

Economic evaluation of environmental services: a demand-oriented perspective

FOOD SAFETY ASPECTS OF INTEGRATED FOOD SYSTEMS
EFSA SUMMER SCHOOL

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e Sistemi Agro-Forestali



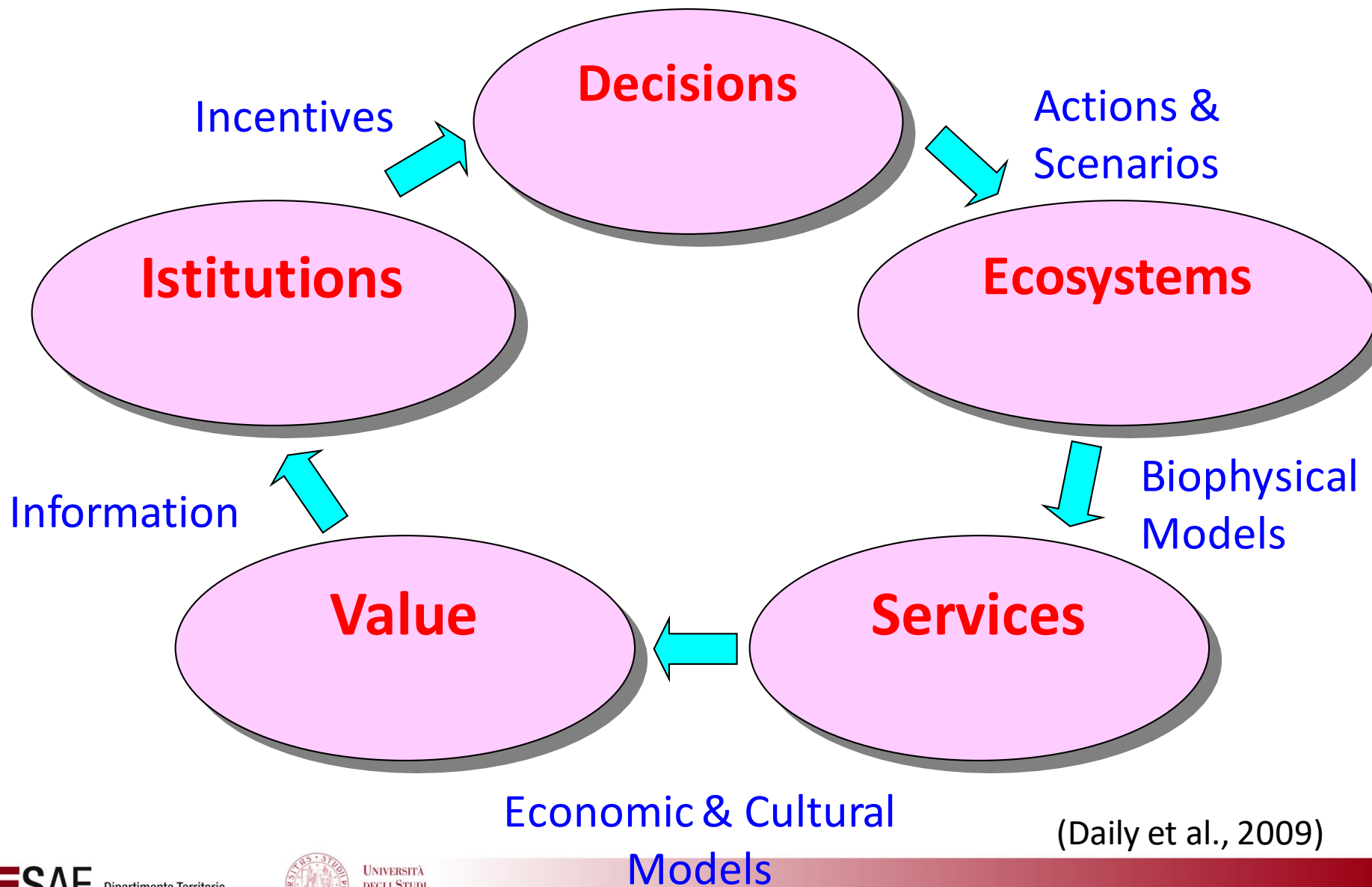
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What do we mean by: Ecosystem Services

	Main service types
	PROVISIONING SERVICES
1	Food (e.g. fish, game, fruit)
2	Water (e.g. for drinking, irrigation, cooling)
3	Raw materials (e.g. fiber, timber, fuel wood, fodder, fertilizer)
4	Genetic resources (e.g. for crop-improvement and medicinal purposes)
5	Medicinal resources (e.g. biochemical products, models & test-organisms)
6	Ornamental resources (e.g. artisan work, decorative plants, pet animals)
	REGULATING SERVICES
7	Air quality regulation (e.g. capturing (fine)dust, chemicals)
8	Climate regulation (e.g. incl. C-sequestration, influence of vegetation on rainfall)
9	Moderation on extreme events (e.g. storm protection and flood prevention)
10	Regulation of water flows (e.g. natural drainage, irrigation and drought prevention)
11	Waste treatment (especially water purification)
12	Erosion prevention
13	Maintenance of soil fertility (incl. soil formation)
14	Pollination
15	Biological control (e.g. seed dispersal, pest and disease control)
	HABITAT SERVICES
16	Maintenance of life cycles of migratory species (incl. nursery service)
17	Maintenance of genetic diversity (especially in gene pool protection)
	CULTURAL & AMENITY RESOURCES
18	Aesthetic information
19	Opportunities for recreation & tourism
20	Inspiration for culture, art and design
21	Spiritual experience
22	Information for cognitive development

(The Economics of Ecosystems Biodiversity-TEEB, 2010)

