

# Curriculum Vitae



## Personal information

Researcher on sustainability of coupled human-natural systems

First name / Surname

**Stefano Balbi**

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Nationality

Italian

Date of birth: 01/11/1981

## Work experience

Dates

January 2020 – ongoing

Occupation or position held

**Ikerbasque Research Fellow – Tenure Track**

Main activities and responsibilities

Computational models of complex systems for the analysis of ecosystem services, human mobility and security, and natural resource management. Research group leader on coupled human-natural systems.

Managing director of the Integrated Modelling Partnership

(<https://www.integratedmodelling.org/>) hosted at BC3 and responsible for the ARIES (ARTificial Intelligence for Environment & Sustainability) platform.

Employer

**Basque Centre for Climate Change (BC3), Bizkaia, Spain - co-funded Ikerbasque Research Fellowship**

Dates

January 2016 – December 2019

Occupation or position held

**Associate Researcher**

Main activities and responsibilities

Research on the sustainability of coupled human-environmental systems. Main methods: data/model integration and agent-based modelling. Management of the ARIES project (<https://aries.integratedmodelling.org/>).

PI of the ALICE Interreg Atlantic (European Territorial Cooperation) Project on Blue and Green Infrastructure (<https://project-alice.com/>).

Employer

**Basque Centre for Climate Change (BC3), Bizkaia, Spain - co-funded Juan de la Cierva incorporación Fellowship (Grant IJCI-2014-22590, <10% success rate).**

Dates

January 2013 – December 2015

Occupation or position held

**Post-Doctoral Researcher**

Main activities and responsibilities

Analysis of ecosystem services, agriculture and food security, flood risk reduction, through dynamic spatial modeling integrating agent-based modeling, and Bayesian networks. Modelling Ecosystem Services for decision support with the ARIES technology. Contribution to the UK NERC ESPA ASSETS (Attaining Sustainable Services from Ecosystems through Trade-off Scenarios) project.

Employer

**Basque Centre for Climate Change (BC3), Bizkaia, Spain - co-funded Marie Curie Actions (People -- Grant agreement n° 267230 by BizkaiaTalent).**

Dates

October 2011 – December 2012

Occupation or position held

**Expert of the Italian Delegation for the Alpine Convention Tourism Protocol.**

Main activities and responsibilities

Participation to the drafting of the Fourth Report on the State of the Alps about Sustainable Tourism.

Employer

**Italian Ministry for Environment and Territory and Sea and Euro-Mediterranean Centre for Climate Change (CMCC)**

Dates	August 2011 – December 2012
Occupation or position held	<b>Post-Doctoral Researcher</b> for the KULTURisk (EC Seventh Framework Program) research project on hydrological disasters integrated risk management. From November 2011, <b>Honorary fellow</b> in environmental economics.
Main activities and responsibilities	Economic analysis of floods and landslides and integrated assessment of the risk prevention measures. Research on environmental economics, project appraisal and agent-based modeling.
Employer	<b>Ca' Foscari University of Venice</b> , Department of Economics.
Dates	January 2011 – July 2011
Occupation or position held	<b>Post-Doctoral Researcher</b> for the FIUMI project of the Lombardy Region on the analysis of the pollution impacts and of the measures of intervention for the Olona, Seveso, Lambro and Mella river basins.
Main activities and responsibilities	Cost-Effectiveness Analysis of the measures of intervention through a multi-criteria approach applied to a Decision Support System (mulinoDSS).
Employer	<b>Polytechnic University of Milan</b> , Department of Environmental Engineering.
Dates	May 2009 – October 2011.
Occupation or position held	<b>Scientific consultant</b> for the ClimAlpTour project concerning the impacts of Climate Change on Tourism in the Alps. European Territorial Cooperation, Alpine Space Programme 2007-2013.
Main activities and responsibilities	Project management, data analysis, development and application of a Decision Support System (mulinoDSS) in various participatory decision making processes.
Employer	<b>Euro-Mediterranean Centre for Climate Change (CMCC)</b> , Venice. Division Climate Impacts and Policies (CIP).
Dates	October 2008 – March 2009
Occupation or position held	Trainee at the Directorate C, Climate Change & Air, Unit C2.
Main activities and responsibilities	Research on market based instruments including Greenhouse gas emissions trading
Name and address of employer	<b>European Commission, DG Environment</b> , Bruxelles, Belgium.
Dates	February 2007 – October 2007
Occupation or position held	United Nations Volunteers <b>Internship Programme</b> .
Main activities and responsibilities	Researcher and Programme Manager Assistant. Contributed to the elaboration of a strategic framework for the green development of Tobago, <b>with focus on the tourism sector</b> . Developed a strategy for energy security in Trinidad.
Employer	<b>United Nations Development Programme</b> , Office of Trinidad and Tobago, Department of Energy and Environment.

