



# SCIENCE OF THE TOTAL ENVIRONMENT

An International Journal for Scientific Research into the Environment and its Relationship with Humankind

## AUTHOR INFORMATION PACK

### TABLE OF CONTENTS

|   |                                 |             |
|---|---------------------------------|-------------|
| ● | <b>Description</b>              | <b>p.1</b>  |
| ● | <b>Audience</b>                 | <b>p.1</b>  |
| ● | <b>Impact Factor</b>            | <b>p.1</b>  |
| ● | <b>Abstracting and Indexing</b> | <b>p.1</b>  |
| ● | <b>Editorial Board</b>          | <b>p.2</b>  |
| ● | <b>Guide for Authors</b>        | <b>p.11</b> |



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### DESCRIPTION

*Science of the Total Environment* is an international multi-disciplinary journal for publication of original research on the **total environment**, which includes the **atmosphere, hydrosphere, biosphere, lithosphere, and anthroposphere**.

[totalenvironment.gif](http://totalenvironment.gif)

### AUDIENCE

Environmental Scientists, Environmental Toxicologists, Ecologists, Chemical/Environmental Engineers, Environmental Health Scientists and Epidemiologists, Risk Scientists, Environmental Science Managers and Administrators.

### IMPACT FACTOR

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### ABSTRACTING AND INDEXING

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Elsevier BIOBASE  
Meteorological and Geostrophysical Abstracts  
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## EDITORIAL BOARD

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### **Co-Editors in Chief:**

**Damià Barceló**, Consejo Superior de Investigaciones Científicas (CSIC), Barcelona, Spain  
Environmental analysis; Water and soil quality; Organic mass spectrometry; Emerging organic contaminants; Nanomaterials; Biosensors for: Analysis, Fate and Risk of Emerging Pollutants such as Pharmaceuticals and Nanomaterials in the Environment Water Pollution Control and Protection Bridging analytical chemistry with ecotoxicology- toxicity identification; Evaluation techniques used: GC and LC tandem MS, biosensors, sample preparation, automated on-line techniques for water analysis environmental samples (water, including marine waters, sediments soils, biota samples)

**Jay Gan**, University of California, Riverside, Riverside, California, USA  
Organic Contaminants; Pesticides; Emerging Contaminants; Adsorption; Transformation; Mitigation; Water Quality; Aquatic Toxicology; Remediation; Water Reuse

### **Special Issues Editor**

**Elena Paoletti**, National Research Council of Italy (CNR), Firenze, Italy  
Plant health; Plant ecophysiology; Forests; Climate stressors; Air pollution impacts on terrestrial ecosystems; BVOC; Ground-level ozone

### **Associate Editors**

**Julian Blasco**, Instituto de Ciencias Marinas de Andalucía (CSIC), Puerto Real (Cádiz), Spain  
Metals; Pharmaceuticals; Nanoparticles; Pollution; Ecotoxicology; Risk assessment; Seawater; Sediment

**Baoliang Chen**, Zhejiang University, Hangzhou, China  
Soil pollution control and remediation; Traditional and novel functional materials and environmental applications (biochar, graphene, biosorbent, and organoclay); Sorption and reactions of organic and inorganic contaminants with natural and synthesised media; Novel membrane and pollutant abatement

**Jianmin Chen**, Fudan University, Shanghai, China  
Gaseous and particulate air monitoring and chemistry (particularly urban); Secondary aerosol; Haze formation and fog chemistry; Human toxicity of atmospheric particulates; Aerosols and climate impacts

**Frederic Coulon**, Cranfield University, Cranfield, Bedfordshire, England, UK  
Remediation, hazardous waste, water and wastewater treatment ; Risk assessment and remediation; Bioaerosols; Hydrocarbons; Environmental microbiology; Antarctic science

**Adrian Covaci**, University of Antwerp, Wilrijk, Belgium  
Human exposure; Exposure assessment; Human health effects; Biomarkers; Food safety; Biomonitoring; Indoor pollution; Emerging contaminants; Legacy contaminants; Wastewater epidemiology