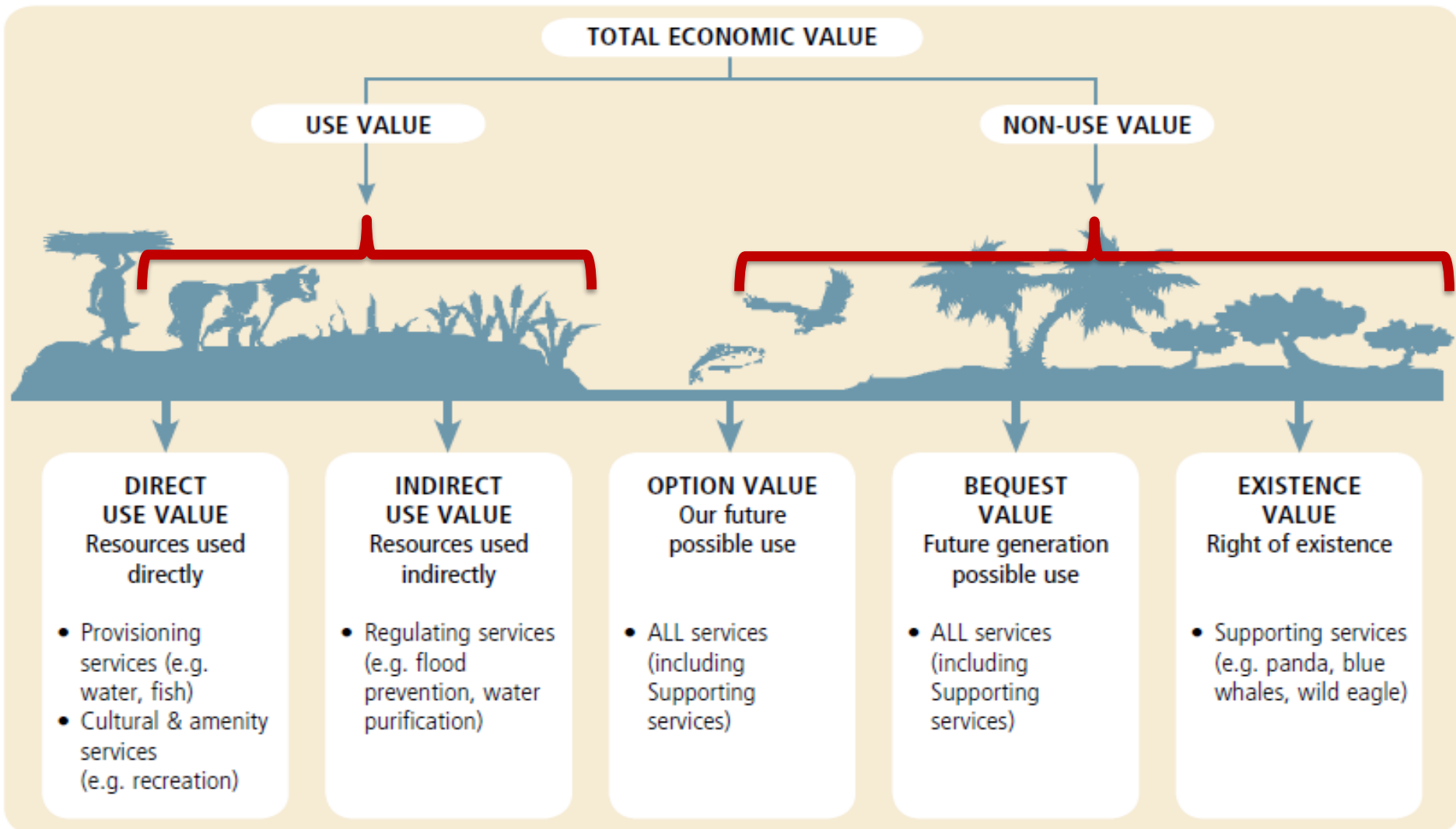
Integrating ES into decision-making & policy



(Daily et al., 2009)

Total Economic Value (TEV)

TEV: the economic value people attach to natural resources.
It is an aggregated value: use values + non use values.



Case Studies

Are economic values useful tools in environmental and food policy ?

Case studies:

1. Protected areas & land management
2. Ecosystem Services at spatial/regional scale
3. Attention to ES and congestion management
4. Valuing Collective Reputation for Environmentally-Friendly Production Methods

1 Protected areas & land management

The Alps traditionally generate a wide range of ecosystem goods and services to the population and tourists: landscape beauty, outdoor recreation, cultural values, air quality, etc.

The effects of Alpine park management policies on outdoor recreation are increasingly coming under public scrutiny.

Alpine park agencies face controversial decisions:

- preserve land and ecosystems
- provide services to visitors.

It increasingly difficult to fund the services to facilitate the broad variety of outdoor recreation activities (decreasing funds).

This is further exacerbated by the increasing expectations for high-quality experiences by recreationists .

The Natural Park of the Regole D'Ampezzo



UNESCO Heritage Sites

Data are collected via individual questionnaires.

Respondents were selected from the population of visitors, surveyed on-site at the end of their outdoor experience.

Visitor types:

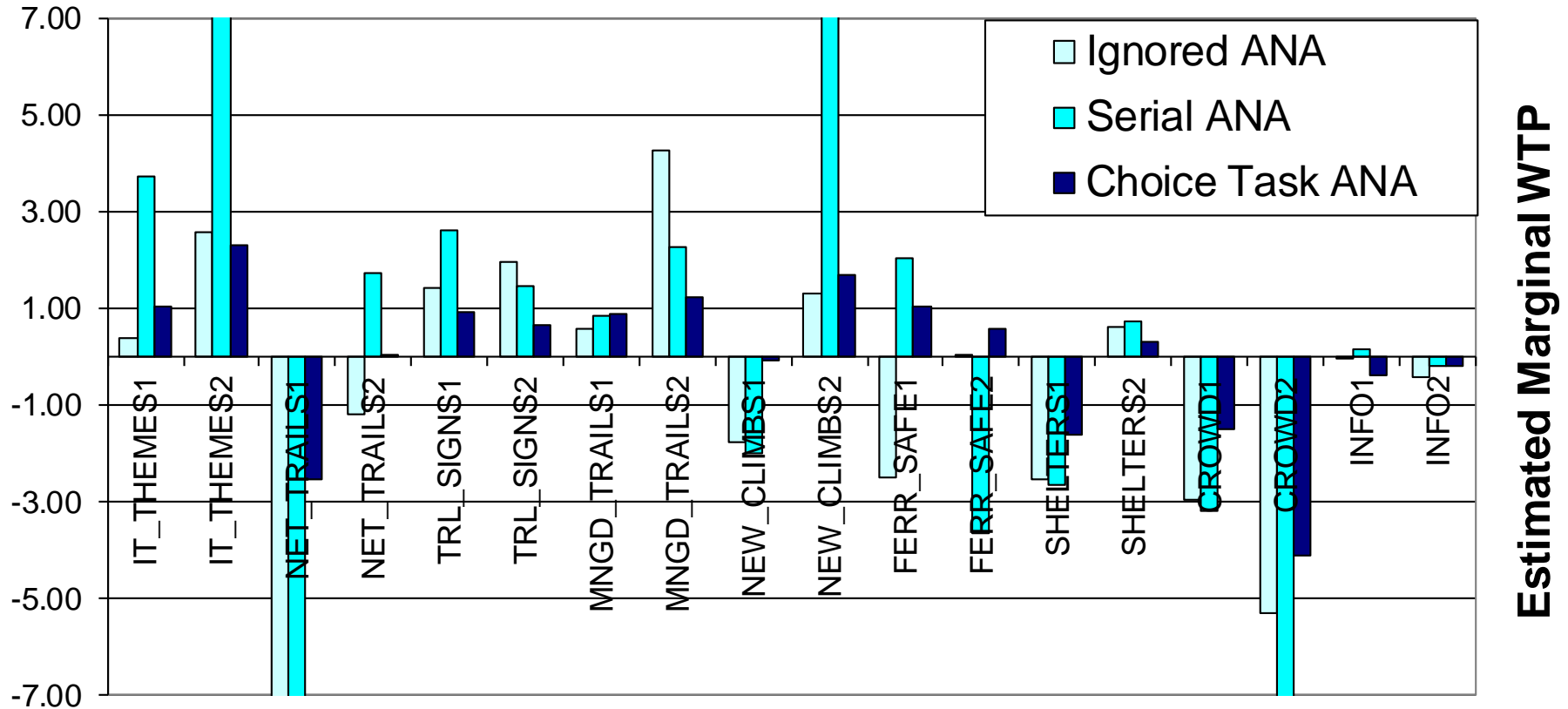
- 1) hikers,
- 2) climbers,
- 3) mountain bikers,
- 4) visitors who use via-ferratas
- 5) visitors engaged in short walks and/or picnicking.

