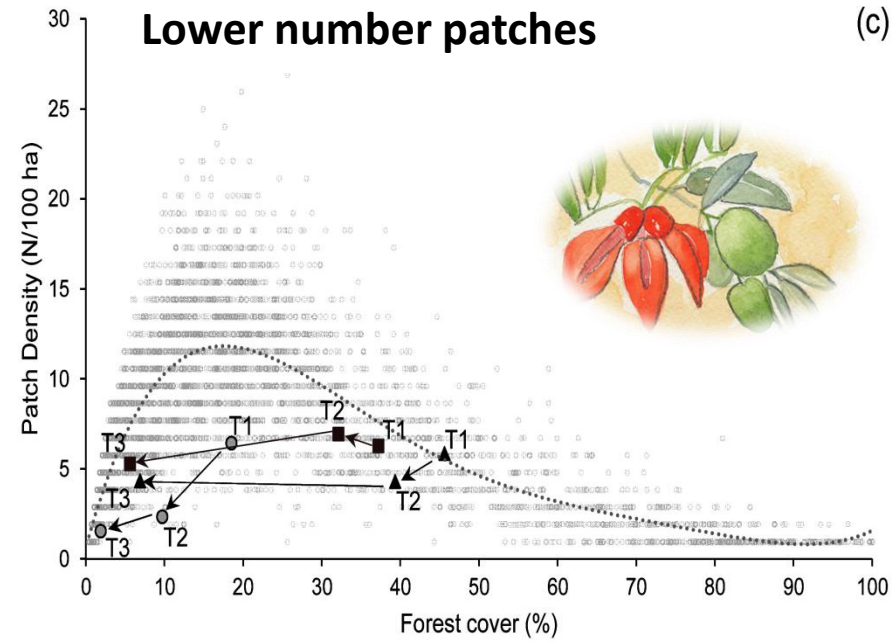
Smaller patches



Regularly shaped



Lower number patches



Mean values

- ▲ Northwest sector
- West sector
- Northeast sector

- Observed values
- Relationship curve
- ➔ Trajectories, T1:1979
T2:1999, T3:2010

- Local and regional extinctions
- Simplification of the trophic network → permanent loss of biodiversity and function