**Xinbin Feng**, Chinese Academy of Sciences (CAS), Guiyang, China  
Mercury biogeochemical cycling in the environment and its health impact; Mercury stable isotope geochemistry and remediation of mercury contaminated lands; Cd, Pb, As and Sb biogeochemical cycling in the environment

**José Virgílio Matos Figueira Cruz**, University of the Azores, Ponta Delgada, Portugal  
Groundwater geology; Groundwater geochemistry; Surface water chemistry; Water quality; Water pollution; Water management; Water planning

**Alejandro García-Gil**, Instituto Geológico y Minero de España (IGME), Zaragoza, Spain  
Urban hydrogeology; Groundwater quality; Shallow geothermal exploitation impacts on water resources; Groundwater management; hydrogeochemistry; River-groundwater interaction; Groundwater flow and reactive transport numerical modelling; Groundwater microbiology; Emerging organic contaminants

**Ashantha Goonetilleke**, Queensland University of Technology, Brisbane, Queensland, Australia  
Water quality; Water pollution; Water reuse; Water treatment; Stormwater pollutant processes; Integrated Water Resources Management; Water infrastructure resilience; climate change adaptation

**Mae Gustin**, University of Nevada at Reno, Reno, Nevada, USA  
Biogeochemical cycling of mercury, metals, and isotopes; Air pollution

**Zhen (Jason) He**, Virginia Tech, Blacksburg, Virginia, USA  
Water pollution and treatment; Environmental biotechnology; Resource recovery from wastes; Bioelectrochemical systems; Bioenergy; Membrane technology; Bioremediation; Desalination

**Patricia A. Holden**, University of California, Santa Barbara, California, USA

**Henner Hollert**, RWTH Aachen University (RWTH), Aachen, Germany

Bioanalytical environmental toxicology; Aquatic toxicology; Triad (Weight of evidence) approaches; Effect directed analysis; Sediments; In-situ investigations and monitoring; In-vitro bioassays; Waste- and ground water investigations (advanced wastewater treatment); Ecology

**Deyi Hou**, Tsinghua University, Beijing, China

Sustainability assessment; Life cycle assessment; Environmental footprint analysis; Risk management; Contaminated soil and groundwater remediation; Heavy metal contamination; Biochar production and application; Green synthesis of environmental functional materials; Fate and transport of volatile organic compounds in porous media

**Ching-Hua Huang**, Georgia Institute of Technology, Atlanta, Georgia, USA

Environmental chemistry; Water quality; Physicochemical treatment processes; Drinking water quality; Wastewater reuse; Contaminants of emerging concern; Reaction kinetics and mechanism

**Wei Huang**, Peking University, Beijing, China

Exposure assessment; Environmental epidemiology; Health intervention

**Pavlos Kassomenos**, University of Ioannina, Ioannina, Greece

Air pollution; Meteorology; Environmental health; Climate change; Particulates; Ozone; Bioaerosols; Dust transportation; Vehicle emissions; Noise

**Ewa Korzeniewska**, University of Warmia and Mazury, Olsztyn, Poland

Air pollution quality and human health; Contaminant (bio)monitoring and assessment; Ecotoxicology and risk assessment; Environmental management and policy; Human health risk assessment and management; Waste and water treatment; Antibiotic resistance; Biogas production

**Ralf Ludwig**, Ludwig-Maximilians-Universität München (LMU), Munich, Germany

Hydrology; Water resources management; Climate change; Land use change; Extreme events; Modeling; Remote sensing

**Lidia Morawska**, Queensland University of Technology, Brisbane, Queensland, Australia

Air pollution; Air quality; Indoor air pollution; Exposure assessment; Contaminated particulates; VOC; anthropogenic; Characterization; Automotive; Apportionment; Pollution transport; Monitoring; Analytical

**Jose Julio Ortega-Calvo**, Consejo Superior de Investigaciones Científicas (CSIC), Sevilla, Spain

Biodegradation and biotransformation of organic pollutants in soils and sediments; Bioremediation; Environmental microbiology; Bioavailability and persistence; Risk assessment