Collected data are analyzed via econometric models.

Site Attributes

Variable	Attribute description
Thematic itineraries (n)	Building of 5 and 7 additional thematic itineraries, focusing on flora, fauna and historical aspects (baseline 2)
Network of trails (km)	Decrease the network of trails and hiking paths to 300 km Increase the network of trails and hiking paths to 400 km (baseline 350 km)
Trail signs	Vertical signs at junctions plus painted signs every 200 mt along the path Vertical signs at junctions plus painted signs every 50 mt along the path (baseline vertical sign)
Managed trails excursions (hours)	New challenge itineraries of 3 and 6 hours (baseline 1 hour)
Climbing routes (n)	New 40 and 60 climbing itineraries along cliffs and crags (baseline 20 climbs)
Via Ferrata	Iron cable along the whole path Iron cable along the whole path plus artificial holds (baseline: iron cable part of the path)
Shelters (n)	Decrease of 3 alpine shelters Increase of 3 alpine shelters (baseline: 20)
Congestion (n)	Number of people met along the trails (20-50) Number of people met along the trails (more than 50) (baseline: less than 20)
Information	Brochure providing a little more than basic information of the area (baseline: leaflet) Book containing an extended description of the floristic, historic aspects and the wildlife
Cost	Entrance fee (2, 5, 7, 10 €)

Willingness to Pay Estimates for Park Management Attribute Level



2 Ecosystem Services at spatial & regional scale

Aim of the study:

To derive **spatially benefit estimates** for **ecosystem services** produced in protected areas of Lombardy (Northern Italy)

Two protected areas:

1. Regional Park Adamello (mountain area)
2. Regional Park (plain area)

Methodology framework

Households survey (**Choice Experiment**)



WTP estimation (**Choice Models**)



WTP maps (sampled municipalities)