3

FRAMMENTAZIONE – ANALISI DEL CONTESTTO

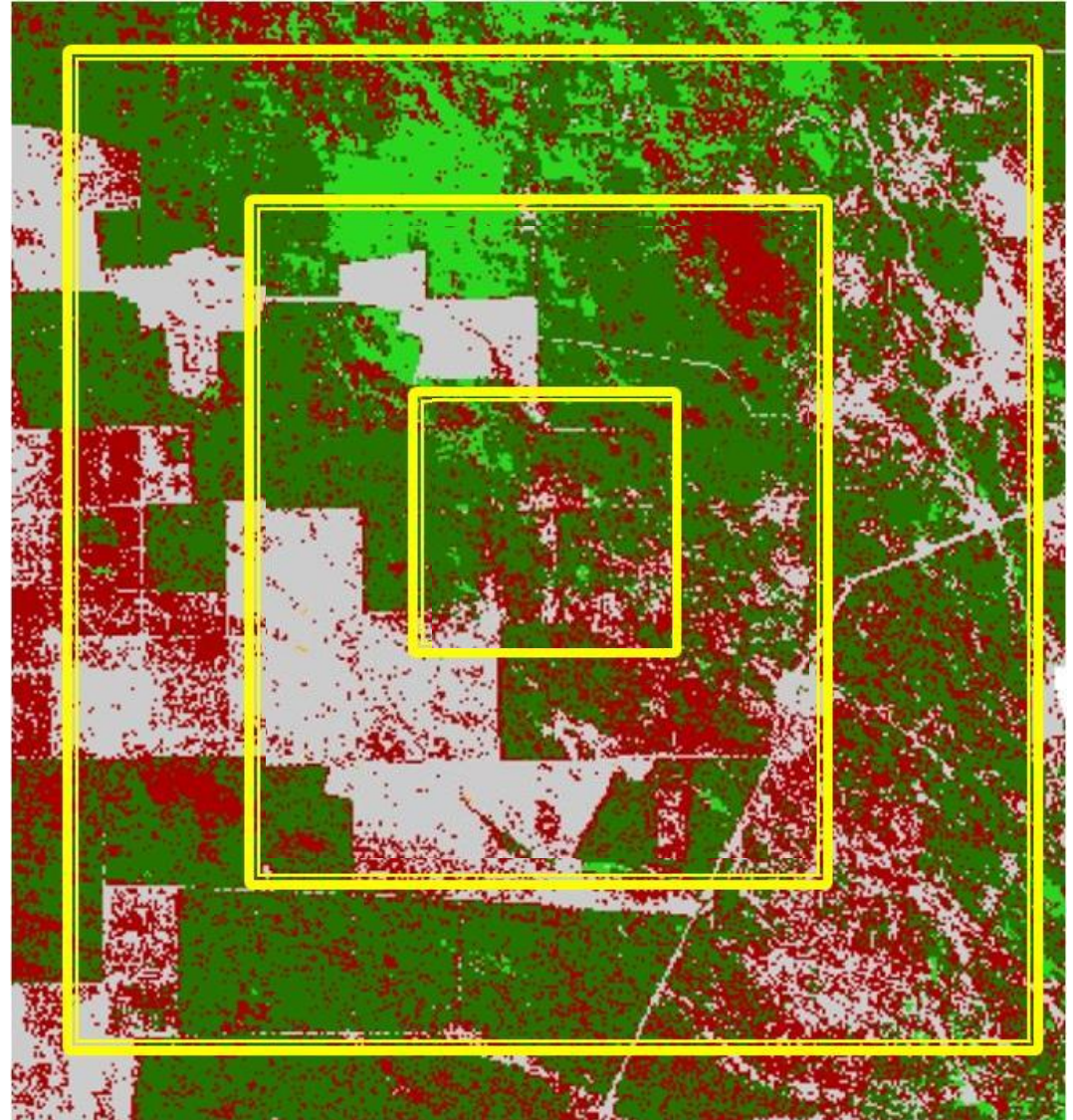
LE FORESTE NON SONO ISOLATE

Ogni foresta è immersa in un paesaggio con caratteristiche di frammentazione specifiche

Che è parte a sua volta di un paesaggio più ampio

Che si trova immerso in un paesaggio più vasto ancora e così via

(McGarigal et al. 2005)



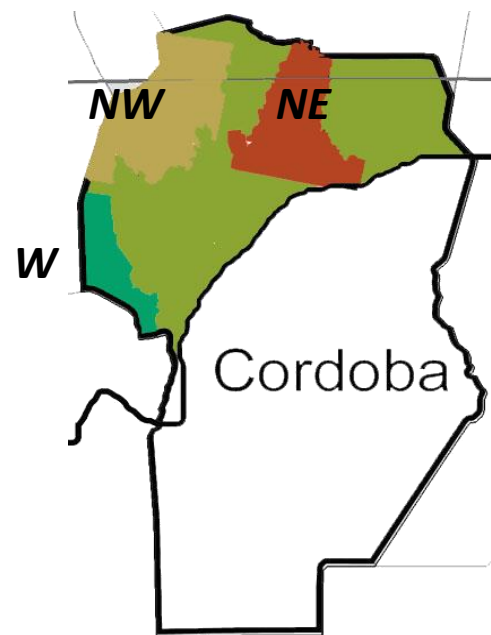
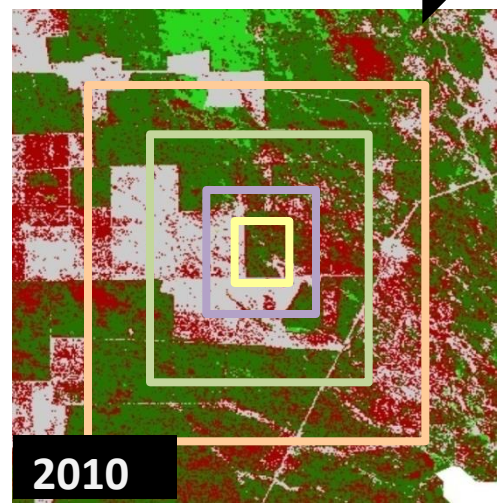
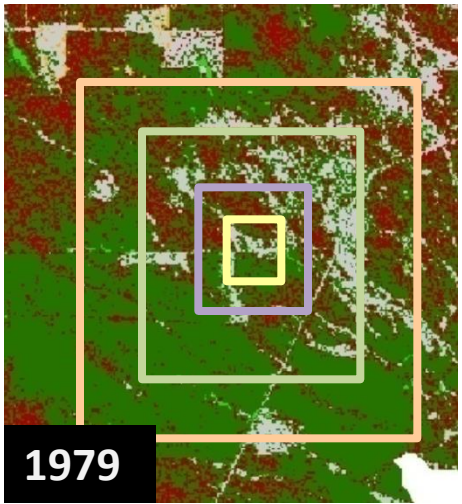


