

## Curriculum Vitae

### Luigimaria Borruso

#### PERSONAL INFORMATIONS

Name and surname: Luigimaria Borruso  
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Nationality: Italian  
Date of birth: 18/05/1981

#### EDUCATION

01/2011 – 04/2014

**Ph.D. degree in Management of Mountain Environment.**

Faculty of Science and Technology, Free University of Bozen/Bolzano – Italy.

Thesis: *Bacterial communities as bioindicators of environmental stresses in freshwater ecosystems.*

The project was founded by Stifterverband für die Deutsche Wissenschaft.

The general aim of the research was to test the utilization of bacteria communities as indicators for atrophic and natural stresses. I was also involved in others two projects focus on: i) Bacterial communities involved in soil formation in high mountain environments, and ii) Rhizobacterial communities in soils treated different nitrogen stress amendments.

02/2005 – 10/2007

**Master degree (Laurea Magistrale) in Biodiversity and Biological Evolution.** Grade: 110/110 cum Laude. University of Milan- Italy. Experimental thesis focus on the ecology of Alictidae and Sphecidae (Hymenoptera).

10/2001 – 01/2005

**Bachelor degree (Laurea) in Biological Sciences.** University of Milan- Italy. Experimental thesis focus on aquatic insect in an alpine stream.

#### RESEARCH ACTIVITIES

04/2014 – present

**Postdoctoral researcher** at Free University of Bozen Bolzano, Faculty of Science and Technology, Italy.

Studies of the effect of different soil managements on the bacterial and fungi communities in a forest ecosystem; Analysis of the microbial communities of phyllosphere, rhizosphere and soil associated with a coniferous tree forest under aerial fertilization.

In parallel to my Postdoc project, I have been collaborating on two other projects: i) Investigation of the processes and mechanisms involved in soil nutrient availability, plant uptake and translocation, and ii) Metagenomics analysis of the bacterial communities in the lateral moraine of the Weisskuegel (palla Bianca).

01/2013 – 06/2013

**Visiting scientist** at University of Tromsø, Faculty of Health Science, Norway.

Project focus on the Biogeographical distribution of Class I Integrons as bioindicator for soil and freshwater ecosystems. Project founded by the Norwegian Research Council.

7/2010 – 12/2011

**Scientific collaborator** at Free University of Bozen-Bolzano, Faculty of Science and Technology, Bolzano, Italy

International research project (for the microbial ecology aspects) "Sustainable water management and wetland restoration in settlements of continental arid Central Asia (SuWaRest). Project founded by Stifterverband für die Deutsche Wissenschaft.

10/2007 – 12/2008

**Scientific collaborator** at Department of Food Science and Microbiology (DiSTAM), Faculty of Agriculture Science, University of Milan- Italy.

I worked on two projects: i) Microbial communities involved in biogas production from vegetable biomass and animal sewage, and ii) Microbial bioremediation of sediments and soils contaminated by coplanar polychlorinated biphenyls compounds.

## TEACHING ACTIVITIES

2010 – present

**Teaching assistant** in Agro-environmental microbiology - Bachelor in Agricultural Science and Agricultural Technology. Faculty of Science and Technology, Free University of Bozen/Bolzano – Italy.

10/2014 – present

**Co-supervision** of bachelor thesis of Ania Margoni (Free University of Bolzano) and Marianna Papa (University of Parma).

## OTHER WORK ACTIVITIES

9/2009 – 06/2010

**Research technician** at AUSTEP S.r.l.- Extant Environmental Solutions, Milan, Italy.

Renewable energy (chemical analysis, control and management of biomass reactors).

4/2009 – 8/2009

**Collaborator at** HQ S.r.l- High Quality, Milan, Italy.

Company services and advice in areas of environmental management (i.e. microbial detection and reclamation treatments of *Legionella pneumophila* in cooling system) and food safety (i.e. Hazard Analysis and Critical Control Point).

## TECHNICAL SKILLS

### MOLECULAR BIOLOGY AND MICROBIAL ECOLOGY SKILLS

**Microbiology:** Culture media preparation; (isolation and identification of culturing bacteria); epifluorescence and phase contrast microscopy.