## Education and training

Dates	October 2007 – March 2011
Title of qualification awarded	<b>Ph.D.</b> in Analysis and Governance of Sustainable Development. Awarded with the title of " <b>Doctor Europaeus</b> ".
Principal subjects covered	Environmental Economics, MultiCriteria Analysis, Agent-Based Modelling, Climate Change, Tourism Planning, Decision Support Systems, Water management, Global Governance. Dissertation: " <i>Three essays on agent-based modelling and climate change adaptation</i> "
Organisation providing education	<b>Ca' Foscari and IUAV Universities of Venice</b> School for Advanced Studies in Venice Foundation
Dates	October 2003 – March 2006
Title of qualification awarded	<b>Master's Degree</b> in Economics and Management of Environment and Tourism.
Principal subjects covered	Dissertation: " <i>Tourism Planning. A case of mature tourism in a developing country: Balneario Camboriù, Brazil</i> ". Final mark: 110/110 with honor.

Organisation providing education **University of Trento**, Department of Economics.

Dates September 2000 – September 2003

Title of qualification awarded **Bachelor's Degree** in Economics and Management.

Organisation providing education **University of Padova**, Department of Economics.

### Personal skills and competences

Mother tongue **Italian** (A1 Min – C2 Max)

Self-assessment

**English**

**Spanish**

**Portuguese**

**French**

Understanding		Speaking		Writing	
Listening		Reading		Spoken interaction	
Spoken production					
	C1		C1		C1
	B2		B2		B1
	B1		B1		A2
	A1		A1		A1
					-

Teaching skills and competences Lectured at various **seminars and courses** for the Ca' Foscari University and for different Summer Schools (BC3, IUAV and University of Padova) and High Schools (in Italy and Spain), in English, in Spanish and in Italian. Supervised several Master's and PhD's dissertations. Organized seven editions (2013-2019) of the BC3 school on ecosystem services <http://springuniversity.bc3research.org/>. Trained more than 100 people, at Metro Vancouver, ICIMOD (Kathmandu), CSIR (Western Cape), NIES (Tokyo), ISPRA (Rome). Currently supporting 3,500+ registered users of the ARIES platform.

Organisational skills and competences **Project cycle management**, including conceptualization and budgeting. Organization and direction of participatory consultation processes. Communication management. I'm managing director of the Integrated Modelling Partnership hosted at BC3 <https://www.integratedmodelling.org/> and managing one of the five research lines of the centre. Managed a team of 20 in 2022. I collaborated to 20+ collaborative research projects funded by Horizon 2020, FP7, Interreg, UK NERC programs, among others.

Computer skills and competences Programming with domain specific languages for system modelling. Softwares and packages: Simile, Vensim (**system dynamics**); QuantumGis, ArcGis (**geographic information system**); NetLogo (**agent-based modelling**); R (**data analysis and modelling**); Pajek, Gephi (**social network analysis**); mulinoDSS (**multi-criteria decision support system**); GeNie (**Bayesian networks**); ARIES, k.LAB (**semantic meta-modelling**); StarUML (**unified modelling language**); Git (**version control and code sharing**), WEKA (**Machine Learning**). Basic knowledge of **Java**, familiarity with **Eclipse** IDE.

### Research stays

June-July 2022: **Visiting Professorship** at IMASS, University of Nagoya, Japan.

July-August 2017: **Short sabbatical** at CSIR, Western Cape, South Africa.

January 2016: Grant awarded for workshops and **short sabbatical** stays at the Wageningen school of social sciences (WASS).

May 2010 – August 2010: **Visiting Scholar** at the Centre for Artificial Intelligence, Nova University of Lisbon.

November 2009 – February 2010: **Visiting Scholar** at the Australian National University, Resource in Asia and Pacific Programme, Canberra.

September 2005 – December 2005: Universidade do Vale do Itajaí, Balneario Camboriú, Santa Catarina, Brazil. Tourism Department. **Scholarship awarded** for thesis research.

September 2002 – February 2003: Universidade Moderna do Porto, Portugal. Department of Economics. **Erasmus** European exchange project.