3 CONTEXT ANALYSIS - AIMS



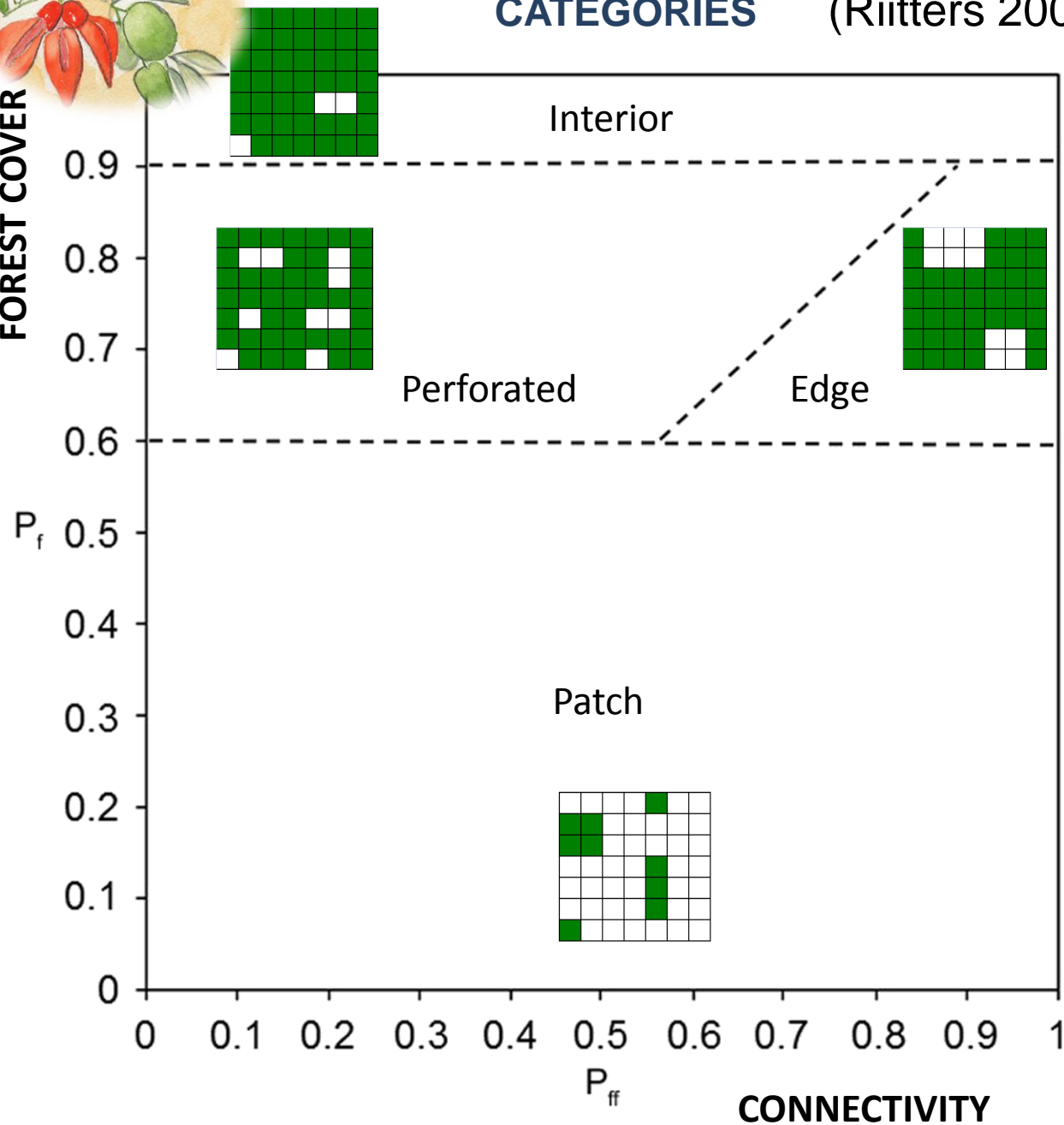
Analisi del contesto dei boschi nel tempo a diverse scale spaziali

- 1 Come varia il contesto dei boschi a scale diverse? Da scala locale a regionale
- 2 Come cambia questo contesto nel tempo?



