

# Report on Ecosystem Services research in Italy

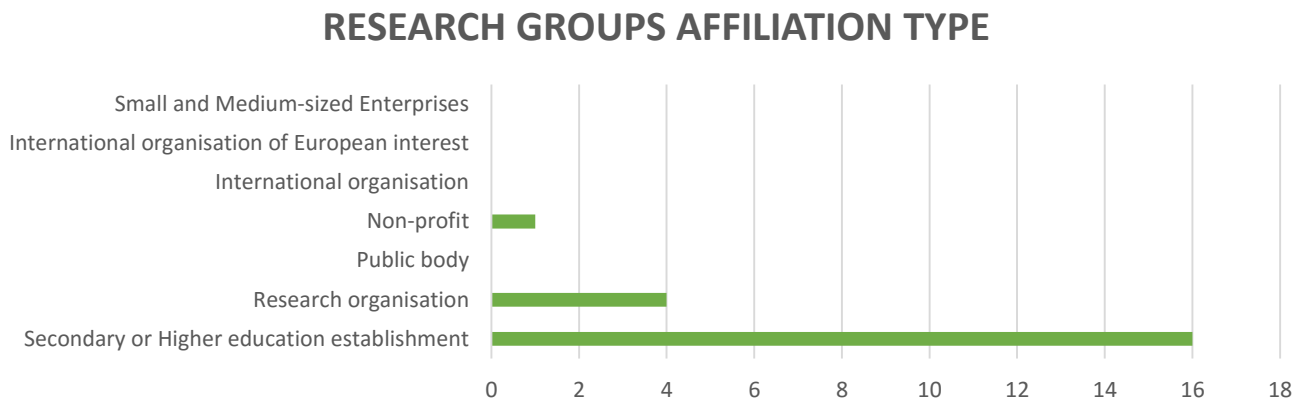
version 1 \_ September 2015

The report provides an overview of the most significant studies and main research groups in the field of Ecosystem Services in Italy, based on an online survey that was distributed during summer 2015. The initiative has been promoted by the ESP National Network Lead for Italy and is a first step towards building a strong and motivated ESP National Network. Twenty-one research groups voluntarily adhered to the survey and provided the information that are summarized in this report.

The report is composed of two parts. The first part contains a list of the research groups that answered the questionnaire and summarizes the main results of the survey in terms of ES considered and scale and type of analysis, thus providing a general overview of ES research in Italy. The second part contains more detailed information for each research group, including a direct link to the website as well as name and mail address of the contact person. A table sums up types and scales of analysis for each ES. A short description of the three most representative studies of each group in the ES field completes the sheet.

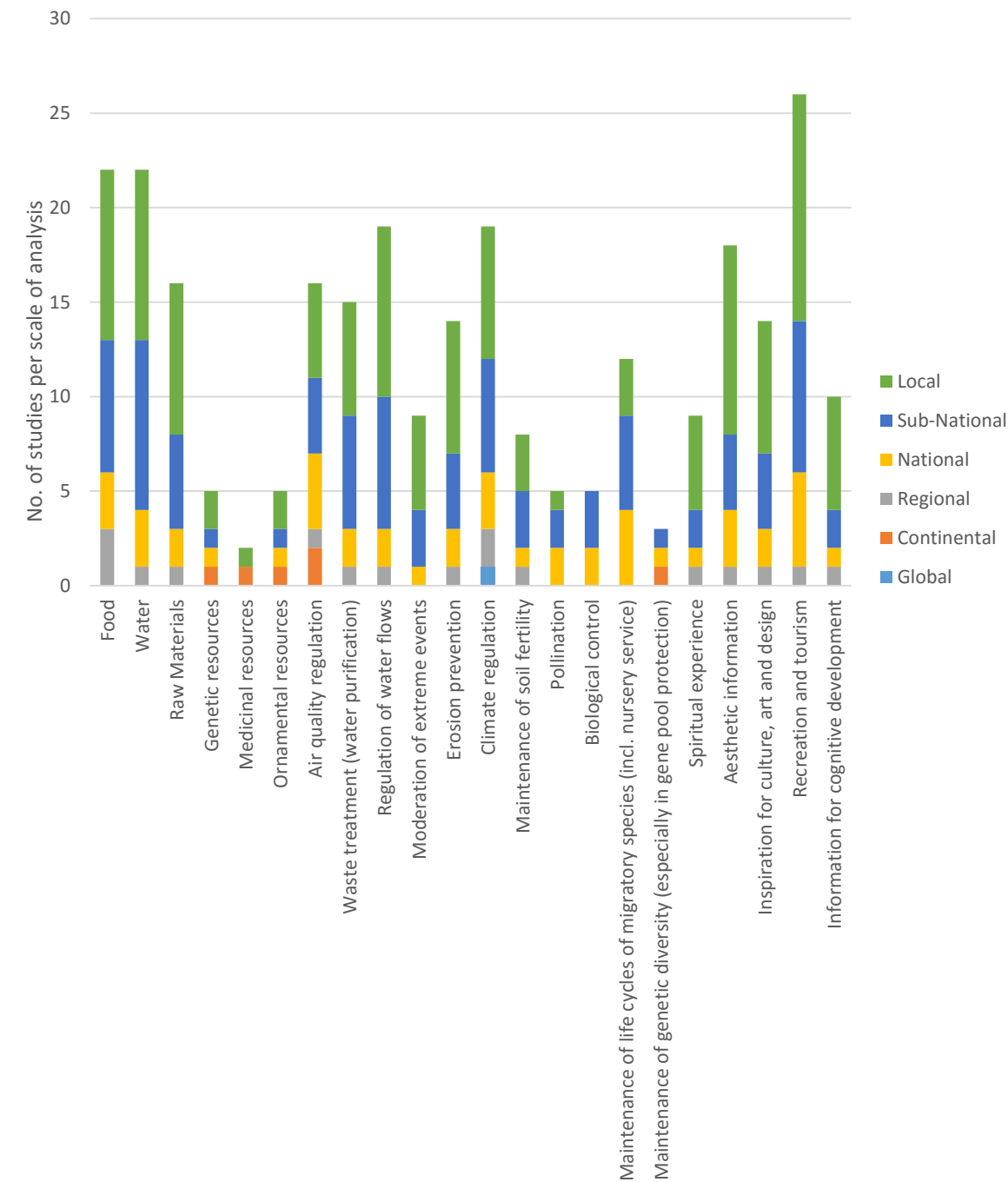
The table below lists the research groups that adhered to the survey. The detailed information regarding each group are accessible through an internal link by clicking on the names. The graph that follow shows the distribution of the respondents according to the type of the affiliation institution. Most of the groups (16) belong to *Secondary or Higher education establishments*. Four of the respondents are from *Research organizations* and only one is a *Non-profit organization*. *Small and medium sized enterprises*, *International organizations* and *Public bodies* are not represented among the respondents to this first version of the survey.

#	RESPONDENT RESEARCH GROUP	AFFILIATION
1	<a href="#">Aquatic Ecology Lab</a>	University of Parma
2	<a href="#">CETA</a>	
3	<a href="#">Dept. Agri-Food Production and Environmental Science</a>	University of Firenze
4	<a href="#">Dept. Civil Engineering and Architecture</a>	University of Catania
5	<a href="#">Envix lab</a>	University of Molise
6	<a href="#">Governing and Governance of Landscape</a>	University luav of Venice
7	<a href="#">Institute for Alpine Environment</a>	EURAC
8	<a href="#">Institute of Management / Sustainability Management</a>	School of Advanced Studies St. Anna
9	<a href="#">Laboratorio di Fisica Ambientale ed Ecofisiologia</a>	Università Cattolica del Sacro Cuore
10	<a href="#">Laboratory of Ecodynamics and Sustainable Development</a>	Parthenope University of Naples
11	<a href="#">Laboratory of Functional Ecology and ESs</a>	Sapienza University of Rome
12	<a href="#">LANDS Onlus</a>	
13	<a href="#">Landscape Ecology Laboratory and ESs Evaluation</a>	Urbino University “Carlo Bo”
14	<a href="#">Making Good NATURA Project</a>	University of Molise - CURSA
15	<a href="#">Paesaggi Agrari</a>	University of Sassari
16	<a href="#">Planes</a>	University of Trento
17	<a href="#">Tempesta and Vecchiato</a>	University of Padova
18	<a href="#">Territories of ecological and cultural diversities</a>	University of Padova
19	<a href="#">TreeCity Group</a>	University of Pisa
20	<a href="#">Unità di Analisi e Gestione delle Risorse Ambientali</a>	University of Insubria
21	<a href="#">Weed Science group</a>	CNR Institute for agroenvironmental and forest biology