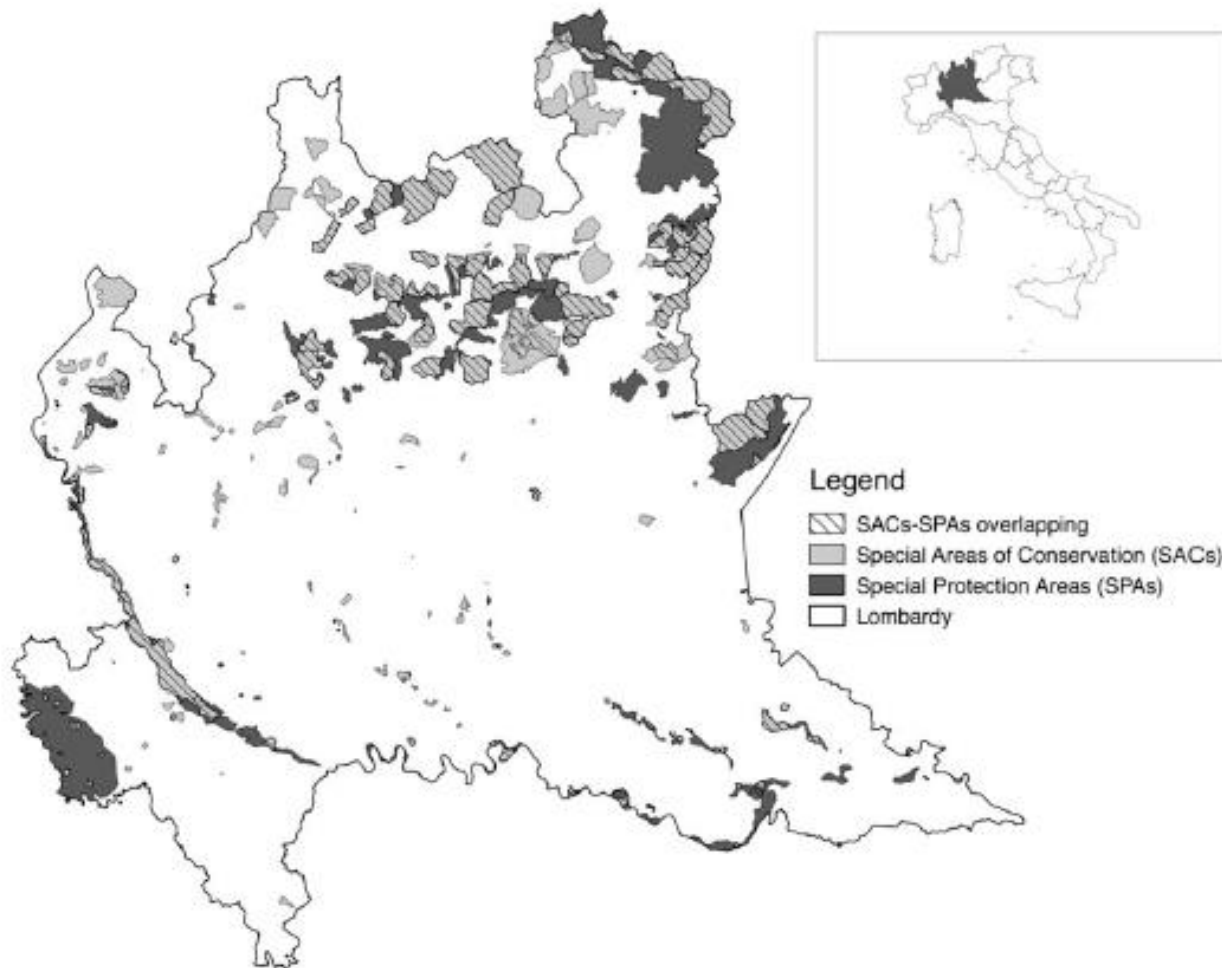


Benefit transfer

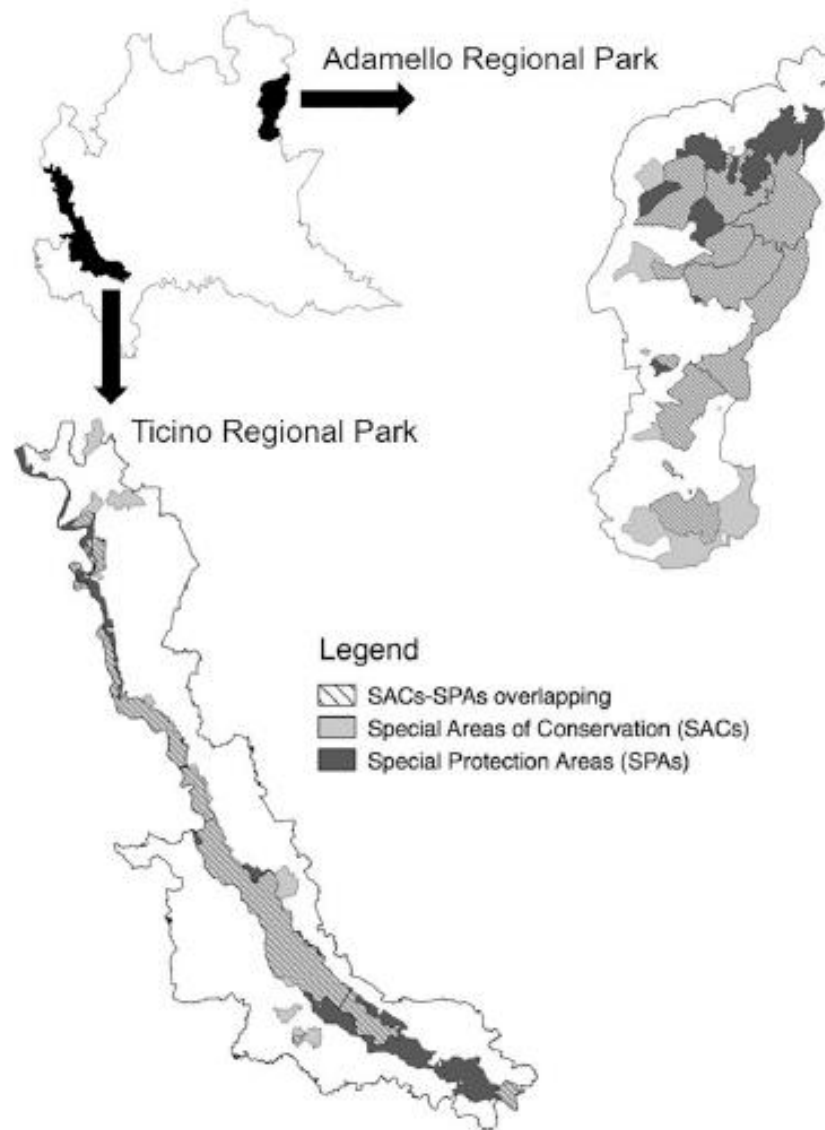


WTP maps (whole region)

Sites of Community Importance (SACs) and Special Protection Areas (SPAs) in Lombardy