THE MODEL: FOREST CONTEXT FRAGMENTATION CATEGORIES (Riitters 2002)

FOREST COVER

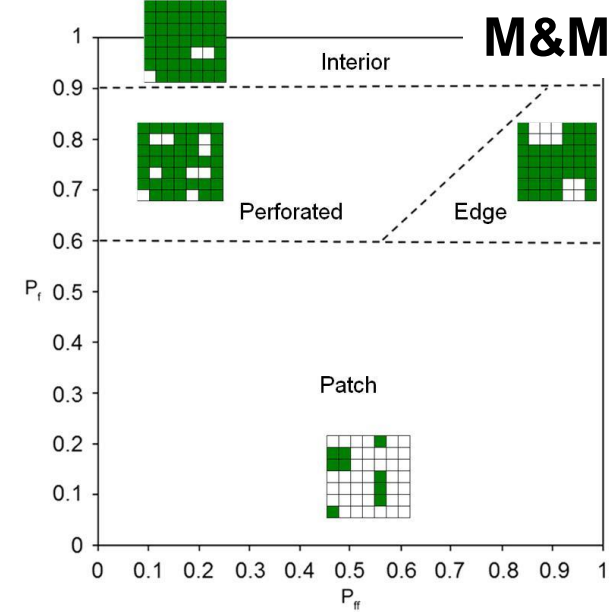




FOREST CONTEXT: METHODS

An interesting extension of forest context analysis could be implemented to evaluate the distribution of other land-cover types on forest surroundings