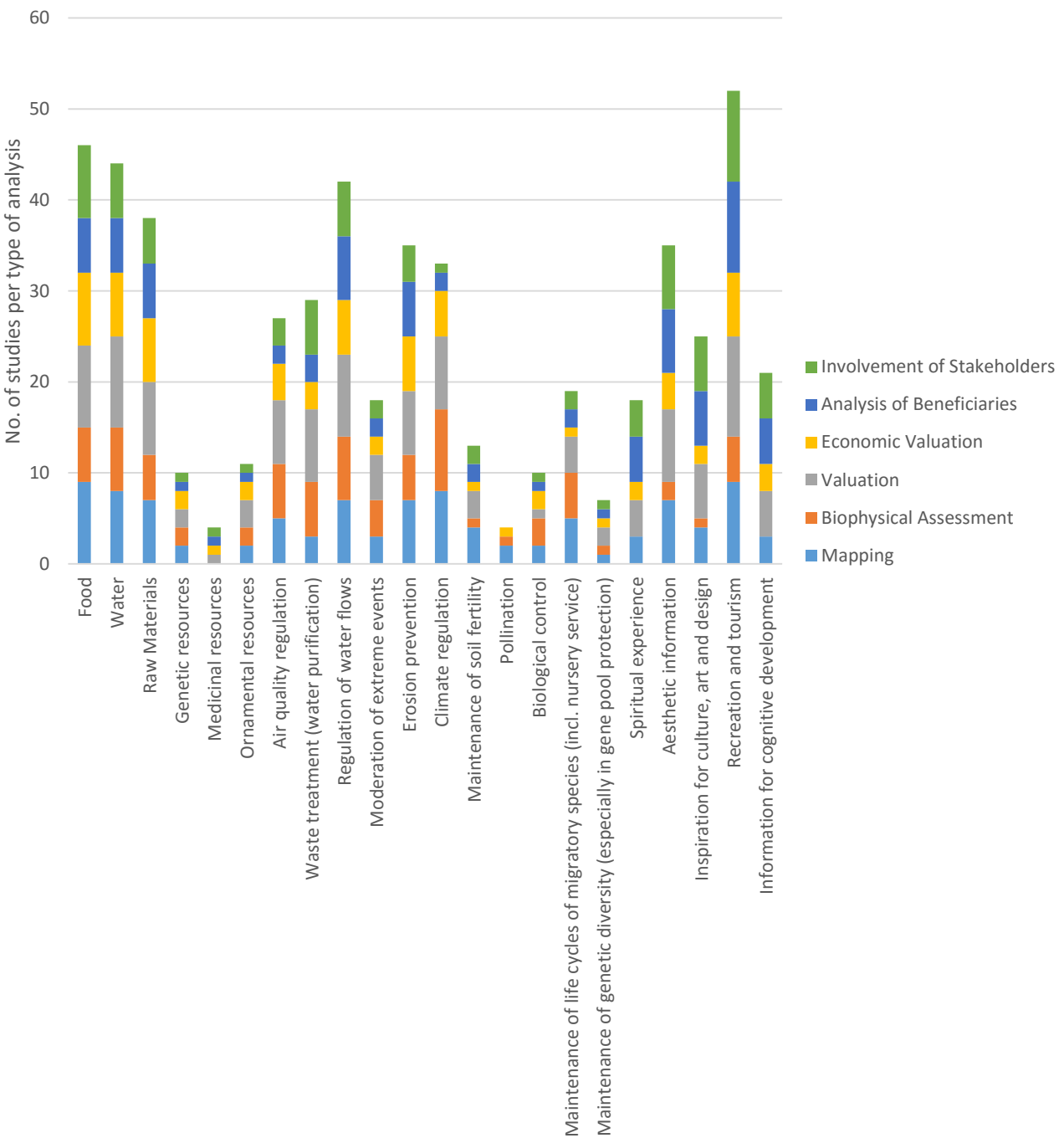


The following pages summarize scale and type of analysis of the ES studies realized by the respondents. Recreation and tourism are the most studied services both in terms of types and scales of analysis applied, followed by food and water provision and by regulation of water flows. The smaller scales (local and sub-national) are the most analyzed, while continental and global scales are hardly ever considered. The panorama on the types of analysis is wider and more diverse with all the six types applied to almost all the ecosystem services.

ECOSYSTEM SERVICES STUDIES AND SCALE OF ANALYSIS



ECOSYSTEM SERVICES STUDIES & TYPE OF ANALYSIS



Italian research groups on ES

Aquatic Ecology Lab, University of Parma

website: <http://laboratoryofaquaticecology.weebly.com/>

contact person: [Pierluigi Viaroli](#)

	SCALE OF ANALYSIS	Global	Comtonental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
ECOSYSTEM SERVICE														
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Spiritual experience														
Aesthetic information														
Inspiration for culture, art and design														
Recreation and tourism														
Information for cognitive development														

1. Study of nitrogen and phosphorus fluxes in riverine wetlands and coastal lagoons in relation to hydraulic connectivity and vegetation communities

LOCATION:

**DESCRIPTION:** Wetland ecosystems heavily exploited watersheds often become isolated from main water bodies and/or the vegetation undergoes shifts in composition and biomass. In this context nitrogen recycling prevails over nitrogen dissipation and P fluxes are subject to pulsed availability. Experiments were carried out in about 20 wetlands in the lower Po River reaches and in coastal lagoons in the delta. Wetlands with different connectivity degree with rivers and with different vegetation communities were considered. There is evidence from these studies, that healthy phanerogams communities and interconnected wetlands and aquatic habitats could greatly improve nitrogen removal via denitrification and phosphorus control, with beneficial effects on water quality and persistence of habitats themselves.

LINKS and PUBLICATIONS:

Bartoli M., Castaldelli G., Nizzoli D., Viaroli P. (2012). Benthic primary production and bacterial denitrification in a Mediterranean eutrophic coastal lagoon, Journal of Experimental Marine Biology and Ecology 438, 41–51. [doi:10.1016/j.jembe.2012.09.011](#)

Bartoli M., Longhi D., Nizzoli D., Como S., Magni P., Viaroli P. (2009). Short term effects of hypoxia and bioturbation on solute fluxes, denitrification and buffering capacity in a shallow dystrophic pond, Journal of Experimental Marine Biology and Ecology 381(2), 105–113. [doi:10.1016/j.jembe.2009.09.018](#)

Bartoli M., Racchetti E., Delconte C.A., Sacchi E., Soana E., Laini A., Longhi D., Viaroli P. (2012). Nitrogen balance and fate in a heavily impacted watershed (Oglio River, Northern Italy): in quest of the missing sources and sinks, Biogeosciences 9, 361-373. [doi:10.5194/bg-9-361-2012](#)

Pinardi M., Bartoli M., Longhi D., Viaroli P. (2011). Net autotrophy in a fluvial lake: the relative role of phytoplankton and floating-leaved macrophytes, Aquatic Sciences 73, 389-403. [doi:10.1007/s00027-011-0186-7](#)

Racchetti E., Bartoli M., Ribaudo C., Longhi D., Brito L.E.Q., Naldi M., Iacumin P., Viaroli P. (2010). Short term changes in pore water chemistry in river sediments during the early colonization by *Vallisneria spiralis*, Hydrobiologia 652, 127-137. [doi:10.1007/s10750-010-0324-6](#)

Racchetti E., Bartoli M., Soana E., Longhi D., Christian R.R., Pinardi M., Viaroli P. (2011). Influence of hydrological connectivity of riverine wetlands on nitrogen removal via denitrification, Biogeochemistry 103(1), 335-354. [doi:10.1007/s10533-010-9477-7](#)

Viaroli P., Bartoli M., Giordani G., Naldi M., Orfanidis S., Zaldivar J.M. (2008). Community shifts, alternative stable states, biogeochemical controls and feedbacks in eutrophic coastal lagoons: a brief overview, Aquatic Conservation: Freshwater and Marine Ecosystems 18, S105-S117. [doi:10.1002/aqc.956](#)

2. Study of CO2 and CH4 fluxes in lakes, rivers and riverine wetlands in relation to trophic conditions, vegetation communities and meio- and macrofauna

LOCATION:

**DESCRIPTION:** The main hypothesis of these studies is that aquatic vegetation controls to different degree water-air fluxes of carbondioxide and methane. Healthy submerged vegetation can control both water and sediment process through oxygen release. Thisway they control methane emission and keep low the carbon dioxide effluxes. Floating leaved macrophytes are only temporary sink of atmospheric carbon dioxide and that they favor water hypoxia and large methane efflux from sediment to the atmosphere, due to their shading effect and scarce ability to transfer oxygen to submerged tissues. These studies are performed in a series of wetlands, rivers and coastal lagoons in the Po river basin.