## -----Selected Publications

- Marquez Torres, A., Balbi, S., & Villa, F. (2023). Scientific modelling can be accessible, interoperable and user friendly: A case study for pasture and livestock modelling in Spain. **Plos one**, 18(2), e0281348. <https://doi.org/10.1371/journal.pone.0281348>
- Balbi, S., Bagstad, K.J., Magrach, A., Sanz, M.J., Aguilar-Amuchastegui, N., Giupponi, C. and Villa, F. (2022). The global environmental agenda urgently needs a semantic web of knowledge. **Environmental Evidence**, 11(1), pp.1-6. <https://doi.org/10.1186/s13750-022-00258-y>
- Villa, F., Bulckaen, A. and Balbi, S. (2021). Artificial Intelligence technology for rapid Natural Capital Accounting: The ARIES for SEEA Explorer. **BC3 Policy Brief** 2021-06. <http://dx.doi.org/10.13140/RG.2.2.36406.01600>
- Balbi, S., Alvarez-Rodriguez, U., Latora, V., Antonioni, A. and Villa, F. (2020). A game theory model to explore the role of cooperation and diversity in community food security: the case of Southern Malawi. **Regional Environmental Change**, 20, pp.1-12. <https://link.springer.com/article/10.1007/s10113-020-01642-5>
- Capriolo, A., Boschetto, R.G., Mascolo, R.A., Balbi, S. and Villa, F. (2020). Biophysical and economic assessment of four ecosystem services for natural capital accounting in Italy. **Ecosystem Services**, 46, p.101207. <https://www.sciencedirect.com/science/article/abs/pii/S2212041620301492>
- Balbi S., Selomane O., Sitas N., Blanchard R., Kotzee I., O'Farrell P. and Villa F. (2019). Human dependence on natural resources in rapidly urbanising South African regions. **Environmental Research Letters**, <http://iopscience.iop.org/article/10.1088/1748-9326/aafe43>
- Martínez-López, J., Bagstad, K.J., Balbi, S., Magrach, A., Voigt, B., Athanasiadis, I., Pascual, M., Willcock, S. and Villa, F. (2019). Towards globally customizable ecosystem service models. **Science of the Total Environment**, 650: 2325-2336. <https://www.sciencedirect.com/science/article/pii/S0048969718338737>
- Dobbie, S., Schreckenber, K., Dyke, J., Schaafsma, M. and Balbi, S. (2018). Agent-based modelling to assess community food security and sustainable livelihoods. **Journal of Artificial Societies and Social Simulation**, 21(1):1-23. <http://jasss.soc.surrey.ac.uk/21/1/9.html>
- Willcock, S., Martínez-López, J., Hooftman, D.A., Bagstad, K.J., Balbi, S., Marzo, A., Prato, C., Sciandrello, S., Signorello, G., Voigt, B. and Villa, F. (2018). Machine learning for ecosystem services. **Ecosystem Services**, 33B: 165-174. <https://www.sciencedirect.com/science/article/pii/S2212041617306423>
- Villa, F., Balbi, S., Athanasiadis, I.N., Caracciolo, C. (2017). Semantics for interoperability of distributed data and models: Foundations for betterconnected information. **F1000Research** 6, 686. <https://doi.org/10.12688/f1000research.11638.1>
- Balbi, S. (2017). Traveling for happiness, moving to adapt: An agent-based perspective on population mobility. **BC3 Working Paper Series**, WP No. 2017/03.
- Amelung, B., Student, J., Nicholls, S., Lamers, M., Baggio, R., Boavida-Portugal, I., Johnson, P., de Jong, E., Jan Hofstede, G., Pons, M., Steiger, R., Balbi, S. (2017). The value of agent-based modelling for assessing tourism–environment interactions in the Anthropocene. **Current Opinion in Environmental Sustainability**, 23:46-53. <https://www.sciencedirect.com/science/article/pii/S187734351630104X>
- Sun, Z., Lorscheid, I., Millington, J. D.; Lauf, S., Magliocca, N. R., Groeneveld, J., Balbi S., et al. (2016). Simple or complicated agent-based models? A complicated issue. **Environmental Modelling & Software**, 86: 56-67. <http://www.sciencedirect.com/science/article/pii/S1364815216306041>
- Balbi, S., Villa, F., Mojtahed, V., Hegetschweiler, K. T., Giupponi, C. (2016). A spatial Bayesian network model to assess the benefits of early warning for urban flood risk to people. **Natural Hazards and Earth System Sciences**, 16: 1323-1337. <http://www.nat-hazards-earth-syst-sci.net/16/1323/2016/nhess-16-1323-2016.html>
- Balbi S., del Prado A., Gallejones P., Geevan C.P., et al. (2015). Modeling trade-offs among ecosystem services in agricultural production systems. **Environmental Modelling & Software**, 72: 314–326. <http://www.sciencedirect.com/science/article/pii/S1364815214003740>
- Müller B., Balbi S., Buchmann C.M., De Sousa L., et al. (2014). Standardised and transparent model descriptions for agent-based models: Current status and prospects. **Environmental Modelling & Software**, 55: 156-163. <http://www.sciencedirect.com/science/article/pii/S1364815214000395>
- Permanent Secretariat of the Alpine Convention (2013). Sustainable tourism in the Alps. Report on the State of the Alps. Innsbruck. Alpine Convention. <http://www.alpconv.org/en/AlpineKnowledge/RSA/tourism/default.html>
- Balbi S., Giupponi C., Perez P., Alberti M. (2013). A spatial agent-based model for assessing strategies of adaptation to climate and tourism demand changes in an alpine tourism destination, **Environmental Modelling & Software**, 45: 29-51. <http://www.sciencedirect.com/science/article/pii/S1364815212002514>
- Balbi S., Giupponi C. (2010). Agent-Based Modelling of Socio-Ecosystems: A Methodology for the Analysis of Climate Change Adaptation and Sustainability. **International Journal of Agent Technologies and Systems (IJATS)**, 2(4): 17-38. <http://www.igi-global.com/article/agent-based-modelling-socio-ecosystems/47414>