Seminatural
Cultural



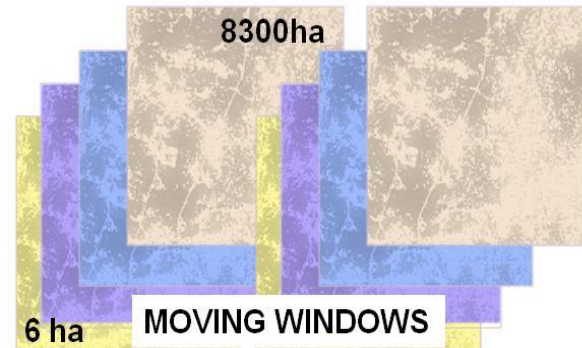


3

FOREST CONTEXT: METHODS

INDEX CALCULATION

Pf, Pff,
% Seminat; % cultural

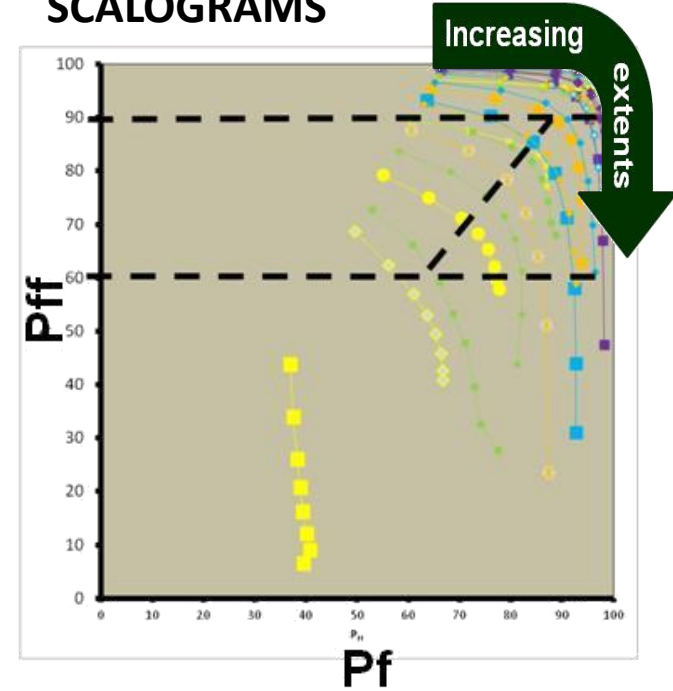


EXTRACTION
of forest pixels
context
information



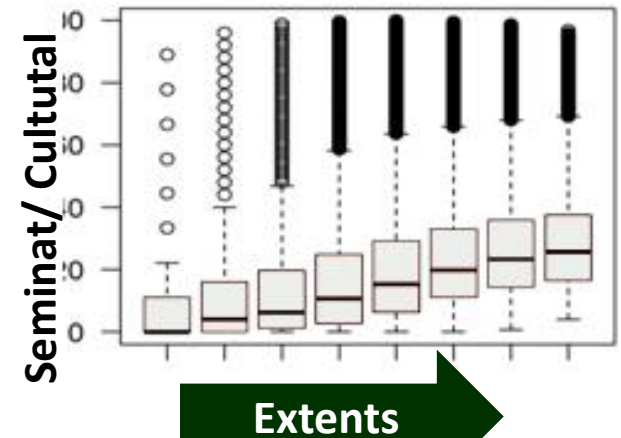
FOREST

FOREST CONTEXT SCALOGRAMS



NON-FOREST

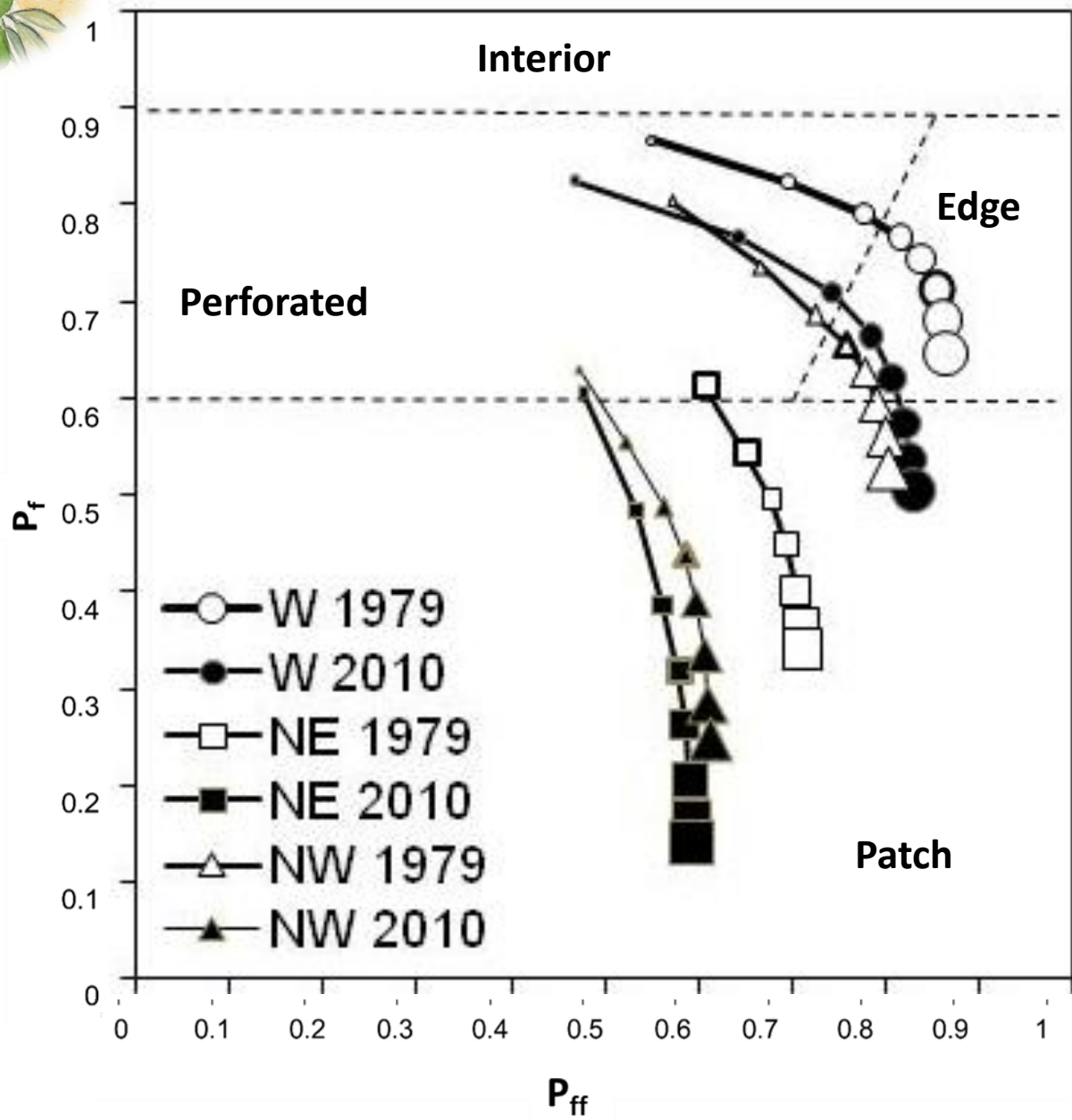
MULTI-SCALE CONTEXT BOX-PLOTS



3 TEST CONTEXT - RESULTS



increasing
extents



1979 white
2010 black



Contents lists available at ScienceDirect

Landscape and Urban Planning

Journal homepage: www.elsevier.com/locate/landurbplan



Research Paper

Measuring forest fragmentation using multitemporal forest cover maps: Forest loss and spatial pattern analysis in the Gran Chaco, central Argentina

Maria Laura Carranza¹, Ludovico Frate^{1,2}, Laura Hoyos³, Carlo Ricca⁴



THE 60th IAVS ANNUAL SYMPOSIUM

Vegetation patterns in a landscape

June 20 -24, 2017 (Tuesday - Friday)

The venue: Palermo - NH Hotel

European Journal of Remote Sensing - 2014, 47: 793-804

doi: 10.5721/EJRS20144745

Received 25/11/2014, accepted 10/12/2014



European Journal of Remote Sensing

An official journal of the Italian Society of Remote Sensing

www.aitjournal.com



onal de Cordoba),