LINKS and PUBLICATIONS:

Bolpagni R., Pierobon E., Longhi D., Nizzoli D., Bartoli M., Tomaselli M., Viaroli P. (2007). Diurnal exchanges of CO2 and CH4 across the water–atmosphere interface in a water chestnut meadow (*Trapa natans L.*), Aquatic Botany 87, 43–48. [doi:10.1016/j.aquabot.2007.02.002](#)

Pierobon E., Bolpagni R., Bartoli M., Viaroli P. (2010). Net primary production and seasonal CO<sub>2</sub> and CH<sub>4</sub> fluxes in a *Trapa natans* L. meadow, Journal of Limnology 69, 225-234. [doi:10.3274/JL10-69-2-05](https://doi.org/10.3274/JL10-69-2-05)

Ribaudo C., Bartoli M., Racchetti E., Longhi D., Viaroli P. (2011). Seasonal fluxes of O<sub>2</sub>, DIC and CH<sub>4</sub> in sediments with Vallisneria spiralis: indications for radial oxygen loss, Aquatic Botany 94, 134- 142. [doi:10.1016/j.aquabot.2011.01.003](https://doi.org/10.1016/j.aquabot.2011.01.003)

Ribaudo C., Bartoli M., Longhi D., Castandi S., Neubauer S.C., Viaroli P. (2012). CO<sub>2</sub> and CH<sub>4</sub> fluxes across a *Nuphar lutea* (L.) Sm. stand, Journal of Limnology 71, 200- 210. [doi:10.4081/jlimnol.2012.e21](https://doi.org/10.4081/jlimnol.2012.e21)

Pinardi M., Rossetto M., Viaroli P., Bartoli M. (2014). Daily and seasonal variability of CO<sub>2</sub> saturation and evasion in a free flowing and in a dammed river reach, Journal of Limnology 73, 468-481.

**3. Restoration of pit lakes and rehabilitation of functions and services in the lowland river floodplain**

**LOCATION:** Po river floodplain, North Italy

**DESCRIPTION:** In the Po river floodplain there are ca. 500 pit lakes (originated from sand, gravel and clay quarrying) with a surface area of ca. 50 km<sup>2</sup>. Their sustainable management can provide biodiversity enhancement, availability of good quality water, fish fauna, and processes that can improve water quality. In the last three decades we studied seven main lakes in the middle Po river reach aiming to analyze and quantify key functions of P and N control. Overall, our results indicate that in both denitrification and N assimilation play important and comparable roles in nitrogen removal and suggest that these shallow aquatic environments can be managed for removing nitrate that is one of the major contaminants in the farmland.

**LINKS and PUBLICATIONS:**

Tavernini S., Nizzoli D., Rossetti G., Viaroli P. (2009). Trophic state and seasonal dynamics of phytoplankton communities in two sand-pit lakes at different successional stages, Journal of Limnology 68, 217-228. [doi:10.3274/JL09-68-2-06](https://doi.org/10.3274/JL09-68-2-06)

CETA

contact person: [Francesca Visintin](#)

	SCALE OF ANALYSIS	Global	Comtonental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
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Spiritual experience														
Aesthetic information														
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Recreation and tourism														
Information for cognitive development														

1. SARA project: terrestrial protected areas

LOCATION:

DESCRIPTION: Flow account of cost (economic and environmental costs) and benefits (economic and environmental). Environmental benefits have been assessed assigning economic value to ESs.

LINKS and PUBLICATIONS:

2. Marine protected areas

LOCATION: Miramare marine Protected Area, Italy

DESCRIPTION: Environmental accounting model has been developed in order to assess the economic value of ESs.

LINKS and PUBLICATIONS:

3. Italian marine protected areas

LOCATION: Italy

DESCRIPTION: Environmental accounting, on the base of the CICES matrix (MAES working group) ESs are going to be assessed: Wild animals and their outputs, Mass stabilization and control of erosion rates, Global climate regulation by reduction of greenhouse gas concentrations, Experiential use of plants, animals and land/sea-scapes in different environmental settings, Physical use of land/sea-scapes in different environmental settings, Scientific, Educational

LINKS and PUBLICATIONS:

Dept. Agri-Food Production and Environmental Science, University of Firenze

contact person: [Filippo Bussotti](#)

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1. FunDivEUROPE project (7FP)

LOCATION: Europe

DESCRIPTION: Links between tree diversity and Ecosystem services were evaluated in 6 European forests.

LINKS and PUBLICATIONS:

<http://www.fundiveurope.eu/>



contact person: [Daniele La Rosa](#)

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Information for cognitive development														

1. Characterization of open spaces in urban/periurban contexts for Ecosystem Services provision

LOCATION: Italy

DESCRIPTION:

LINKS and PUBLICATIONS:

La Rosa S.D., Privitera R. (2013). Characterization of non-urbanized areas for land-use planning of agricultural and green infrastructure in urban contexts. Landscape and Urban Planning 109, 94-106. [doi:10.1016/j.landurbplan.2012.05.012](#)

La Rosa S.D., Barbarossa L., Privitera R., Martinico F., La Greca P. (2014). Agriculture and the City: A Method for Sustainable Planning of New Forms of Agriculture in Urban Contexts, Land Use Policy 41, 290-303. [doi:10.1016/j.landusepol.2014.06.014](#)

2. Cultural ecosystem services evaluation and mapping

LOCATION: -

DESCRIPTION:

LINKS and PUBLICATIONS:

La Rosa S. D., Spyra M, Inostroza L. (in press). Indicators of Cultural Ecosystem Services for urban planning: a review. Ecological Indicators. [doi:10.1016/j.ecolind.2015.04.028](#)

3. Small scale Geodesign of urban areas for optimazion/maximizaton of ES

LOCATION: Catania, Italy

DESCRIPTION:

LINKS and PUBLICATIONS:

Martinico F., La Rosa S. D., Privitera R. (2014). Green Oriented Urban Development for urban ecosystem services provision in a medium sized city in Southern Italy, iForest 7, 385-395. [doi:10.3832/ifor1171-007](#)

La Rosa S. D. (2014). Geodesign for Urban Ecosystem Services, TeMA - The journal of Land Use, Mobility and Environment, 06/2014. [doi:10.6092/1970-9870/2537](#)

	SCALE OF ANALYSIS	Global	Comtonental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
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1. Boundary-based analysis for assessing coastal dune landscape integrity over time

LOCATION: Two Italian LTER sites on the Adriatic coast of Central Italy (Molise Region)

DESCRIPTION: Coastal dunes are transitional systems which offer manifold ecosystem services, including material and intangible benefits, whose relevance for human society has been little investigated to date. In order to plan a sustainable use of these threatened ecosystems, proper indicators to quantify ecological services and functions over time should be provided. Since the functionality of coastal dunes is affected by the specific contiguity among different dune habitat patches, in this paper we propose the use of landscape integrity, expressed by the number and length of boundary types among the aforementioned habitats, as an ecosystem functionality indicator. In particular, we aim at properly expressing the trend of coastal dune mosaic integrity in two Italian LTER sites over the last sixty years by applying a generalized diversity function on the number and length of boundary types. Such functions, unlike a traditional diversity index, allow a complete summarization of landscape diversity and structure. The proposed method has proved to be effective in the considered context, because it has adequately underlined the different landscape integrity trend recorded in the two sites. In particular, generalized diversity functions showed to efficiently express both rough and moderate anthropogenic transformations, which affected spatial heterogeneity and functionality of the considered coastal dune mosaic. Further applications at different scales and across different ecosystems are encouraged.

LINKS and PUBLICATIONS:

Drius M., Malavasi M., Acosta A.T.R., Ricotta C., Carranza M.L. (2013). Boundary-based analysis for assessing coastal dune landscape integrity over time, Applied Geography 45, 1-48. [doi:10.1016/j.apgeog.2013.08.003](https://doi.org/10.1016/j.apgeog.2013.08.003)

2. Assessment of ecosystem integrity and service gradients across Europe using the LTER Europe network

LOCATION:

DESCRIPTION: Better integration of knowledge from ecological, social and economic science is necessary to advance the understanding and modelling of socio-ecological systems. To model ecosystem integrity (EI) and ecosystem services (ES) at the landscape scale, assessment matrices are commonly used. These matrices assign capacities to provide different services to different land cover types. We revised such an existing matrix and examined the regional heterogeneity in EI and ES provision in Europe and searched for spatial gradients in their provision to elucidate their suitability for large-scale EI and ES mapping in Europe. Overall, 28 sites belonging to the Long-Term Ecological Research network in Europe participated in this study, covering a longitudinal gradient from Spain to Bulgaria and a latitudinal gradient from Italy to Sweden. As a primary outcome, an improved and consolidated EI and ES matrix was achieved with 17.5% of all matrix fields updated. For the first time, this new matrix also contains measures of uncertainty for each entry. EI and ES provision assessments were more variable for natural and semi-natural than for more anthropogenically dominated land cover classes. Among the main types of EI and ES, cultural service provision was rated most heterogeneously in Europe, while abiotic provisioning services were more constant. Longitudinal and latitudinal EI and ES gradients were mostly detected in natural and semi-natural land cover types where temperature and precipitation are major drivers. In anthropogenically determined systems in which cultural services play a dominant role, temperature and precipitation gradients were less important. Our results suggest that this matrix approach to assess EI and ES provision principally works on broad spatial scales; however, local assessments for natural systems seem to be less generalizable than assessments from anthropogenically determined systems. Provisioning and regulating services are more generalizable than cultural services. Particularly in natural and semi-natural systems, spatial gradients need to be considered. We discuss uncertainties associated with this matrix-based EI and ES assessment approach and suggest that future large-scale studies should include additional land cover information and ecosystem disservices and may determine ES fluxes by differentiating between ES provision and consumption.