**DNA extraction:** Bacterial and fungi DNA (plasmidic and chromosomal) extraction and purification from soil, sediments, vegetable tissue and rocks; DNA quantification.

**Diversity analysis:** cloning and screening for genes.

**Fingerprinting analysis of the environmental microbial communities:** Denaturing Gel Gradient Electrophoresis; Automated Ribosomal Intergenic Spacer and Length Heterogeneity PCR.

**Microorganisms quantification:** Quantitative Real Time PCR

**Functional genes analysis:** detection and quantification of genes linked with metals, antibiotic, nutrient and biogeochemical cycles.

### ENVIRONMENTAL ECOLOGY AND CHEMISTRY SKILLS

Basic spectrophotometry; Chemical Oxygen Demand (COD); Extended Biotic Index; pH and electric conductivity (soil, sediment and water); biomass compositional chemistry analysis (nitrogen, ammonia, phosphorus, phosphate and sulphate).

### FIELD SAMPLING SKILLS

Experience of sampling from different environmental matrices: soil, rhizosphere, sediments and vegetable tissue. Sampling Campaign:

2014 Moticolo forest- South Tyrol, Italy

2011, 2012 and 2013 Weisskugel glacier and Matschertal – South Tyrol, Italy.

2010 and 2011 Hetao Irrigation District (Yellow River basin, Inner Mongolia) and Zhangye city (Gansu province) – China.

### STATISTIC SKILLS

**Univariate** and **multivariate** statistic focusing on the microbial communities; analysis of ecological matrices based on fingerprinting technique and next generation sequencing (**PAST**: Paleontological Statistics and **"R" environment** using R-studio).

### INFORMATIC AND BIOINFORMATIC SKILLS

**Windows** and **LINUX** operating system (command line language); basic python scripting (using biopython); **Diversity Database** (gel acquisition); **Clustal X** (multiple alignment of nucleic acid and protein sequences); **Treecon** (analysis of DNA sequence, alignment and phylogenetic analysis); **Chromas** (chromatogram viewer and analyzer), **ClustalW** (multiple sequence alignment); **MEGA** (Molecular Evolutionary Genetics Analysis) and **bioinformatics database** (SILVA, BLAST, RDP etc.).

### ANALYSIS OF COMMUNITY SEQUENCE DATA OBTAINED THROUGH THE NEXT GENERATION SEQUENCING

Bioinformatics analysis of next-generation sequencers outputs (454 and Illumina) using ad-hoc pipelines (such as **Mothur** and **QIIME**); **PICRUSt** (Predict metagenome functional content from marker gene); **Dendroscope** (visualizing

phylogenetic trees and rooted networks); **MEGAN5** (Metagenome analyzer).

## REVIEWING ACTIVITIES

Annals of Microbiology (May 2012); iForest Biogeoscience and Forestry (June 2014)

## PROJECT AND GRANT APPLICATIONS

I won the competition for the research grant (Yggdrasil) founded by the Norwegian Research Council. Title of the project: "Prevalence of clinically troublesome antibiotic resistance traits in severely polluted freshwater channels in northern China". However, I actively participated in writing and coordinating of the project: "ALGAREM: Algae for antibiotic remediation" submitted to Autonomous Province of Bolzano (3rd call for projects in the field of scientific research).

## FOREIGN LANGUAGES

English as independent user (C1).

## HOBBIES

Mountaineering (snowboard, rock and ice climbing), backpacking and music.