Study areas – Adamello and Ticino RPs



Ecosystem services considered

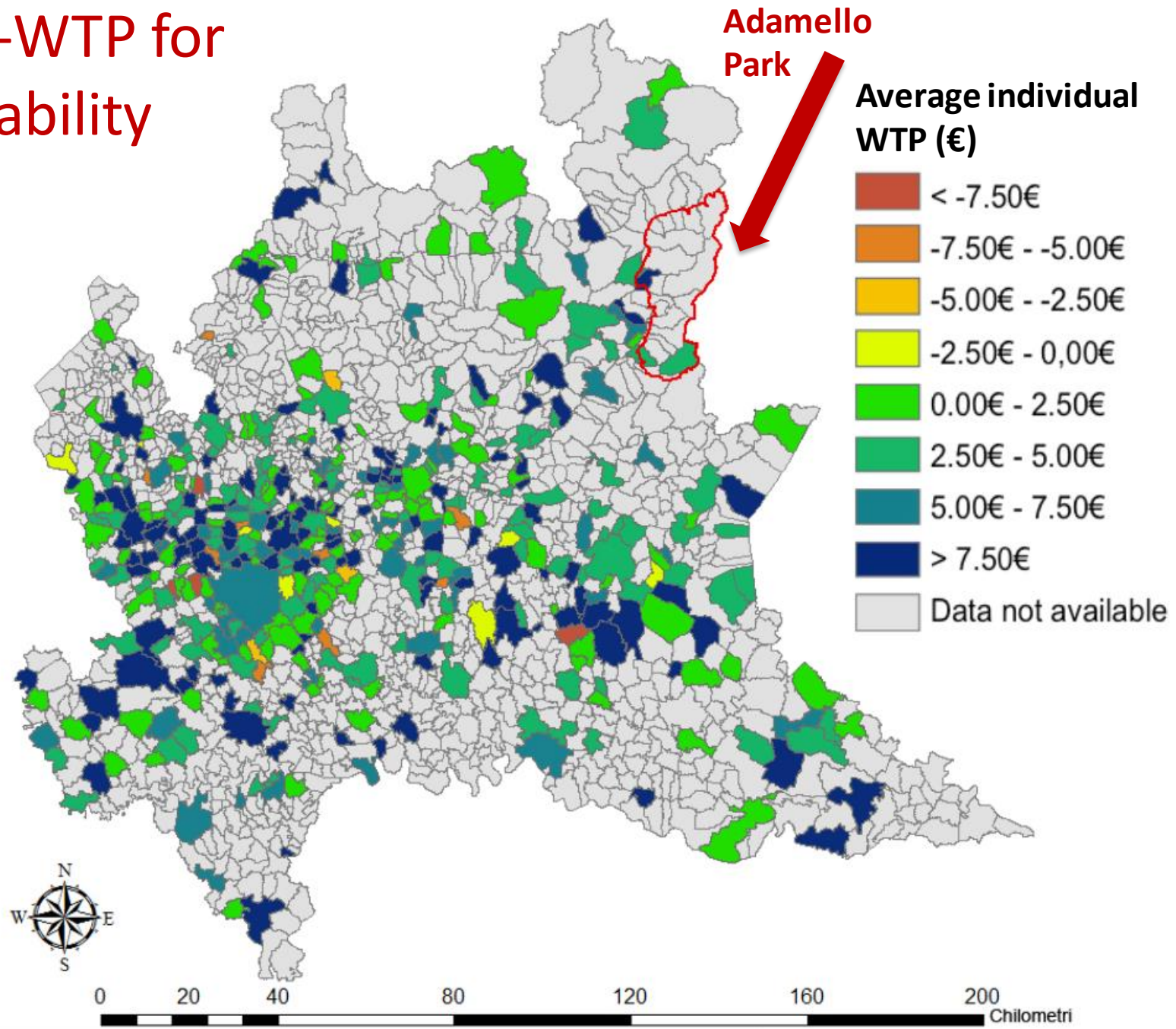
Adamello Park

Attributes (ES) Levels	
Slope stability	10 km safe roads 20 km safe roads (+10) 35 km safe roads (+25) 45 km safe roads (+35)
Biodiversity (flora conservation)	0 ha managed meadows 200 ha managed meadows (+200) 250 ha managed meadows (+250) 300 ha managed meadows (+300)
Fauna	2 fauna sighting sites 5 fauna sighting sites (+3) 7 fauna sighting sites (+5) 10 fauna sighting sites (+8)
Recreation	1 floristic trails 2 floristic trails (+1) 4 floristic trails (+3) 6 floristic trails (+5)
Aesthetic value (landscape)	450 ha dry-stone walls in good state 453 ha dry-stone walls in good state (+3) 455 ha dry-stone walls in good state (+5)
Regional Tax	Regional Tax (0, 2,5, 10, 15, 20€)

Ticino Park

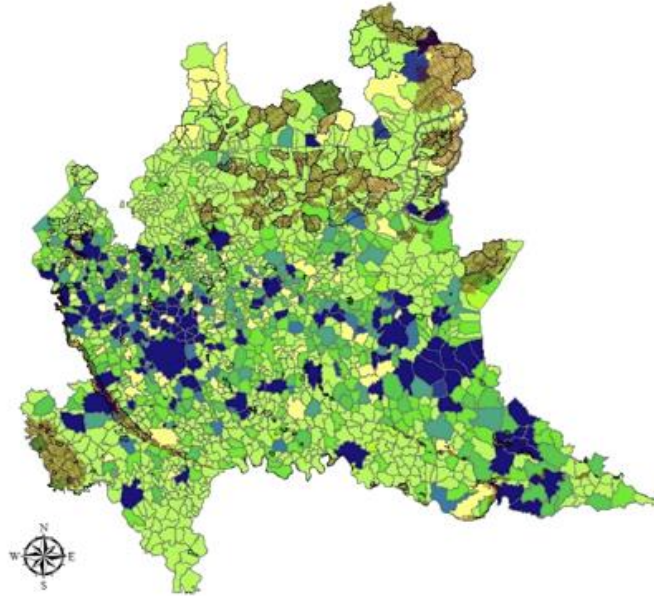
Attributes (ES) Levels	
Carbon sequestration	0% CO ₂ emission reduction 5% CO ₂ emission reduction (+5%) 10% CO ₂ emission reduction (+10%) 20% CO ₂ emission reduction (+20%)
Water quality	2 indicator species 3 indicator species (+1) 4 indicator species (+2)
Biodiversity (flora conservation)	320 ha water meadows 400 ha water meadows (+80) 450 ha water meadows (+130)
Aesthetic value (landscape)	0 scenic views with screened detractors 6 scenic views with screened detractors 8 scenic views with screened detractors 12 scenic views with screened detractors
Recreation	62 thematic trails 65 thematic trails (+3) 67 thematic trails (+5)
Regional Tax	Regional Tax (0, 2,5, 10, 15, 20€)

Results: i-WTP for «Slope stability (45km)»

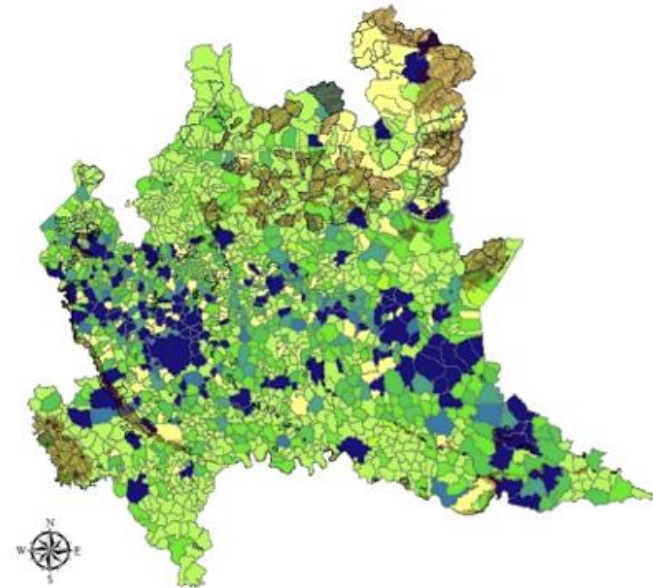


Results: Benefit Transfer for «floristic trails»

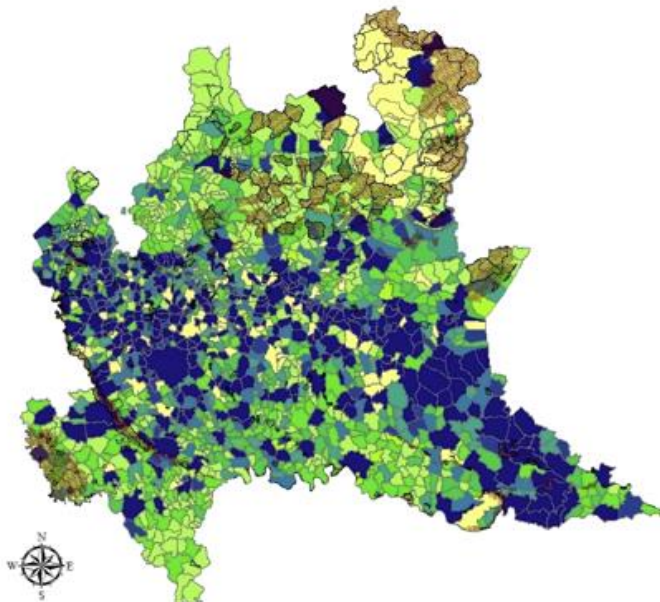
2 floristic trails



4 floristic trails



6 floristic trails





3 ES and congestion management

➤ 2 surveys addressing different populations:

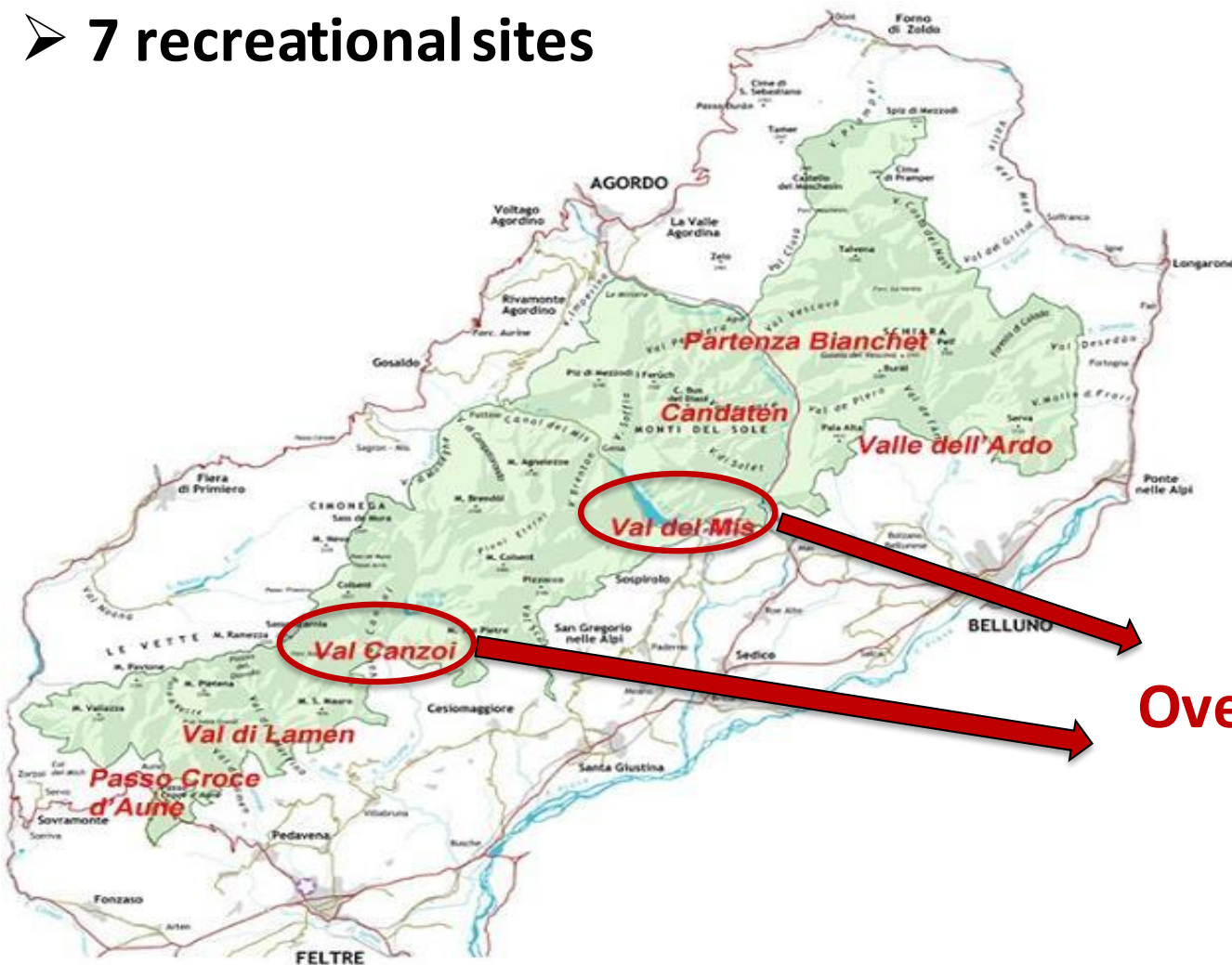
1. Park visitors (face-to-face interviews during visit), N=432
2. Inhabitants of the Veneto region (visitors + potential visitors; web-based), N=1,381

➤ 2 Research Questions:

1. On-site or off-site sampling (Q1)?
2. Congestion: a real issue or just a perception (Q2)? Any case: we need to manage congestion!