LINKS and PUBLICATIONS:

Stoll S., Frenzel M., Burckhard B., Adamescu M., Augustiatis A., Baeßler C.,Bonet F.J., Cazacu C., Cosor G.L., Diaz-Delgado R., Carranza M.L., Grandin U., Haase P., Hämäläinen H., Loke R., Müller J., Stanisci A., Staszewski T., Müller F. (2015). Assessment of ecosystem integrity and service gradients across Europe using the LTER Europe network, Ecological Modeling 295, 75–87. [doi:10.1016/j.ecolmodel.2014.06.019](https://doi.org/10.1016/j.ecolmodel.2014.06.019)

### 3. Assessing conservation status on coastal dunes: A multiscale approach

**LOCATION:** Tyrrhenian coast, Latium, Italy

**DESCRIPTION:** Coastal dune systems are particularly fragile and threatened environments, which, however, provide fundamental ecosystem services to nearby urban areas acting for example as protective buffers against erosion. Correctly assessing their conservation status is a priority in order to manage them adequately and to plan urban development in coastal regions. In this paper we propose a practical multiscale method for the assessment of the conservation status of sandy coastal environment. The proposed method is articulated in two stages, one focusing on the landscape and the other on the plant community level. In the first phase mosaic structure and composition of the coastal landscape are analyzed using a series of indicators: natural coastal surface, richness of land cover typologies, landscape diversity and evenness, number and average size of habitat patches, and mean shape index. At a detailed scale, floristic, vegetational and structural aspects of the dune plant communities are analyzed along the main environmental gradient by measuring: spatial connectivity and richness of boundaries, species diversity, evenness and chorological index. In this work we apply and test the method in an experimental area on the Tyrrhenian coast of Italy (Latium region), comparing the conservation status of two study sites.

**LINKS and PUBLICATIONS:**

Carboni M., Carranza M.L., Acosta A. (2009). Assessing conservation status on coastal dunes: A multiscale approach. Landscape and urban planning. 91, 17–25. [doi:10.1016/j.landurbplan.2008.11.004](https://doi.org/10.1016/j.landurbplan.2008.11.004)

Governing and Governance of Landscape, University luav of Venice

website: <http://www.planningclimatechange.org/selector/index.html>

contact person: [Elena Gissi](#)

	SCALE OF ANALYSIS	Global	Comtonental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
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1. Biomass supply chain and ecosystem services: operational criteria for the installation and management of low-power plants

LOCATION: Province of Rovigo, Italy

DESCRIPTION: The research aims at investigating the trade-offs between bioenergy, specifically Biomass-based energy sources, and other ecosystem services. The study proposes a methodology to calculate the sustainable potential as a portion of bioenergy theoretical potential, considering trade-offs with other ES.

LINKS and PUBLICATIONS:

<http://www.planningclimatechange.org/>

Gissi E., Gaglio M., Reho M (2014). Trade-off between carbon storage and biomass-based energy sources ecosystem services, the case study from the province of Rovigo (Italy), Annali di Botanica 4, 73-81. [doi:10.4462/annbotrm-11814](https://doi.org/10.4462/annbotrm-11814)

Gissi E., Gaglio M., Reho, M. (under evaluation). Sustainable energy potential from biomass through Ecosystem Services Trade-off Analysis: the case of the Province of Rovigo (Veneto Region, Italy).

2. Exploring the social production of Ecosystem Services within a decision making process. Comparative analysis from a role-playing game approach in South East Europe

LOCATION: South East Europe

DESCRIPTION: The research aims at supporting capacity building in natural resources management and energy planning through the application of training program based on Role Playing game and Simulation on Ecosystem Services. The experiment has been replicated in 10 sessions in 8 Southern East European Countries, with almost 230 participants from marginal rural landscapes.

LINKS and PUBLICATIONS:

[www.terre-project.eu](http://www.terre-project.eu)

Gissi E., Musco F., Garramone V. (2014). Esperienze di capacity building nella gestione delle risorse naturali secondo l’approccio dei servizi ecosistemici, Urbanistica Informazioni 256, 77-78.

Gissi E., Garramone V., Lucertini G., Musco F., Reho M. (2014). Capacity-building for sustainable development through renewable energy sources, Consorzio per la Gestione del Centro di Coordinamento delle Attività di Ricerca inerenti il Sistema lagunare di Venezia (CORILA), Venezia, ISBN 9788889405284.

Gissi E., Garramone V. (under preparation). Exploring the social production of Ecosystem Services within a decision making process. Comparative analysis from a role-playing game approach in South East Europe.

3. Paesaggi Italiani, Toward a fourth pole of Italian tourism

LOCATION: Veneto and Friuli Venezia Giulia regions, Italy

DESCRIPTION: Paesaggi Italiani is a project that aims at developing a fourth pole of Italian tourism, the so-called Landscape Tourism which, in addition to the three consolidated National tourist supplies (sea, mountains and cities of art), promotes the landscape in rural areas. A model that is based on the promise of a new emotional experience in which all the senses are involved and that becomes the occasion to pursue quality of life and leisure benefiting of landscape services. Paesaggi Italiani is a National project for rural areas promoted by a partnership of Local Action Groups (LAGs) of Eastern Veneto, Alta Carnia and the Natisone valleys, within the respective Local development programs (cooperation under measure 421 of the Rural Development Program 2007/13).

LINKS and PUBLICATIONS:

Institute for Alpine Environment, EURAC

website: <http://www.eurac.edu/en/research/mountains/alpenv/Pages/default.aspx>

contact person: [Uta Schirpke](#)

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Recreation and tourism														
Information for cognitive development														

1. LIFE+ Making Good Natura

**LOCATION:** 21 sites of the Natura 2000 network in Italy (Basilicata, Calabria, Campania, Emilia Romagna, Marche, Lombardy e Sicily)

**DESCRIPTION:** The project LIFE+ Making Good Natura develops innovative approaches of environmental governance to preserve agro-forest-ecosystems and elaborates instruments for qualitative and quantitative valuation of the ecosystem services in the study sites of the Natura 2000 network. The project aims to create the basis for an effective management of the habitats and species included in the Habitat and Birds Directive to provide management and self-financing instruments for financing conservation measures to the administrative authorities of the Natura 2000 sites. The project involves 21 study sites of the Natura 2000 network in Italy (Basilicata, Calabria, Campania, Emilia Romagna, Marche, Lombardy e Sicily).

**LINKS and PUBLICATIONS:**

[www.lifemgn-serviziecosistemici.eu](http://www.lifemgn-serviziecosistemici.eu)

Schirpke U., Scolozzi R., De Marco C., Tappeiner U. (2014). Mapping beneficiaries of ecosystem services flows from Natura 2000 sites, Ecosystem Services 9, 170-179. [doi:10.1016/j.ecoser.2014.06.003](https://doi.org/10.1016/j.ecoser.2014.06.003)

2. Stubaital (Austria) VITAL: Ecosystem serVlce provision from coupled planT and microbiAL functional diversity in managed grasslands

**LOCATION:**

**DESCRIPTION:** VITAL is a Europe wide BiodivERsA funded project that explores the hypothesis that the delivery of multiple ecosystem services in semi-natural grasslands, and its vulnerability to changing management, can be explained by the coupling among plant and soil microbial functional diversity, and its impacts on carbon and nitrogen turnover. Our core objective is therefore to build a conceptual model of relationships among plant and microbial functional diversity, and multiple ecosystem service delivery.