**Wei Ouyang**, Beijing Normal University, Beijing, China

Water environment and climate risk; Watershed environment management; Non-point source modeling and control; Diffuse pollution assessment

**Elena Paoletti**, National Research Council of Italy (CNR), Firenze, Italy

Plant health; Plant ecophysiology; Forests; Climate stressors; Air pollution impacts on terrestrial ecosystems; BVOC; Ground-level ozone

**Yolanda Picó**, Universitat de València, Valencia, Spain

Media / Habitats: drinking water, water quality, water pollution, rivers, lakes, sediments, watersheds, soils, exposure assessment, human health effects, biomarkers, bioindicators, dietary exposure, food contamination, food safety; Human Health Effects: pesticides, endocrine disruptors, pharmaceutical residues, organics, analytical, surveys

**Charlotte Poschenrieder**, Universitat Autònoma de Barcelona (UAB), Bellaterra, Spain

Plant-Environment Interactions; Plant-Soil Relationships; Salinity; Plant- Microbe Interactions; Plant Toxicology; Crop Production; Plant Natural Adaptation

**Sergi Sabater**, Universitat de Girona, Girona, Spain

River and stream ecology; Biofilm ecology and ecotoxicology; Mediterranean; Water scarcity; Ecosystem functioning; Biodiversity; Conservation of rivers

**Scott C. Sheridan**, Kent State University, Kent, Ohio, USA

Human biometeorology, climate change, synoptic climatology, extreme temperature events

**Filip M.G. Tack**, Universiteit Gent, Gent, Belgium

Heavy metals; Trace element biogeochemistry; Dredged materials; Soil and sediment remediation; Phytoremediation

**Kevin Thomas**, University of Queensland, Woolloongabba, Queensland, Australia

Contaminants of emerging concern; Non-target analysis; High resolution Mass Spectrometry; Microplastics; Biomonitoring

**Daniel Tsang**, The Hong Kong Polytechnic University, Hong Kong, China

Green chemistry/engineering; Soil/sediment remediation; Engineered biochar; Waste valorization; Resource recovery; Wastewater/stormwater treatment; Catalytic conversion/degradation; Pollutant transport; Environmental pollution

**Paola Verlicchi**, Università di Ferrara, Ferrara, Italy

Water treatment; Wastewater treatments; Reuse of reclaimed water; Occurrence and removal of pharmaceuticals from (waste)water; Hospital effluent management and treatment; Petrochemical wastewater treatment; Environmental risk assessment

**Daniel A. Wunderlin**, Universidad Nacional de Cordoba (Argentina), Córdoba, Argentina

Tracing pollutants from their source to foods; Food Integrity, including the evaluation of bioactive compounds in foods; Studying links between food production and environmental pollution

**Shuzhen Zhang**, Chinese Academy of Sciences (CAS), Beijing, China

soil contamination; Sorption/desorption of organic contaminants; Bioaccumulation and transformation of organic contaminants in the terrestrial environment; Applications of synchrotron-based spectroscopy techniques in environmental chemistry, NOM analysis and effects on contaminant behaviors

#### **Editorial Board**

**Jésus R. Aboal Viñas**, Universidade de Santiago de Compostela, Santiago de Compostella, Spain

Biomonitoring; Moss biomonitoring; Raptor biomonitoring; Algae biomonitoring; PAHs contamination; Heavy metal contamination; Cellular localization of metals; Hydrological fluxes of forest canopies

**Souhail R. Al-Abed**, U.S. Environmental Protection Agency (EPA), Cincinnati, Ohio, USA

Environmental implication and applications of nanomaterials; Sediment and water remediation; Contaminant (metals and organics) transformations in the environment; Reuse of materials in environmental applications