## -----Selected Talks

*Organizer:* **ARIES for SEEA at COP28**. Side event at the Spain pavilion. <https://aries.integratedmodelling.org/aries-for-seea-at-cop28/>

*Invited Speaker:* **UN Big Data Conference 2022**. Presentation of the ARIES for SEEA Sector Hub of the UN Global platform <https://unbigdata.bps.go.id/>

*Invited talk:* Workshop on earth observation for ecosystem accounting (EO4EA 2022) organized by the **European Spatial Agency (ESA)** <https://eo4ea-2022.esa.int/>

*Invite talk:* Live demo of ARIES global models. 3rd **ESP** (Ecosystem Services Partnership) **Asia**, 14/12/2021: <https://youtu.be/y-7BJXlxyQw>

*Invited talk:* ARIES Master class. 3rd **ESP** (Ecosystem Services Partnership) **Europe** Conference, 07/06/2021: <https://youtu.be/nCs0pdoABV4>

*Invited talk:* Tutorial on Ecosystem Services assessment using k.LAB. **ALICE Winter school** "Landscape habitats and Ecosystem Services mapping for landscape management" 09/12/2020: <https://youtu.be/SrmlPTyr5Gg>

*Invited session talk:* Philosophy of Globally Customizable ARIES models. **ESP10** (Ecosystem Services Partnership). Hannover, 21/10/2019.

*Invited modeller and teacher:* **Bremen International Graduate School of Social Sciences (BIGSSS)** summer school **on Migration**. Cagliari 10/06/2019. <https://bigsss-css.jacobs-university.de/migration2019/keynote-speakers-experts/>

*Invited talk:* A Semantic Web for Sustainability. **Oxford Center for Tropical Forest**, 11/05/2018.

*Invited session talk:* A decade of ARIES: adapting ecosystem service models to decision making needs. **ESP** (Ecosystem Services Partnership) **EU 2018**. San Sebastian, 17/10/2018.

*Invited session talk:* Modelling beneficiaries in dynamic Ecosystem Services assessments. **ICMaSS2017** International Conference on Materials and Systems for Sustainability 2017. **Nagoya University**, 01/10/2017.

*Session talk:* Integrating human agency and ecosystem services: an ABM perspective on food. 8th Intl. Congress on Env. Modelling and Software (**iEMSs 2016**). Toulouse, 12/07/2016.

*Invited talk:* Complexity oriented approaches and environmental sustainability policy: experiences from tourism, agriculture, and flood protection. **Wageningen school of social sciences (WASS)**, 21/11/2016.

*Invited session talk:* Incorporating biophysical model output into economic models. International Conference of Agricultural Economists (**ICAE2015**). Milan, 10/08/2015.