**LINKS and PUBLICATIONS:**

[www.project-vital.net](http://www.project-vital.net)

Schirpke U., Leitinger G., Tasser E., Schermer M., Steinbacher M., Tappeiner U. (2013). Multiple ecosystem services of a changing Alpine landscape: past, present and future, International Journal of Biodiversity Science, Ecosystem Services & Management 9, 123-135. [doi:10.1080/21513732.2012.751936](https://doi.org/10.1080/21513732.2012.751936)

Leitinger G., Ruggenthaler R., Hammerle A., Lavorel S., Schirpke U., Clement J.C., Lamarque P., Obojes N., Tappeiner U. (2015). Impact of droughts on water provision in managed alpine grasslands in two climatically different regions of the Alps, Ecohydrology. [doi:10.1002/eco.1607](https://doi.org/10.1002/eco.1607)

Institute of Management / Sustainability Management, School of Advanced  
Studies St. Anna

contact person: [Natalia Gusmerotti](#)

[illegible]

Laboratorio di Fisica Ambientale ed Ecofisiologia, Università Cattolica del Sacro Cuore

contact person: [Giacomo Gerosa](#)

	SCALE OF ANALYSIS	Global	Comtonental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
ECOSYSTEM SERVICE														
Food														
Water														
Raw Materials														
Genetic resources														
Medicinal resources														
Ornamental resources														
Air quality regulation														
Waste treatment (water purification)														
Regulation of water flows														
Moderation of extreme events														
Erosion prevention														
Climate regulation														
Maintenance of soil fertility														
Pollination														
Biological control														
Maintenance of life cycles of migratory species (incl. nursery service)														
Maintenance of genetic diversity (especially in gene pool protection)														
Spiritual experience														
Aesthetic information														
Inspiration for culture, art and design														
Recreation and tourism														
Information for cognitive development														

1. Ozone removal from Alpine forests

LOCATION: Valle Camonica (BS), Italy.

DESCRIPTION: Quantify the amount of ozone removed from the atmosphere and the partition of deposition pathways: stomatal and non stomatal.

LINKS and PUBLICATIONS:

Gerosa G., Finco A., Negri A., Marzuoli R., Wieser G (2013). Ozone Fluxes to a Larch Forest Ecosystem at the Timberline in the Italian Alps, in G.A. Cerbu, M. Hanewinkel, G. Gerosa and R. Jandl (Eds.), "Management Strategies to Adapt Alpine Space Forests to Climate Change Risks", ISBN 978-953-51-1194-8. [doi:10.5772/56282](#)

2. Food safety under pollutant climate

LOCATION: Curno (BG), Italy

DESCRIPTION: Quantify the relative yield of different crops under high ozone and nitrogen exposure.

LINKS and PUBLICATIONS:

<http://icpvegetation.ceh.ac.uk/>

3. Role of planitial forests in the removal of airborne pollutants

LOCATION: Bosco della Fontana (MN), Italy

DESCRIPTION: Quantify the amount of pollutants removed by the forest in a multiannual span, namely ozone, NOx, PM and ammonia.

LINKS and PUBLICATIONS:

<http://www.eclair-fp7.eu/>

Laboratory of Ecodynamics and Sustainable Development, Parthenope  
University of Naples

contact person: [Natasha Nikodinoshka](#)

[illegible]



## Laboratory of Functional Ecology and ESs, Sapienza University of Rome

website: <http://www.dba302.uniroma1.it/>

contact person: [Fausto Manes](#)

	SCALE OF ANALYSIS	Global	Comtontental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
<b>ECOSYSTEM SERVICE</b>														
Food						■	■	■	■		■			■
Water						■	■	■			■	■		
Raw Materials								■						
Genetic resources								■						
Medicinal resources								■						
Ornamental resources								■						
Air quality regulation				■	■	■		■	■	■	■	■	■	■
Waste treatment (water purification)						■		■	■	■				
Regulation of water flows								■						
Moderation of extreme events								■						
Erosion prevention								■						
Climate regulation							■	■	■					
Maintenance of soil fertility								■						
Pollination								■						
Biological control								■						
Maintenance of life cycles of migratory species (incl. nursery service)								■						
Maintenance of genetic diversity (especially in gene pool protection)								■						
Spiritual experience								■						
Aesthetic information								■						
Inspiration for culture, art and design						■	■	■			■			
Recreation and tourism						■	■	■			■			
Information for cognitive development								■						

### 1. Urban ecosystem services: tree diversity and stability of tropospheric ozone removal

**LOCATION:** Rome, Italy

**DESCRIPTION:** Urban forests provide important ecosystem services, such as urban air quality improvement by removing pollutants. While robust evidence exists that plant physiology, abundance, and distribution within cities are basic parameters affecting the magnitude and efficiency of air pollution removal, little is known about effects of plant diversity on the stability of this ecosystem service. Here, by means of a spatial analysis integrating system dynamic modeling and geostatistics, we assessed the effects of tree diversity on the removal of tropospheric ozone (O<sub>3</sub>) in Rome, Italy, in two years (2003 and 2004) that were very different for climatic conditions and ozone levels. Different tree functional groups showed complementary uptake patterns, related to tree physiology and phenology, maintaining a stable community function across different climatic conditions. Our results, although depending on the city-specific conditions of the studied area, suggest a higher function stability at increasing diversity levels in urban ecosystems. In Rome, such ecosystem services, based on published unitary costs of externalities and of mortality associated with O<sub>3</sub>, can be prudently valued to roughly US\$2 and \$3 million/year, respectively.

**LINKS and PUBLICATIONS:**

Manes F., Incerti G., Salvatori E., Vitale M., Ricotta C., Costanza R. (2012). Urban ecosystem services: tree diversity and stability of tropospheric ozone removal, *Ecological Applications* 22(1), 349–360. [doi:10.1890/11-0561.1](https://doi.org/10.1890/11-0561.1)

## 2. Natural vegetation and ecosystem services related to air quality improvement: Tropospheric ozone removal by evergreen and deciduous forests in Latium (Italy)

**LOCATION:** Latium, Italy

**DESCRIPTION:** The background concentrations of tropospheric ozone (O3) are increasing in both industrialized and developing countries, thus posing a concrete risk to human health, natural vegetation and crops. Several papers have reported that the total O3 flux from the atmosphere to canopy surfaces can have positive effects on air quality, and consequently to human health and wellbeing. In this work, we have estimated the role of the main natural woody vegetation classes of the CORINE Land cover Classification System in the Latium Region (Central Italy) in removing O3 during the growing season of the year 2005. Cumulated O3 fluxes data allowed to estimate the externality value of this ecosystem service provided by deciduous and evergreen forests in the Latium region to be around a total value of 85025821. In the Apennine chain Province, this value should be around 57248431 \$ while in the Tyrrhenian Borderland Province 2286567 \$, 22376136 \$ and 3114686 \$ for deciduous and evergreen forests, respectively. This corresponds, for the growing season 2005, to a total value of 85025821 \$ attributable to the ecosystem service of tropospheric O3 removal provided by the natural forests of the Latium region. Although we acknowledge the uncertainty in producing such estimate, we think our effort as a useful first contribution addressed to the monetization of one of the ecosystem services of Italian forests at a regional level, and more in general, to open the discussion in a field that would be very useful in forest management and environmental policy-making.

**LINKS and PUBLICATIONS:**

Manes F., Blasi C., Salvatori E., Capotorti G., Galante G., Feoli E., Incerti G. (2012). Natural vegetation and ecosystem services related to air quality improvement: tropospheric ozone removal by evergreen and deciduous forests in Latium (Italy). *Annali di Botanica* 2, 79-86. [doi:10.4462/annbotrm-10029](https://doi.org/10.4462/annbotrm-10029)

### 3. Urban ecosystems services: Tree diversity and stability of PM10 removal in the metropolitan area of Rome

**LOCATION:** Rome, Italy

**DESCRIPTION:** Urban vegetation, and particularly urban forests, are known to provide important ecosystem services, such as urban air quality improvement by removing gaseous and particulate pollutants. The amount of PM10 removed by urban and periurban trees of the metropolitan area of Rome (evergreen broadleaves, deciduous broadleaves and conifers) was estimated by considering the minimum and maximum PM10 concentration values recorded in the Municipality of Rome during the years 2003 and 2004. The results of these simulations have been used to map the Ecosystem Service of PM10 removal by the three functional groups in the five Sanitary Districts of the Municipality. Given the spatial uniformity of PM10 levels in the urban area, the highest amount of PM10 deposition rates, during the whole period, are those of the Sanitary District with the largest vegetation cover (RMD). It is also interesting to highlight that the highest deposition fluxes, for the three functional groups, were estimated for the 2004 summer period, in concurrence with the highest mean values of Leaf Area Index. Our results confirm the crucial role of vegetation in supporting significant Ecosystem Services as air quality improvement, highlighting the importance of biodiversity and green infrastructures in sustain and enhance benefits provided by trees.