**Alexandros G. Asimakopoulos**, Norwegian University of Science & Technology NTNU, Trondheim, Norway

**Takashi Azuma**, Osaka University of Pharmaceutical Sciences, Osaka, Japan

Pharmaceuticals and personal care products; Hospital effluent; Water environment; Sewage treatment plant; Occurrence and environmental fate; Water treatment system; Water management; Environmental science; Environmental hygiene; Public health

**Roya Bahreini**, University of California, Riverside, Riverside, California, USA

Aerosol sources; Formation processes; Composition and microphysical properties; Direct and indirect effects on climate

**Carlos Barata**, IDAEA-CSIC, Barcelona, Spain

Analytical chemistry; Aquatic toxicology; Environmental risk assessment; Toxicogenomics

**Roberto Bargagli**, Università degli Studi di Siena, Siena, Italy

environmental biogeochemistry, active and passive biomonitoring of persistent contaminants in terrestrial and aquatic ecosystems

**Georgios Bartzas**, National Technical University of Athens (NTUA), Athens, Greece

Expertise in Waste management; Environmental monitoring and Risk assessment; Life cycle analysis; Soil and Groundwater decontamination; Geochemical/Thermodynamic modelling; Environmental economics

**Ivan Bergier**, EMBRAPA Brazil, Corumbá, Brazil

Expertise in sustainable development, particularly in the following areas: environmental services, ecology and biogeochemistry of ecosystems and agroecosystems; Bioenergy; Biofuels; Biochar; Remote sensing; Electron microscopy; Applied to nanotechnology, electronics and automation; Climate change adaptation; Mitigation of greenhouse gases emissions

**Harald Biester**, Technische Universität Braunschweig, Braunschweig, Germany

Biogeochemical cycling of mercury and trace elements; Biogeochemistry of peatlands

**Jayanta Kumar Biswas**, University of Kalyani, Kalyani, India

Environmental pollution; Water and soil contamination; Biomonitoring; Toxic metal(loid)s; Ecotoxicology; Bioremediation; Environmental microbiology; Ecological engineering; Ecotechnology; Nanobiotechnology; Wastewater treatment

**Paul Bradley**, U.S. Geological Survey (USGS), Columbia, South Carolina, USA

Drinking Water Exposure; Water Quality; Environmental and Public Health; Contaminants of emerging concern; Pharmaceuticals; Water Reuse; Remediation; Environmental microbiology; Urban and Aquatic Ecology

**Cristina M. Branquinho**, Universidade de Lisboa, Lisbon, Portugal

air quality, water quality, forests, ecological effects, bioavailability, bioindicators, PAHs, Dioxin, nutrients, copper, natural, anthropogenic, diffuse, apportionment, bioremediation, restoration, climate change, eutrophication, desertification, deforestation, monitoring, sequential extraction, remote sensing, moss biomonitoring, lichens, tree rings (dendrochronology), historical monitoring, Africa, Western Europe, Mediterranean region, South America

**Satinder Brar Kaur**, Institut National de la Recherche Scientifique (INRS), Québec, Quebec, Canada

Wastewater; Wastewater sludge; Treatment; Emerging contaminants; Antibiotics; Fermentation; Value-added bioproducts, such as enzymes, organic acids, platform chemicals, biocontrol agents, biopesticides, butanol and biohydrogen

**Birgit Braune**, Environment and Climate Change Canada, Ottawa, Ontario, Canada  
Arctic, marine ecosystems, birds, metals, organo-compounds, biomonitoring, biological effects.

**Bryan W. Brooks**, Baylor University, Waco, Texas, USA  
Water Quality, Environmental and Aquatic Eco-Toxicology, Risk and Hazard Assessment, Comparative Pharmacology and Toxicology, Environmental Public Health, Harmful Algal Blooms, Green and Sustainable Chemistry, Urban and Aquatic Ecology, Water Reuse.