National Park Dolomiti Bellunesi

➤ 7 recreational sites

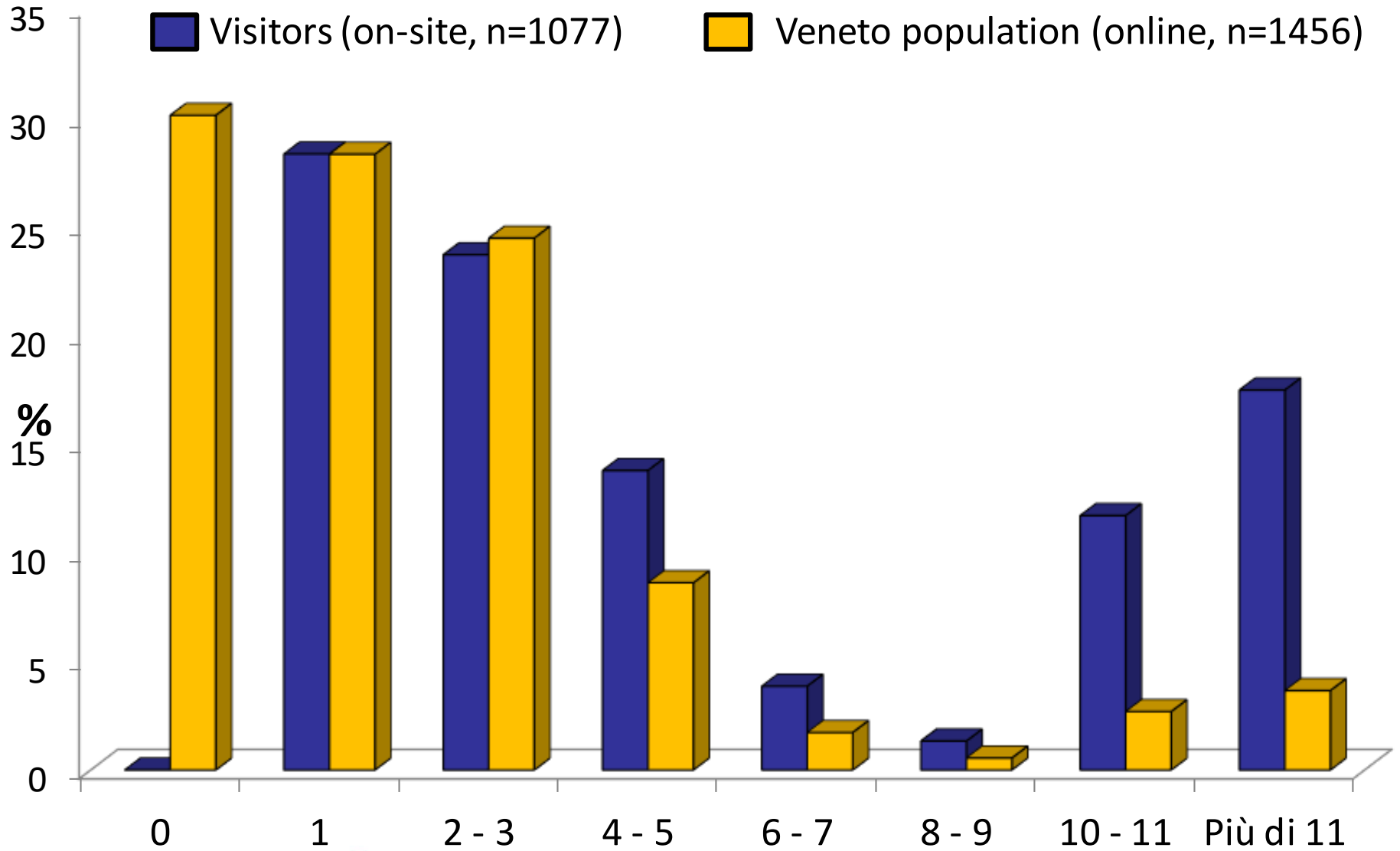


Overcrowding issues

Attributes and levels

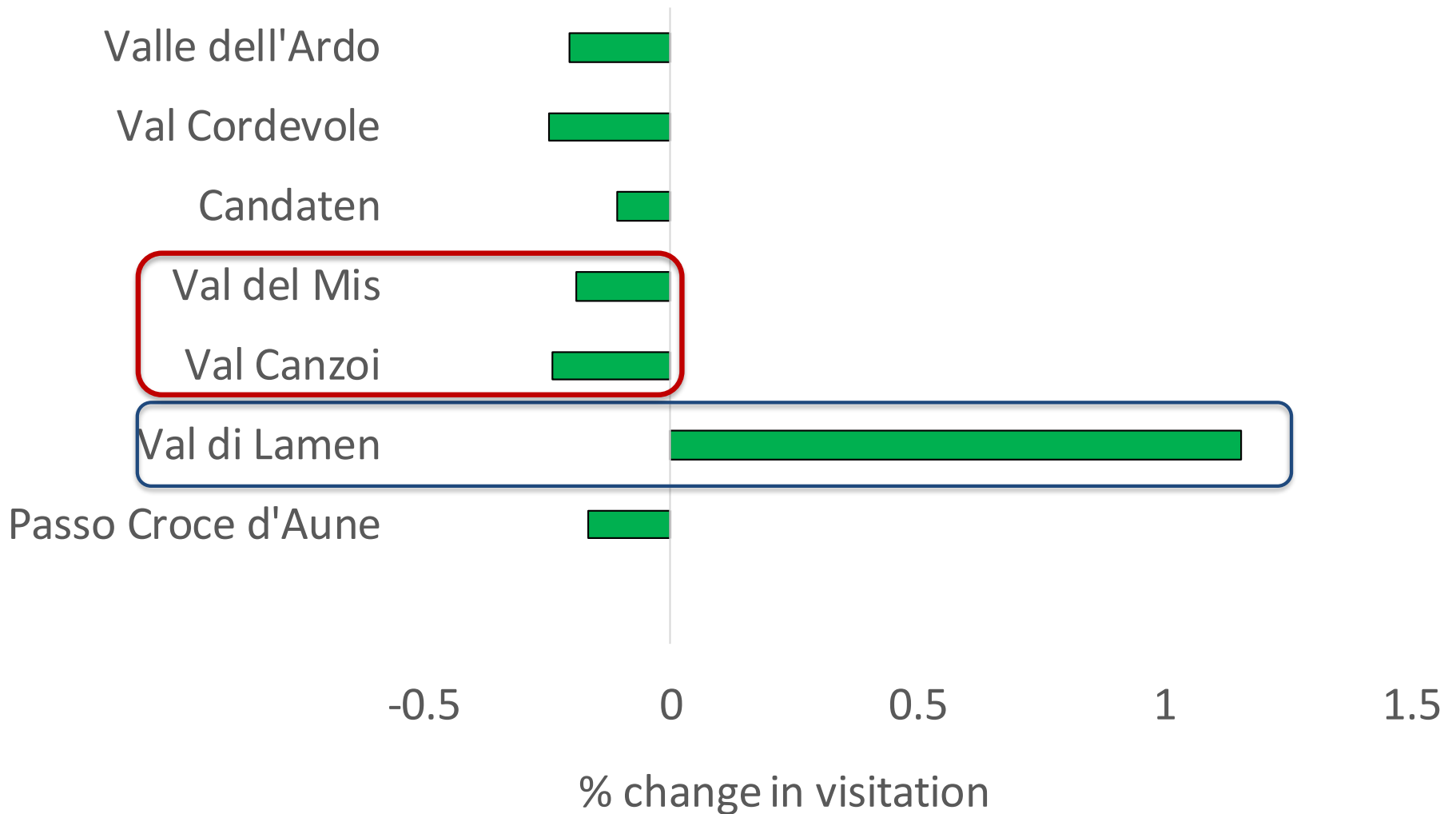
N.	Attribute	Level
1	Entrance fee	2, 6, 10 €
2	Bivouacs	Open upon request, always open, + facilities (food, wood)
3	Vehicular Access	Always open, closed Sunday (shuttle service), closed Saturday-Sunday (shuttle service)
4	Crowding	Less than 20, 21-40, more than 40 visitors
5	Picnic sites	30, 40, 50
6	Griffon vulture	NA/available
7	Information centers	3, 5, 7
9	MTB trails	0, 2, 5
10	Thematic itineraries	8, 16, 23

Q1: Number of visits (last 5 years)