Measuring forest fragmentation using multitemporal remotely sensed data: three decades of change in the Gran Chaco

Maria Laura Carranza¹, Ludovico Frate^{1,2}, Laura Hoyos³, Carlo Ricca⁴



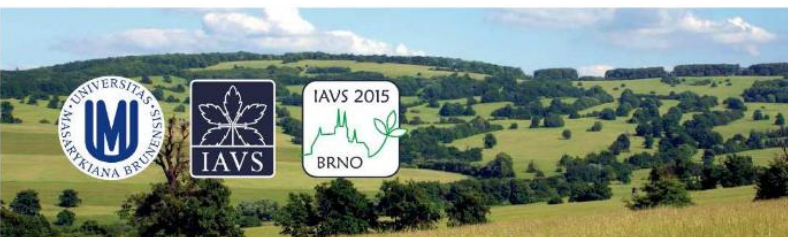
Publicazioni e congressi internazionali

RESEARCH ARTICLE

Temporal Changes in Forest Contexts at Multiple Extents: Three Decades of Fragmentation in the Gran Chaco (1979-2010), Central Argentina

Ludovico Frate^{1,2}, Alicia T. R. Acosta³, Marcelo Cabido⁴, Laura Hoyos⁴, Maria Laura Carranza^{1*}

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58th Annual Symposium of the International Association for Vegetation Science

19-24 July 2015. Brno, Czech Republic

SELECCIÓN DE LOS BOSQUES NATIVOS INTERCAMBIO BUENAS PRÁCTICAS EL DESARROLLO

Provincia de Buenos Aires
Honorable Cámara de Diputados

La Plata, 21 de abril de 2016.

JUEVES

9 a 14 h
Edificio

- **Organizadores.** D-1031/16-17 (Italo Argentino) y Un...
- **Responsables académicos.** Dra. María Laura Carranza de la Un... Italia y Leonardo Pastorino de la Un...

Señora
Representante del CUIA
Consorcio Universitario Italo Argentino
Dra. María Laura Carranza
Su Despacho

Evento d'interesse legislativo - camera di deputati della provincia di Buenos Aires

Dr. EDUARDO GERGNULI
Secretario Legislativo
Honorable Cámara de Diputados
de la Provincia de Buenos Aires