**Giorgio Buonanno**, Università degli Studi di Cassino e del Lazio Meridionale, Cassino (FR), Italy  
10.020: Air pollution; 10.030: Air quality; 10.040: Indoor air pollution; 70.040: Clean technologies; 80.050: Incineration

**Joanna Burger**, Rutgers University, Piscataway, New Jersey, USA  
Eco-toxicology; Behaviour; Monitoring and assessment; Birds and reptiles

**Glòria Caminal Saperas**, Consejo Superior de Investigaciones Científicas (CSIC), Barcelona, Spain  
Biochemical engineering; Environmental engineering ( focused on biodegradation of pollutants by microorganisms or enzymes); Bioreactors; Immobilization; Kinetics

**Art Chappelka**, Auburn University, Auburn, Alabama, USA  
Air pollution and global climate effects to terrestrial ecosystems; Native plant community responses (shifts in diversity) to air pollutants and global climate change; Plant-stress-air pollution/global climate change interactions; Urban ecology and ecosystem services

**Da Chen**, Jinan University, Gangzhou, China  
Environmental chemistry; Analytical chemistry; Ecotoxicology; Persistent organic pollutants; Flame retardants; Pesticides; Mass spectrometry; Gas/liquid chromatography.

**Wei Chen**, Nankai University, Jinnan District, Tianjin, China  
Nanoparticles; Nanomaterials; Adsorption; Reactivity; Transport; Remediation; Groundwater; Soil; Organic contaminants

**Joaquín Cochero**, Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Buenos Aires, Argentina  
Biofilm; Stream ecology; Biomonitoring; Urban streams; Citizen science

**Xinyi (Lizzy) Cui**, Nanjing University, Nanjing, China  
Organics; Bioavailability

**Rui da Silva Coutinho**, Universidade Dos Açores, Ponta Delgada, Portugal  
Hydrogeology, Volcanology, Natural Hazards, Water Resources Management, Environmental Geology.

**Guido Del Moro**, National Research Council of Italy (CNR), Bari, Italy  
novel processes for wastewater treatment, aerobic granular biomass technologies, integration of chemical oxidation and biological processes for industrial wastewater, advanced oxidation processes, electro-degradation processes, wastewater treatment modelling

**José L. Domingo**, Universitat Rovira i Virgili, Reus, Catalonia, Spain

**Margaret Eng**, University of Saskatchewan, Saskatoon, Saskatchewan, Canada  
Avian toxicology; Wildlife toxicology; Ecotoxicology; Physiological, neurological and behavioral effects of contaminants; Developmental exposure; Flame retardants; Pesticides; Dioxin-like compounds

**Zhaozhong Feng**, Chinese Academy of Sciences (CAS), Beijing, China  
Air pollutant; BVOCs; Crop growth; Forest health; N deposition; N use and allocation; Ozone pollution; Photosynthesis and C cycle; Water use efficiency; Urban environment and forestry

**Jose Angel Fernández**, Universidade de Santiago de Compostela, Santiago de Compostela, Spain  
Air pollution; Air quality; Water pollution; Rivers; Ecological effects; Bioavailability; Bioindicators; Aquatic toxicology; Heavy metals; Biomagnification; Bioaccumulation; Surveys; Moss; Biomonitoring; Western Europe

**Jean-Francois Focant**, Université de Liège, Liège (Sart-Tilman), Belgium  
exposure assessment, dietary exposure, food contamination, Human Health Effects, POPs, VOC, PCBs, Dioxin, analytical, measurement methods

**Bo Gao**, China Inst. of Water Resources and Hydropower (IWHR), Beijing, China  
Geochemistry of trace metals in environment; Water and sediment transport; Large-scale watershed management

**Jorge Gardea-Torresdey**, University of Texas at El Paso, El Paso, Texas, USA  
Applications of spectroscopy techniques in environmental chemistry; Phytoremediation; Novel methods for the bioproduction of nanoparticles; Development of analytical methods to detect nanomaterials; Study of the fate of nanoparticles in the environment; Applications of nanotechnology to clean water

**Leobardo Manuel Gómez Oliván**, Universidad Autónoma del Estado de México, Toluca, Mexico  
Aquatic toxicology; Fish toxicity; Emerging contaminants; Metals; Genotoxicity; Citotoxicity; Embryotoxicity; Teratogenesis; Oxidative stress; Biomarkers