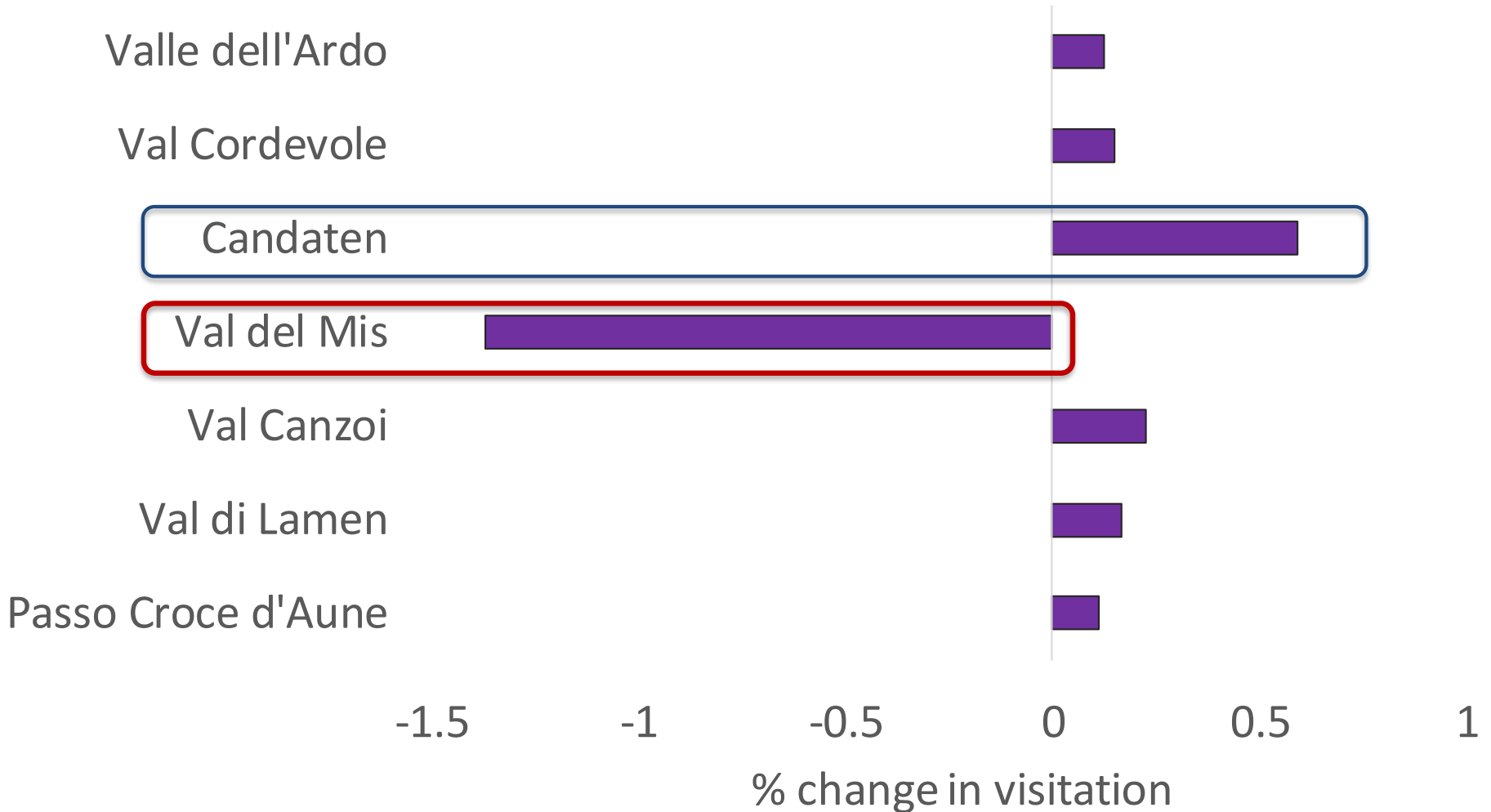
Q2: Congestion management

Policy scenario 1: +1 picnic area in Val di Lamen



Q2: Congestion management

Policy scenario 2: -1 picnic area in Val del Mis



4 Valuing Collective Reputation for Environmentally-Friendly Production Methods

To be successful, new types of environmentally-friendly production methods (EFPMs) for vegetables require consumer recognition in the market place.

While functioning markets have existed for a while for organic products, this is not so for vegetables produced by IPM and bio-dynamic (BD).

Aims to measure WTP for:

- production methods
- collective reputation

Carrots' main attributes

Production method

Conventional

Integr. pest mgmt.

Bio-dynamic

Organic

Skin imperfection

Many

Some

Few

Packaging

yes

no

Cost (Euro)

1.3

1.5

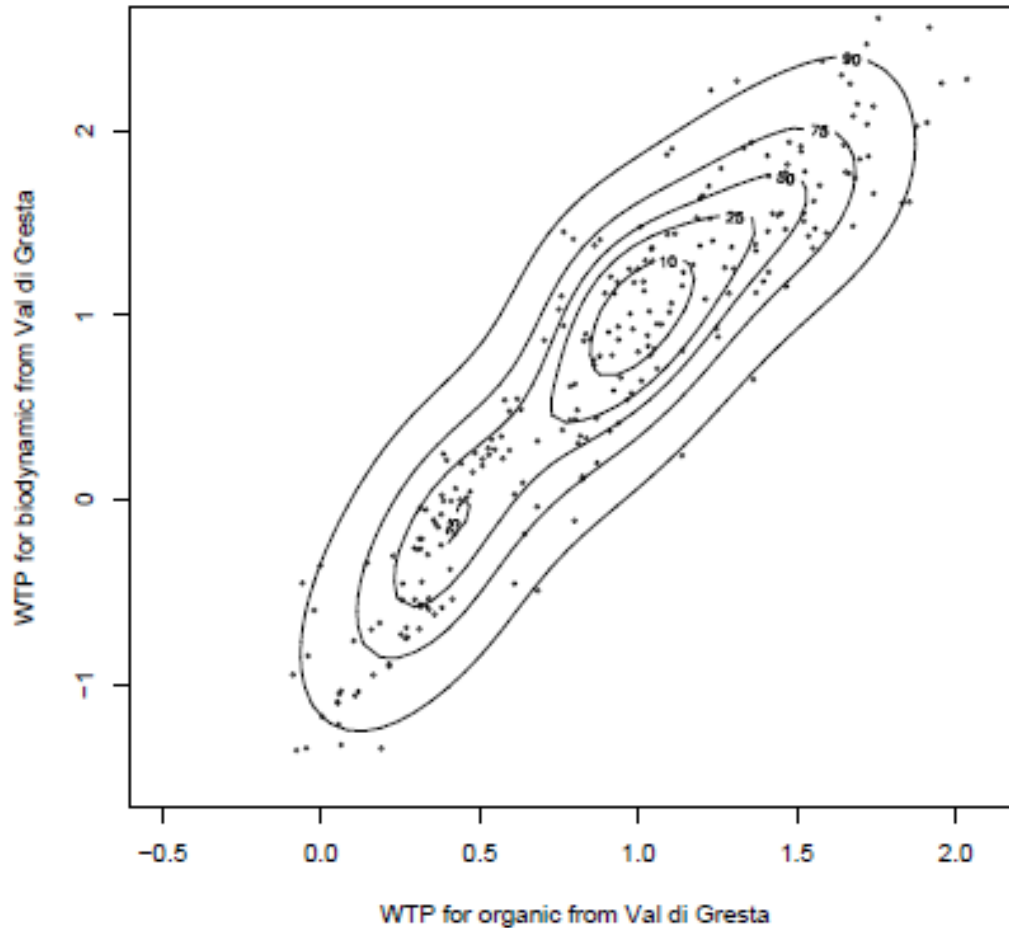
2.2

Collective reputation

Val di Gresta

Out of Val di Gresta

Bivariate kernel plots of conditional WTP estimates (€/kg)



Thanks for your attention!