## LIST OF PUBLICATIONS

### In referred journals

- Borruso L**, Zerbe S and Brusetti L (2014) Bacterial community structures as a diagnostic tool for watershed quality assessment. Research in Microbiology, doi:10.1016/j.resmic.2014.11.004. **(IF: 2.826)**.
- Borruso L**, Bacci G, Mengoni A, De Philippis R and Brusetti L. (2014) Rhizosphere effect and salinity competing to shape microbial communities in *Phragmites australis* (Cav.) Trin. ex-Stued. Fems Microbiology Letters, 359: 193–200 **(IF: 2.723)**
- Borruso L**, Harms K, Johnsen PJ, Nielsen KM and Brusetti L. Biogeographical distribution of Class I integrons as bioindicator for freshwater systems (*SUBMITTED, Scientific Reports*). **(IF: 5.078)**
- Bianciardi G and **Borruso L**. Nonlinear analysis of nucleotide sequences by random walks: randomness at the origin on life, (*ACCEPTED, Journal of Molecular Evolution*). **(IF: 1.863)**
- Esposito A, Ciccazzo S, **Borruso L**, Zerbe S, Daffonchio D and Brusetti L (2013). A three-scale analysis of bacterial communities involved in rocks colonization and soil formation in high mountain environments. Current Microbiology, 67: 472-479. **(IF: 1.359)**
- Gatta G, Libutti A, Gagliardi A, Beneduce L, Brusetti L, **Borruso L** and Tarantino E (2014). Irrigation with treated agro-industrial wastewater of tomato crop: effects on qualitative characteristics of fruits and soil microbiological properties. Agricultural Water Management, 149: 33–43. **(IF: 2.333)**
- Polidori C, **Borruso L**. (2012) Socially peaceful: foragers of the eusocial bee *Lasioglossum malachurum* are not aggressive against non-nestmates in circle-tube arenas. Acta Ethologica, 15:15-23.
- Polidori C, **Borruso L**, Boesi R and Andrietti F. (2009). Segregation of temporal and spatial distribution between kleptoparasites and parasitoids of the eusocial sweat bee, *Lasioglossum malachurum* (Hymenoptera: Halictidae, Mutillidae).

Entomological Science, 17: 116-129. (IF: 1.116).

Polidori C, Ruffato G, **Borruso L**, Settanni C and Pavan G (2012). Stridulatory organ and distress call in males and females of a small velvet ant (Hymenoptera: Mutillidae). Bioacoustics, (IF: 0.727).

Rizzi A, Crotti E, **Borruso L**, Jucker C, Lupi D, Colombo M and Daffonchio D (2013). Characterization of the bacterial community associated with larvae and adults of *Anoplophora chinensis* collected in Italy by culture and culture-independent methods. BioMed Research International, 420287. (IF = 2.880).

Zanaroli G, Balloi A, Negroni A, **Borruso L**, Daffonchio D and Fava F. (2012). A Chloroflexi bacterium dechlorinates polychlorinated biphenyls in marine sediments under in situ-like biogeochemical conditions. Journal of Hazardous Materials, 209: 449-457. (IF: 4.331).

### Book Chapters

Brusetti L and **Borruso L** (2014). Use of microbial communities as bioindicators for land use systems In: Cirella GT and Zerbe S (Eds.), Sustainable Water Management and Wetland Restoration Strategies in Northern China Bu Press, Bozen, Italy.

Brusetti L and **Borruso L** (2014). Diversity and role of rhizobacteria associated with *Phragmites australis* In: Cirella GT and Zerbe S (Eds.), Sustainable Water Management and Wetland Restoration Strategies in Northern China Bu Press, Bozen, Italy.

### Conferences

Beneduce L, Brusetti L, **Borruso L**, Spano G, Gatta G, Libutti A and Tarantino E. Effect of reuse of agro-industrial wastewaters on the agricultural soil microbial community, product safety and yield in tomato cropping, International Conference Microbial Diversity: Environmental Stress and Adaptation. 24-26 October 2013, Turin, Italy.

**Borruso L**, Thevs N, Ping H, Zerbe S and Brusetti L. Bacterial communities associated to *Phragmites australis* stands under severe pollution stress in Northern China, International Conference Microbial Diversity: Environmental Stress and Adaptation. 26-28 October 2011, Milano, Italy.

**Borruso L**, Harms K, Nielsen KM, Johnsen P and Brusetti L. Class I integrons as a bioindicator in freshwater channels in Northern China, International Conference Microbial Diversity: Environmental Stress and Adaptation. 24-26 October 2013, Turin, Italy.

**Borruso L**, Bacci G, Mengoni A, De Philippis R, Zerbe S and Brusetti L. Rhizosphere effect and salinity: competing to shape microbial communities in *Phragmites australis* (Cav.) Trin. ex-Steud. Putting Halophytes to Work: From Genes to Ecosystems. 9-10 April 2014, Coimbra, Portugal.