**Daren Gooddy**, British Geological Survey, Oxfordshire, England, UK  
Groundwater; Biogeochemical cycles; Residence time indicators

**Andrew Gray**, University of California, Riverside, Riverside, California, USA

Sediment transport; Hydrology; Water quality; Plastic pollution; Watershed sediment dynamics; Sedimentology; Paleoenvironmental analysis

**John Gulliver**, University of Leicester, Leicester, England, UK  
Noise and air pollution exposure assessment; Air pollution monitoring; Dispersion modelling; Land use regression modelling; Geographical information systems; Geo-statistical techniques (Kriging etc.); Spatial analysis of environmental and health data; Geographical studies of environment and health; Health risk assessments

**Ying Guo**, New York State Department of Health (NYSDOH), Albany, New York, USA  
My research interests: (1) biomonitoring organic chemicals in human body, such as phthalates, PAHs, organophosphate pesticide and environmental phenols; (2) monitoring organic pollutants in environment, e.g., persistent organic pollutants; (3) Analytical method development for novel organic contaminants in various environmental matrix. Recently, I am working on Exposome to women with fertility problems.

**Gary Hardiman**, Queens University of Belfast, Belfast, UK  
Computational biology; Epigenetics; Endocrine disruption; Systems biology; Biomarkers of exposure and human health risk assessment; Diagnostic tool development

**Neil S. Harris**, University of Alberta, Edmonton, Alberta, Canada  
Expertise: cadmium, micronutrients, membrane transporters, trace metal uptake and translocation in plants

**Roy M. Harrison**, University of Birmingham, Birmingham, England, UK  
Air Pollution; Atmospheric Science; Environmental Health; Environmental Chemistry; Aerosol Science

**Gerard Hoek**, Universiteit Utrecht, Utrecht, Netherlands  
Exposure assessment; Air pollution modelling; Environmental epidemiology

**Peter Hooda**, Kingston University, Kingston upon Thames, England, UK  
Biogeochemical Cycling of Nutrients and Environmental Contaminants; Catchment Water Quality; Land Degradation; Climate Change Impacts on Soil Processes; Emerging Contaminants

**Kiril Hristovski**, Arizona State University, Mesa, Arizona, USA  
Nanomaterials; Water/Wastewater Quality and Treatment; Solid and Hazardous Waste; Developing Countries

**Hafiz M. N. Iqbal**, Instituto Tecnológico y de Estudios Superiores de Monterrey, Monterrey NL Mexico, Mexico  
Environmental Engineering; Bioengineering; Biomedical Engineering; Bioremediation; Emerging contaminants; Wastewater treatment; Biomaterials; Bio-catalysis; Enzymes; Enzyme-based pollutant degradation; Immobilization; Toxic heavy elements; Liquid and solid waste management; Valorization of agro-industrial wastes and by-products

**Rong Ji**, Nanjing University, Nanjing, China  
Organics; Terrestrial; Biodegradation; Environmental process; Radiotracer

**Sunny Jiang**, University of California, Irvine, California, USA  
Pathogens; Water treatment; Membrane fouling; Microbial water quality; Risk assessments; Water reuse, Virus, bacteria

**Weiyang Jiang**, California Environmental Protection Agency, Sacramento, California, USA  
Organics; Pesticides; Dust; Analytics

**Wei Jiang**, Shandong University, Qingdao, China  
Environmental risk of nanomaterials; Nano-bio interaction; Cell membrane damage; Cytotoxicity; Nanoparticle transport

**Begoña Jiménez**, Consejo Superior de Investigaciones Científicas (CSIC), Madrid, Spain  
Persistent Organic Pollutants (POPs); Dioxins; PCBs; Fate of POPs; Contaminants of emerging concern; Organic pollutants in aquatic and terrestrial ecosystems; Bioindicators; Marine mammals; Air Pollution; Environmental chemistry; Monitoring

**Sarah Jovan**, Pacific Northwest Forest Inventory and Analysis (PNW-FIA), Portland, Oregon, USA  
My greatest expertise is in using lichen community composition for monitoring and quantifying nitrogen pollutants. But I also work with lichen/moss tissue assays (for N, S, metals, PAHs), landscape-scale community-based gradient modeling more generally, and biomass modeling for ground-dwelling non-vascular communities in boreal and tundra systems.