**LINKS and PUBLICATIONS:**

Manes F., Silli V., Salvatori E., Incerti G., Galante G., Fusaro L., Perrino C. (2014). Urban ecosystems services: Tree diversity and stability of PM10 removal in the metropolitan area of Rome, *Annali di Botanica* 4, 19-26. [doi: 10.4462/annbotrm-11746](https://doi.org/10.4462/annbotrm-11746)

LANDS Onlus

contact person: [Pierluca Gaglioppa](#)

	SCALE OF ANALYSIS	Global	Comtonental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
ECOSYSTEM SERVICE														
Food														
Water														
Raw Materials														
Genetic resources														
Medicinal resources														
Ornamental resources														
Air quality regulation														
Waste treatment (water purification)														
Regulation of water flows														
Moderation of extreme events														
Erosion prevention														
Climate regulation														
Maintenance of soil fertility														
Pollination														
Biological control														
Maintenance of life cycles of migratory species (incl. nursery service)														
Maintenance of genetic diversity (especially in gene pool protection)														
Spiritual experience														
Aesthetic information														
Inspiration for culture, art and design														
Recreation and tourism														
Information for cognitive development														

1. Water purification, climate regulation and landscape valuation as movie location

LOCATION: Nature Reserve Monterano

DESCRIPTION: PhD thesis in Nature Reserve Monterano about water purification, climate regulation and landscape valuation as movie location (University of Molise, P. Gaglioppa, 2013).

LINKS and PUBLICATIONS:

2. LIFE+ Making Good Natura

LOCATION: 21 sites of the Natura 2000 network in Italy (Basilicata, Calabria, Campania, Emilia Romagna, Marche, Lombardy e Sicily)

DESCRIPTION: The project LIFE+ Making Good Natura develops innovative approaches of environmental governance to preserve agro-forest-ecosystems and elaborates instruments for qualitative and quantitative valuation of the ecosystem services in the study sites of the Natura 2000 network.

LINKS and PUBLICATIONS:

[www.lifemgn-serviziecosistemici.eu](http://www.lifemgn-serviziecosistemici.eu)

Landscape Ecology Laboratory and ESs Evaluation, Urbino University  
“Carlo Bo”

contact person: [Riccardo Santolini](#)

	SCALE OF ANALYSIS	Global	Comtonental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
ECOSYSTEM SERVICE														
Food														
Water														
Raw Materials														
Genetic resources														
Medicinal resources														
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Air quality regulation														
Waste treatment (water purification)														
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Moderation of extreme events														
Erosion prevention														
Climate regulation														
Maintenance of soil fertility														
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Maintenance of life cycles of migratory species (incl. nursery service)														
Maintenance of genetic diversity (especially in gene pool protection)														
Spiritual experience														
Aesthetic information														
Inspiration for culture, art and design														
Recreation and tourism														
Information for cognitive development														

1. Delphi-based change assessment in ecosystem service values to support strategic spatial planning in Italian landscapes

LOCATION: Italy

**DESCRIPTION:** Most impacts on providing ecosystem services (ESs) are related to land use changes that may cause ecosystem fragmentation and loss of ecosystem functions. Spatial planning, focusing on sustainable landscape development, should consider the local potential for providing ESs as well possible impacts due to land use changes. The results of a large number of recent studies on ES assessment are difficult to replicate and integrate into landscape planning or definition of land use policies. The time and resource constraints, needed in data gathering and analysis, limit local administrations in the concern about ES. Extending the approach of spatially explicit benefit transfer, we present an expert-based estimation of land use potential in providing ES. We enhanced ES estimations related to different land use classes (in terms of D/ha year) by considering “local conditions” such as elevation and distance from urban areas, assuming these spatial characteristics can affect ES provisioning. The adaptation for “local conditions” was performed through expert consultation, using Delphi survey and focus groups, involving 46 experts from 10 Italian research institutions. In detail, we used land cover maps for 1990 and 2000, and aggregated the results on the province scale. The results show spatial pattern of gains and losses in ES values for Italian provinces. The province level of aggregation seems to be effective for dealing with strategic phase of spatial planning. By eliciting possible consequences of land use changes, this knowledge framework may foster strategies for sustainable landscape planning and management.

LINKS and PUBLICATIONS:

Scolozzi R., Morri E., Santolini R. (2012). Delphi-based change assessment in ecosystem service values to support strategic spatial planning in Italian landscapes, Ecological Indicators 21, 134–144. [doi:10.1016/j.ecolind.2011.07.019](#)

2. A forest ecosystem services evaluation at the river basin scale: Supply and demand between coastal areas and upstream lands (Italy)

LOCATION: Central Italy

**DESCRIPTION:** Many coastal communities benefit from a lively and profitable economy based on tourism but, simultaneously, cannot rely on the ecosystem services (ESs) provided locally, which have become insufficient because of increasing demand. In the Apennines, a mountain range in central Italy, coastal areas are characterised by growing population and tourist demands and upstream lands mainly supply ecosystem goods and services. Mechanisms to re-distribute resources or payments for ESs would be helpful to foster the sustainability of regional systems. However, currently, there is neither an appreciation for such services nor institutions responsible for addressing this problem. Results: In this paper, we analyse and rank the ecosystem services provided by the forests of two river basins to assign economic values to four ecosystem services relevant for distinguishing provision and benefit areas: soil protection, water retention, drinking water supply and CO2 sequestration. A simplified methodology was developed for contexts with poor environmental datasets. The aim was to provide ecological information to recognise ESs and encourage effective governance of ESs at a regional level. The results showed that the indirect value of the considered ecosystem services was three times higher than the direct value, and a spatial mismatch emphasised a “debt” in coastal areas from upstream areas for selected ecosystem services.

LINKS and PUBLICATIONS:

Morri E., Proscini F., Scolozzi R., Santolini R. (2014). A forest ecosystem services evaluation at the river basin scale: Supply and demand between coastal areas and upstream lands (Italy), Ecological Indicators 37, 210–219. [doi:10.1016/j.ecolind.2013.08.016](#)

### 3. Ecosystem services-based SWOT analysis of protected areas for conservation strategies

**LOCATION:** Italy

**DESCRIPTION:** An ecosystem services-based SWOT analysis is proposed in order to identify and quantify internal and external factors supporting or threatening the conservation effectiveness of protected areas. The proposed approach concerns both the ecological and the social perspective. Strengths and weaknesses, opportunities and threats were evaluated based on 12 selected environmental and socio-economic indicators for all terrestrial Italian protected areas, belonging to the Natura 2000 network, and for their 5-km buffer area. The indicators, used as criteria within a multi-criteria assessment, include: core area, cost-distance between protected areas, changes in ecosystem services values, intensification of land use, and urbanization. Results: The results were aggregated for three biogeographical regions, Alpine, Continental, and Mediterranean, indicating that Alpine sites have more opportunities and strengths than Continental and Mediterranean sites. The results call attention to where connectivity and land-use changes may have stronger influence on protected areas, in particular, whereas urbanization or intensification of agriculture may hamper conservation goals of protected areas. The proposed SWOT analysis provides helpful information for a multiple scale perspective and for identifying conservation priorities and for defining management strategies to assure biodiversity conservation and ecosystem services provision.

**LINKS and PUBLICATIONS:**

Scolozzi R., Schirpke U., Morri E., D'Amato D., Santolini R. (2014). Ecosystem services-based SWOT analysis of protected areas for conservation strategies, Journal of Environmental Management 146, 543–551. [doi:10.1016/j.jenvman.2014.05.040](https://doi.org/10.1016/j.jenvman.2014.05.040)

# Making Good NATURA Project, University of Molise – CURSA

website: <http://www.lifemgn-serviziecosistemici.eu/IT/home/Pages/default.aspx>

contact person: [Davide Marino](#)

	SCALE OF ANALYSIS	Global	Comtonental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
ECOSYSTEM SERVICE														
Food														
Water														
Raw Materials														
Genetic resources														
Medicinal resources														
Ornamental resources														
Air quality regulation														
Waste treatment (water purification)														
Regulation of water flows														
Moderation of extreme events														
Erosion prevention														
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Maintenance of soil fertility														
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Biological control														
Maintenance of life cycles of migratory species (incl. nursery service)														
Maintenance of genetic diversity (especially in gene pool protection)														
Spiritual experience														
Aesthetic information														
Inspiration for culture, art and design														
Recreation and tourism														
Information for cognitive development														

## 1. LIFE+ Making Good Natura

**LOCATION:** 21 sites of the Natura 2000 network in Italy (Basilicata, Calabria, Campania, Emilia Romagna, Marche, Lombardy e Sicily)

**DESCRIPTION:** The project LIFE+ Making Good Natura develops innovative approaches of environmental governance to preserve agro-forest-ecosystems and elaborates instruments for qualitative and quantitative valuation of the ecosystem services in the study sites of the Natura 2000 network.