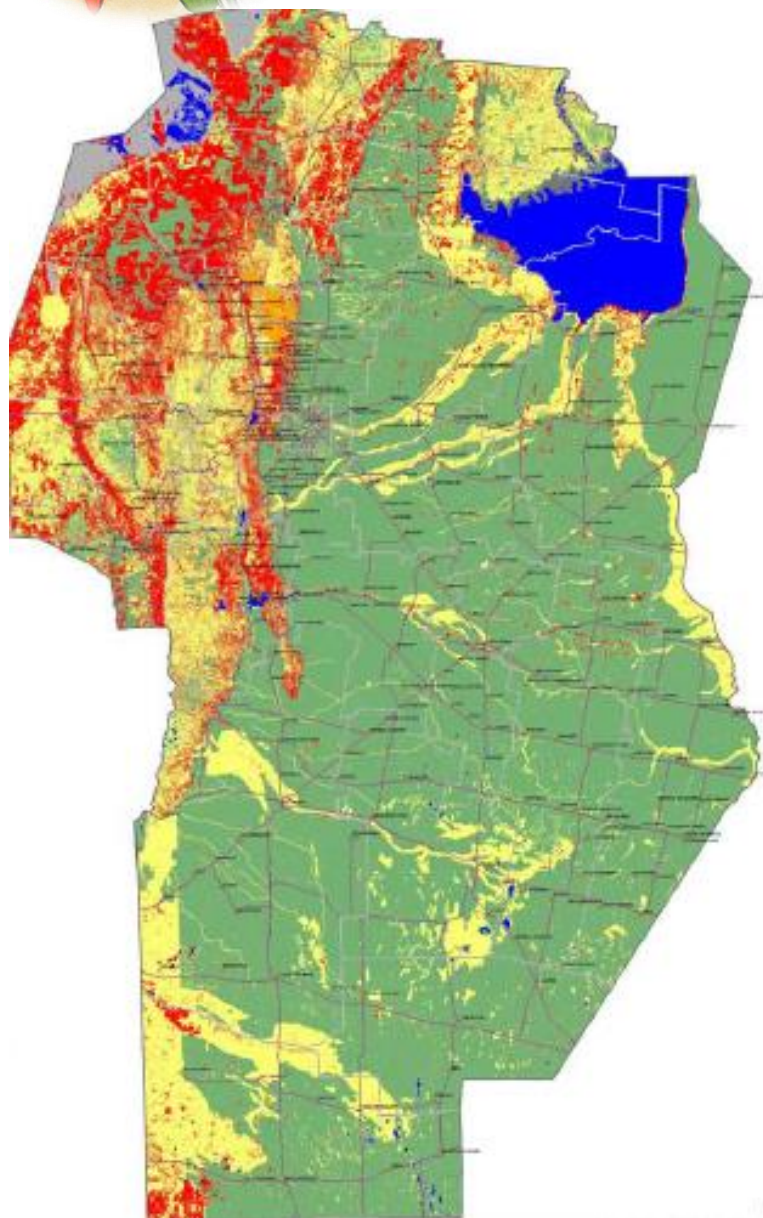


Sarghini
Lic. JORGE EMILIO SARGHINI
Presidente
Honorable Cámara de Diputados
de la Provincia de Buenos Aires