**Borruso L**, Bacci G, Mengoni A, De Philippis R and Brusetti L. Rhizobacterial communities of *Phragmites australis* grown in hypersaline ponds, International Conference Microbial Diversity: Environmental Stress and Adaptation. 24-26 October 2013, Turin, Italy.

**Borruso L** and Brusetti L. Bacterial community structures as a promising bioindicator for watershed management. National Conference, SIMTREA. 26-28 June 2012, Bari, Italy (Oral communication).

**Borruso L**, Köbbing J, Yu LL, Ott K, Thevs N, Ping H, Zerbe S and Brusetti L. Connections between rhizobacterial communities of reed sediments and land-use in Zhangye City area (Gansu Province, China), International conference Environmental Microbiology and Biotechnology in the frame of the knowledge-based bio & green economy, EMB2012. 10-12 April 2012, Bologna, Italy.

Brusetti L, Ciccazzo S, **Borruso L**, Esposito A, Hicks A, Dominguez FS, Schmitt AO. Metagenomics analysis of the bacterial communities in the lateral moraine of the Weisskuegel (palla Bianca) glacier using Illumina's MiSeq technology, Statistical methods for Omics Data Integration and Analysis. 10-12 November 2014, Heraklion, Greece.

- Brusetti L and **Borruso L**. Biogeography of rhizobacteria associated to *Phragmites australis* along a drainage channel in Inner Mongolia (China), National Conference, SIMTREA, 26-28 June 2012, Bari, Italy.
- Brusetti L, Ceccon C, Zanotelli V, Melo W, **Borruso L**, Esposito A, Montagnani L and Tagliavini M. Microbial communities associated to apple tree rhizosphere under different nitrogen stress amendments, International Conference Microbial Diversity: Environmental Stress and Adaptation. 26-28 October 2011, Milan, Italy.
- Borruso L**, N. Thevs, S. Zerbe, H. Ping and L. Brusetti. Bacterial communities associated to *Phragmites australis* stands under severe pollution stress in Northern China, 1st International Conference on Microbial Diversity; 2011- Environmental Stress and Adaptation. 26-28 October 2011 Milan, Italy.
- Brusetti L, Ceccon C, Zanotelli D, Weber de Melo V, **Borruso L**, Esposito A, Montagnani L and Tagliavini M Microbial communities associated to apple tree rhizosphere under different nitrogen stress amendments, 1st International Conference on Microbial Diversity, Environmental Stress and Adaptation. October 26-28, 2011, Milan, Italy.
- Panzacchi P, Ventura M, Wellstein C, Angeli S, Brusetti L, **Borruso L**, Casagrande S, Scandellari F, Zerbe S, Tonon G. Effect of nitrogen deposition on structural and functional characteristics of a forest ecosystem in Trentino - Alto Adige: a multidisciplinary approach, II International Congress of Silviculture, Ecology, biodiversity, genetics and forest adaptation processes to climate change. November 26–29, 2014, Florence, Italy.
- Valducci Vecchi G, Ciccazzo S, **Borruso L**, Manara S, Mimmo T, Angeli S, Baratieri M, Brusetti L. Microbial consortia involved in laboratory-scale bioremediation of pinewood-tar after a steam gasification process. 4<sup>th</sup> International Conference on Engineering for Waste and Biomass Valorisation. September 10-12 2012, Porto, Portugal.
- Valducci Vecchi G, Ciccazzo S, **Borruso L**, Baratieri M and Brusetti L. Microbial consortia involved in pinewood-tar bioremediation in a laboratory scale microcosm study, 1st International Conference on Microbial Diversity Environmental Stress and Adaptation. October 26-28, 2011, Milan, Italy.
- Zanaroli G, Balloi A, Negroni A, **Borruso L**, Daffonchio D, Fava FA Chloroflexi bacterium carrying a new reductive dehalogenase gene dechlorinates PCBs in marine sediments under in situ biogeochemical conditions. 1st International Conference on Microbial Diversity. 2011. Environmental Stress and Adaptation. October 26-28, 2011, Milan, Italy.