### LINKS and PUBLICATIONS:

[www.lifemgn-serviziecosistemici.eu](http://www.lifemgn-serviziecosistemici.eu)

Marino D., Schirpke U., Gaglioppa P., Pellegrino D. (2014). Assessment and Governance of Ecosystem Services: First Insights from LIFE+ Making Good NATURA Project, Annali di Botanica 4: 83–90. [doi:10.4462/annbotrm-11600](https://doi.org/10.4462/annbotrm-11600)

Paesaggi Agrari, University of Sassari

website: <http://www.uniss.it/>  
contact person: [Matilde Silvia Schirru](#)

	SCALE OF ANALYSIS	Global	Comtonental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
ECOSYSTEM SERVICE														
Food														
Water														
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Climate regulation														
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Biological control														
Maintenance of life cycles of migratory species (incl. nursery service)														
Maintenance of genetic diversity (especially in gene pool protection)														
Spiritual experience														
Aesthetic information														
Inspiration for culture, art and design														
Recreation and tourism														
Information for cognitive development														

1. Evaluation of the potential Carbon stocks in the Galio scabri-Quercetum ilicis vegetation series: Monte Arci case study– central Sardinia

LOCATION: Monte Arci, Sardinia, Italy

DESCRIPTION:

LINKS and PUBLICATIONS:

Schirru M.S. (2015). Evaluation of the potential Carbon stocks in the Galio scabri-Quercetum ilicis vegetation series: Monte Arci case study– central Sardinia, PhD thesis, Università degli studi di Sassari, Dip. di Agraria. <http://eprints.uniss.it/10489/>

2. Mapping Landscape services preferences at local level through PPGIS techniques: the Sardinian case studies of Montiferru and Gallura historical regions

LOCATION: Montiferru and Gallura areas, Sardinia, Italy

DESCRIPTION:

LINKS and PUBLICATIONS:

PLANES – Planning for Ecosystem Services, University of Trento

website: <http://www.planningfores.com/>

contact person: [Davide Geneletti](#)

	SCALE OF ANALYSIS	Global	Comtonental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
ECOSYSTEM SERVICE														
Food														
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Genetic resources														
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Maintenance of genetic diversity (especially in gene pool protection)														
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Aesthetic information														
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Recreation and tourism														
Information for cognitive development														

1. ESMERALDA – Enhancing ecoSystem sERvices mApping for poLicy and Decision mAking

LOCATION: Europe

DESCRIPTION: The project aims to deliver a flexible methodology to provide the building blocks for pan-European and regional assessments. This methodology will build on existing ES projects and databases (e.g. MAES, OpenNESS, OPERAs, national studies), the Millennium Assessment (MA) and TEEB. ESMERALDA will identify relevant stakeholders and take stock of their requirements at EU, national and regional levels. The mapping approach proposed will integrate biophysical, social and economic assessment techniques. Flexibility will be achieved by the creation of a tiered methodology that will encompass both simple (Tier 1) and more complex (Tier 3) approaches. UNITN will be responsible for WP5: Testing the final methods in policy- and decision-making. WP5 will identify case studies and demonstrate how the proposed methods for mapping and assessment of ecosystem services may be used to inform policy and decision-making processes. Testing activities will be conducted through a series of workshops in different European contexts, each addressing a different set of themes and regions.

LINKS and PUBLICATIONS:

<http://www.esmeralda-project.eu/>

2. Ecosystem-based approaches for climate change adaptation

LOCATION: Indian cities, European urban areas

DESCRIPTION: A branch of the PLANES research group is focusing on the interlinks between Ecosystem-based actions, Climate Change adaptation and urban settlements. A well designed urban green area, coherent with the needs of the city, can foster a well-worn groove for human wellbeing. In 2013 the European Union launched its new Strategy for adaptation to Climate Change, which represented a strong call for Nature-based approaches. Nature-based actions have been recognized as cheap, win-win and multipurpose solution, both in scientific literature and by administrations. However the application of Nature-based actions for Climate Change Adaptation in urban areas is still rare at European level. The main reason is the little awareness about the potential of green areas to ameliorate climate change effects (e.g. Urban Heat Island Adaptation). Our work focuses on two main paths. The first aims to assess how urban green planning can enhance the delivery of ecosystem services that support climate change adaptation and improve human well-being. The second analyzes vulnerabilities of cities to different climate change issues and investigates the extent to which EbA for climate change adaptation are considered by climate-related plans in the European context

LINKS and PUBLICATIONS:

Kumar P., Geneletti, D. (2015). How are climate change concerns addressed by spatial plans? An evaluation framework, and an application to Indian cities, Land Use Policy 42, 210–226. [doi:10.1016/j.landusepol.2014.07.016](https://doi.org/10.1016/j.landusepol.2014.07.016)

Geneletti D., Zardo L., (in press). Ecosystem-based adaptation in cities: An Analysis of European urban climate adaptation plans, Land Use Policy.



### 3. Assessing the impact of alternative land-use zoning policies on future ecosystem services

**LOCATION:** La Araucanía region, Southern Chile

**DESCRIPTION:** This case-study aims at empirically exploring how the implementation of different land-use zoning policies affect the future provision of a set of ecosystem services (water purification, soil conservation, habitat for species, carbon sequestration and timber production). The study area is located in The Araucanía, one of Chile's Administrative Regions. The first part of the methods consisted in the construction of land-use scenarios associated to different policies. Subsequently, the effects of the land-use scenarios on the provision of the selected ecosystem services were assessed in a spatially explicit way, by using modelling tools. Finally, a set of metrics was developed to compare scenarios, and trade-offs in the provision of different ecosystem services were made explicit through trade-off curves. The results indicate that, for this case study, spatial configuration of land uses is as an important factor as their size. This suggests that the analysis of land-use patterns deserves attention, and that this information should be included in scenario exercises aimed to support spatial planning.

**LINKS and PUBLICATIONS:**

Geneletti, D (2013). Assessing the impact of alternative land-use zoning policies on future ecosystem services, Environmental Impact Assessment Review 40, 25-35. [doi:10.1016/j.eiar.2012.12.003](https://doi.org/10.1016/j.eiar.2012.12.003)

Tempesta and Vecchiato, University of Padova

website: <http://intra.tesaf.unipd.it/people/tempesta/>

contact person: [Tiziano Tempesta](#)

	SCALE OF ANALYSIS	Global	Comtonental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
ECOSYSTEM SERVICE														
Food														
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Raw Materials														
Genetic resources														
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Maintenance of genetic diversity (especially in gene pool protection)														
Spiritual experience														
Aesthetic information														
Inspiration for culture, art and design														
Recreation and tourism														
Information for cognitive development														

1. Riverscape and Groundwater Preservation: A Choice Experiment

LOCATION: Serio River, central northern Italy

DESCRIPTION: This study presents a quantitative approach to support policy decision making for the preservation of riverscapes, taking into account the EC Water Framework Directive (2000/60/EC) and the EC Nitrates Directive (91/ 676/EEC) concerning the protection of waters against nitrate pollution from agricultural sources. A choice experiment was applied to evaluate the benefits, as perceived by inhabitants, of the implementation of policies aiming to reduce the concentration of nitrates in groundwater, preserve the riverscape by maintaining a minimum water flow and increasing hedges and woods along the Serio River in central northern Italy. Findings suggested that people were particularly concerned about groundwater quality, probably because it is strongly linked to human health. Nevertheless, it was interesting to observe that people expressed a high willingness to pay for actions that affect the riverscape as a whole (such as the minimum water flow maintenance plus reforestation). This is probably due to the close connection between the riverscape and the functions of the river area for recreation, health purposes, and biodiversity preservation.

LINKS and PUBLICATIONS:

2. Valuing the benefits of an afforestation project in a peri-urban area with choice experiments

LOCATION:

DESCRIPTION: Woodlands on the Veneto region plain have progressively disappeared since the 19th century. This has led to a decrease in environmental and landscape quality with fewer social benefits accruing from the rural land. The demand for environmental conservation and recreational areas has increased in recent years, especially in the urban context. In order to meet these needs the Venice City Council decided to establish an extensive woodland on the Venice hinterland. Due to the high costs of the project it was important to evaluate its benefits in monetary terms and whether a mixed landscape might produce a higher benefits flow than a dense woodland. The objectives of our study are to estimate the willingness to pay (WTP) for different surface allocations of the future Wood of Mestre and to better understand the influence on WTP of the delay in the benefits due to the time needed for tree growth. Our first finding was that people prefer a mixed solution in terms of surface allocation: the wood–meadow mix (75% woodland, 25% meadow) is at the top of the sample preferences. Second, the WTP of the preferred afforestation programme is €51 year/family. The social benefits derived on a 10-year basis considering the presence of animals and lakes in the preferred scenario are €62,755/ha. The research highlighted how WTP has an inverse correlation with age. Nonetheless the WTP of older people is not negligible and this appears to support the hypothesis that the woodland will also have a bequest value. The WTP also tends to decline with the distance of the district where the interviewees live. Finally, CE proves to be a consistent and robust methodology for forest benefit evaluation that can provide both land management and quantitative information to policymakers.