E ADESSO

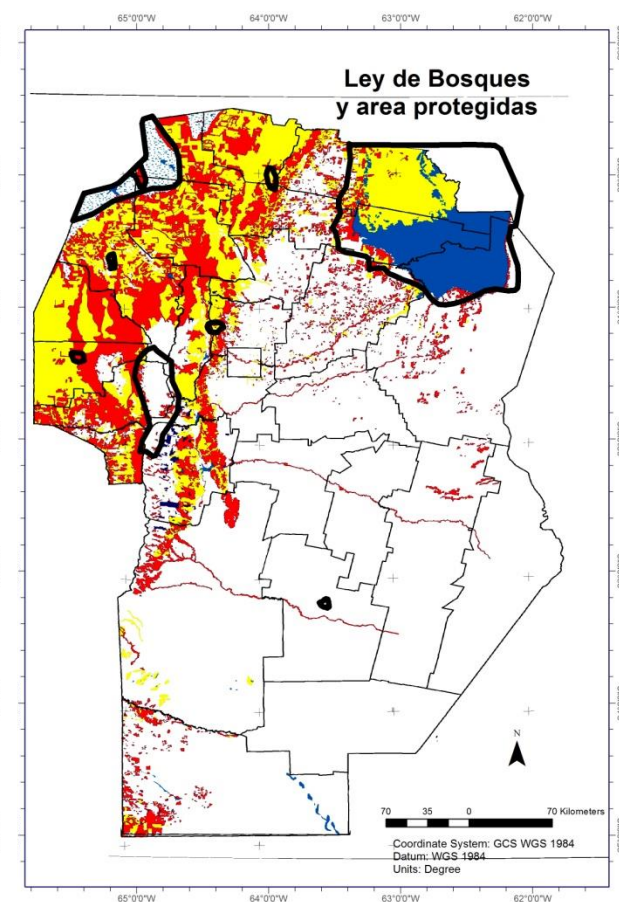
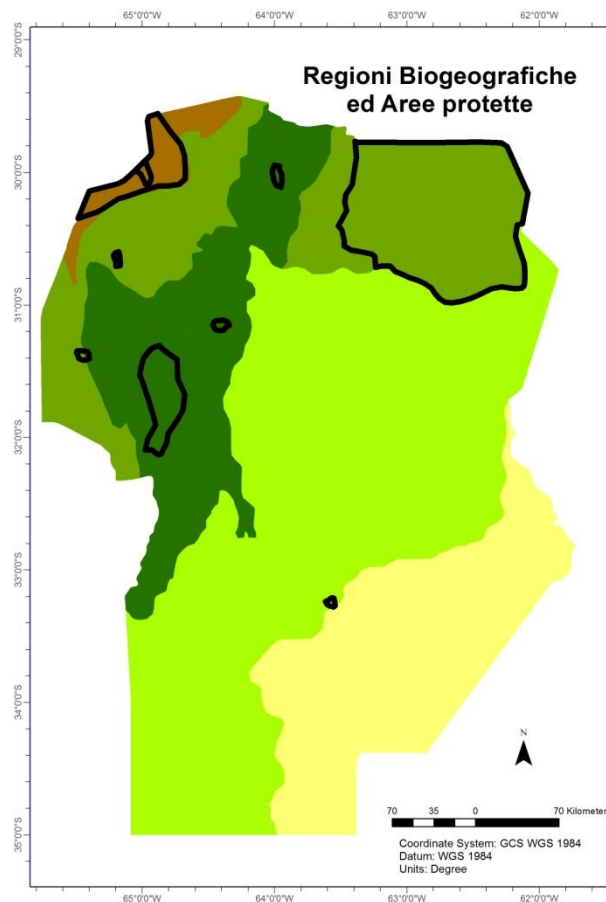
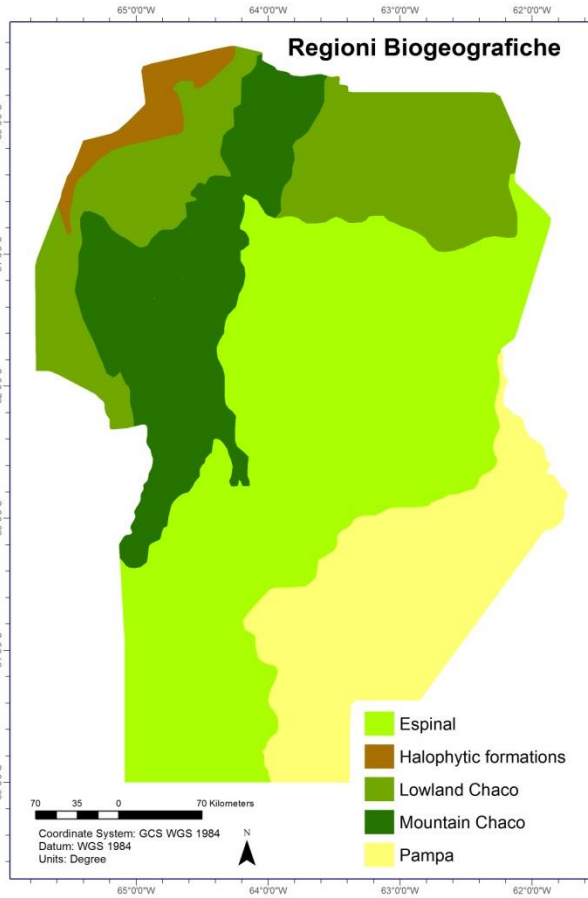


GAP ANALYSIS

<i>Conservazione Cat I</i>	<i>Gestions sostenibile Cat II</i>	<i>Nessun vincolo Cat III</i>
Rojo	Amarillo	Verde
1.863.743 ha 11%	3.936.715 ha 24%	9.676.945 ha 58%
Total Categorias I, II, III: 15.947.403 ha		93%
Total Superficie Provincia: 16.557.757 ha		100%

CONSERVAZIONE E GESTIONE DELLA BIODIVERSITA

Rappresentatività delle aree protette



Ruolo della zonizzazione della “ley de bosques”

GRAZIE! ¡GRACIAS!



Maria Laura Carranza

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