LINKS and PUBLICATIONS:

3. The perception of agrarian historical landscapes: A study of the Veneto plain in Italy

LOCATION:

DESCRIPTION: This article discusses the factors affecting landscape perception, with particular reference to the agrarian historical landscapes of the plains in the Veneto region of Italy. The main historical agrarian landscapes were identified, and their aesthetic value was compared with that of more modern landscapes. Surveys were conducted on three groups of inhabitants: children, university students and adults and three approaches were used to analyze the landscape preferences. First, the appreciation of each landscape was compared; second the effects of the various elements on landscape preferences were determined by means of photomontages; and finally, the visual impact of these elements, in improving or worsening the aesthetic quality of the landscape, was quantified using a statistical model. This made it possible to determine if, and to what extent, some aesthetic and cultural values are shared among the three generations of individuals included in this study. The results have demonstrated that some elements of the historical landscapes (villas and traditional farm buildings in particular) can increase the appreciation for the agrarian landscape in the three groups of interviewees. However, not all historical agrarian landscapes are appreciated. This suggests a need for landscape education programmes, especially for the young, so that future generations will favour interventions in the preservation of the historical and cultural agrarian landscapes.

LINKS and PUBLICATIONS:

Territories of ecological and cultural diversities, University of Padova

website: <http://www.ibaf.cnr.it/it/sede-e-unita-distaccate/uos-legnaro>

contact person: [Massimo Demarchi](#)

	SCALE OF ANALYSIS	Global	Comtonental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
ECOSYSTEM SERVICE														
Food														
Water														
Raw Materials														
Genetic resources														
Medicinal resources														
Ornamental resources														
Air quality regulation														
Waste treatment (water purification)														
Regulation of water flows														
Moderation of extreme events														
Erosion prevention														
Climate regulation														
Maintenance of soil fertility														
Pollination														
Biological control														
Maintenance of life cycles of migratory species (incl. nursery service)														
Maintenance of genetic diversity (especially in gene pool protection)														
Spiritual experience														
Aesthetic information														
Inspiration for culture, art and design														
Recreation and tourism														
Information for cognitive development														

1. Toward a green Amazon Region? Travel assisted by GIS and participatory mapping among institutional practices and ecosystem services in the San Martin Region (Peru)

LOCATION: San Martin Region, Peru

DESCRIPTION: The objective was to investigate the policies of Green Region implemented by the Regional Government of an Martin and the efficacy in improving forest conservation and ecosystem services, actual situation and future scenarios. Methodology: the research adopted a mixed method approach combining policy analysis, interviews with stakeholders, focus group, participatory GIS approach, scenario analysis, GIS data base management. Two tools were used for analysis of ecosystem services: SOLVES (Social Value for Ecosystem Services) and Costing Nature. Results: policy evaluation, awareness of the stakeholders around the concept of ecosystem service, stakeholders rating of value for different ecosystem services, maps of perceived social values of ecosystem services, scenario maps.

LINKS and PUBLICATIONS:

TreeCity Group, University of Pisa

website: <http://www.agr.unipi.it/treecity>

contact person: [Giacomo Lorenzini](#)

	SCALE OF ANALYSIS	Global	Comtonental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
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Spiritual experience														
Aesthetic information														
Inspiration for culture, art and design														
Recreation and tourism														
Information for cognitive development														

1. Impact of the air pollutant ozone on ecophysiological performances of trees

LOCATION:

DESCRIPTION: We study under experimental and controlled conditions the impact of the air pollutant ozone on ecophysiological performances of trees.

LINKS and PUBLICATIONS:

2. Role of urban tree shrubs in the interception of particulate.

LOCATION:

DESCRIPTION: We studied the role of an urban tree shrub in the interception of particulate.

LINKS and PUBLICATIONS:

3. Biological indicators of the diffusion of tropospheric ozone.

LOCATION:

DESCRIPTION: We evaluate the presence/diffusion of tropospheric ozone with the use of a biological indicator such as tobacco plants.

LINKS and PUBLICATIONS:

## Unità di Analisi e Gestione delle Risorse Ambientali, University of Insubria

contact person: [Damiano Preatoni](#)

[illegible]

Weed Science group, CNR Institute for agroenvironmental and forest

website: <http://www.ibaf.cnr.it/it/sede-e-unita-distaccate/uos-legnaro>

contact person: [Giuseppe Zanin](#)

	SCALE OF ANALYSIS	Global	Comtonental	Regional	National	Sub-National	Local	TYPE OF ANALYSIS	Mapping	Biophysical Assessment	Valuation	Economic Valuation	Analysis of Beneficiaries	Involvement of Stakeholders
ECOSYSTEM SERVICE														
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Information for cognitive development														

1. Effect of a full-grown vegetative filter strip on herbicide runoff: Maintaining of filter capacity over time

LOCATION:

**DESCRIPTION:** Narrow vegetative filter strips (VFS) proved to effectively reduce herbicide runoff from cultivated fields mainly due to the ability of vegetation to delay surface runoff, promote infiltration and adsorb herbicides. Since VFS are dynamic systems, their performance would not remain constant over the years indicating the need to define suitable buffer management. In order to evaluate the performance of different five and six year-old VFS, the runoff of the herbicides metolachlor and terbuthylazine was monitored in 2002 and 2003 in an experimental site in northern Italy. The structure of the herbaceous cover in the buffers changes over time. When rows of trees are present, the grass cover is decreased by the shading action of the trees, but the leaf litter gains importance. In VFS with grass cover only, the cover composition changes because of the substitution of grass by broadleaf species. Six metres wide VFS are very effective in reducing runoff volume and concentration during both wet and dry years. Classification analysis showed that runoff concentration and volume are linked to the characteristics of the rainfall event, buffer, source of herbicides and time after application. Regression analysis showed that the significant predictors for runoff volume are rainfall amount and intensity, total vegetal cover in the VFS, crop leaf area index and time after treatment; for concentration they are rainfall intensity, crop leaf area index and total vegetal cover in the VFS. The role of VFS is complex, so appropriate management is required to maintain its increasing filtering capacity over time.

LINKS and PUBLICATIONS:

Otto S; Vianello M., Infantino A., Zanin G., Di Guardo A. (2008). Effect of a full-grown vegetative filter strip on herbicide runoff: Maintaining of filter capacity over time, Chemosphere 71(1), 74-82. [doi:10.1016/j.chemosphere.2007.10.029](#)

2. Role of hedgerows in intercepting spray drift: Evaluation and modelling of the effects

LOCATION:

**DESCRIPTION:** When a pesticide is applied a proportion of the sprayed solution may become a cause of pollution in the surrounding environment, with ecotoxicological implications and phytotoxicity to other crops. Hedgerows can play an important role in reducing pesticide risk. This study focuses on droplet drift, with the aim of evaluating the hedgerow efficacy in reducing drift from broadcast air-assisted sprayers and then to construct a simple model for estimating the spray drift level in surrounding fields. Three experiments were conducted in North-East Italy in 2004 and 2005, in winter, summer and autumn to obtain suitable optical porosity values in order to evaluate their effects. Three study situations (no hedgerow, single, double hedgerow) and two sprayer-hedgerow interaction scenarios (sprayer working perpendicular to or parallel with the hedgerow) were considered. Hedgerows were 7-8 m in height, while spray release height ranged from 1 to 2 m. Where there was at least one hedgerow, off-site spray reductions ranged from 82.6 (with optical porosity of 74.7%) to 97% (with optical porosity of 10.8%). The presence of a double hedgerow did not produce a higher interception rate. Analysis of the spatial pattern of drift showed that where there is a hedgerow with an optical porosity of 74-75%, the aerial drift caused by common broadcast air-assisted sprayers becomes negligible at a distance of 6-7 m. Hedgerows thus proved to be effective in intercepting spray drift leaving cultivated fields. In particular, low optical porosities provided high interception rates, even with very dense canopies, as no spray bypass was recorded. Spray drift profile was then modelled taking into account the effect of wind and optical porosity of a nearby hedgerow.

LINKS and PUBLICATIONS:

Lazzaro L., Otto S., Zanin G. (2008). Role of hedgerows in intercepting spray drift: Evaluation and modelling of the effects, Agriculture Ecosystems & environment 123(4), 317-327. [doi:10.1016/j.agee.2007.07.009](#)