**Anna Jurado**, Technische Universität Dresden, Dresden, Germany  
Aquifer recharge quantification; Emerging organic contaminants; Greenhouse gases; Groundwater quality; Groundwater management; Urban groundwater; River-groundwater interaction; Managed aquifer recharge; Numerical modelling; Quantitative hydrogeology

**Athanasios Katsogiannis**, European Commission, Ispra (VA), Italy  
Development and optimisation of analytical chemistry techniques and sampling methodologies to the source understanding; Occurrence and fate of organic contaminants in all environmental compartments, including indoor air, atmospheric air, soil, water and/or wastewater

**Nerantzis Kazakis**, Aristotle University of Thessaloniki, Thessaloniki, Greece



**Thomas Meinelt**, Institute of Freshwater Ecology and Inland Fisheries, Berlin, Germany  
Alternative treatments in aquaculture; Impact (and interaction) of humic substances on environment and animals.

**Derek Muir**, Environment and Climate Change Canada, Burlington, Ontario, Canada  
Environmental chemistry; Biogeochemistry; Bioaccumulation; Persistent organic pollutants; Chemicals of emerging concern; Chemical inventories; Mercury; Polycyclic aromatic compounds; Arctic; Marine mammals; Fish

**Jacek Namieśnik**, Technical University of Gdansk, Gdansk, Poland  
Environmental analytics and monitoring; Food analysis; QA/QC systems; Green analytical chemistry; Envirometrics

**Howard S. Neufeld**, Appalachian State University, Boone, North Carolina, USA  
The effects of ozone on plants; The role of anthocyanins in vegetative tissues in plants; Climate change impacts on plants in the southern Appalachian mountains; Measuring plant gas exchange and plant water relations, using the Li-Cor 6400 and 6800 gas exchange systems, a Sperry hydraulic conductivity apparatus and Scholander pressure chamber, as well as a variety of other instrumentation (including leaf fluorescence meter) to monitor plant responses to environmental stresses

**Huu Hao Ngo**, University of Technology Sydney, Sydney, New South Wales, Australia  
Water and wastewater treatment and reuse technologies; Alternative water resources; Water management and impact assessment; Solid waste management; Specific green technologies; Water – waste – energy nexus; Greenhouse gas emission control and minimisation

**Hong-Gang Ni**, Peking University, Shenzhen, China  
Organic pollutants (persistent organic pollutants and environmental molecular markers); Environmental model (process and impact); Human exposure and health risk.

**Fernando Pacheco-Torgal**, University of Minho, Guimarães, Portugal  
Eco-efficient construction and building materials; Construction and demolition wastes; Geopolymers; Waste recycling; Durability; Mechanical properties; Alkali-activated cement-based binders; Concrete nanotechnology

**Anastasia K. Paschalidou**, Democritus University of Thrace, Orestiada, Greece  
Air pollution meteorology; Urban meteorology ; Dust transportation; Climate change; Environmental health / Environmental epidemiology; Biometeorology; Synoptic climatology; Dispersion Modeling; Air Quality Indices

**Momir Paunovic**, University of Belgrade, Beograd, Serbia  
Hydrobiology; Aquatic macroinvertebrates; Freshwater mollusks; Invasive aquatic species; Feeding of benthivorous fish; Functional analyses of aquatic ecosystems; Relation of aquatic biota and environmental variables; Bio-monitoring in freshwater; Genotoxicological investigations on aquatic organisms; Microbiology of freshwaters

**Alexandra Pavlidou**, Hellenic Centre for Marine Research, Mavro Lithari, Anavyssos, Greece  
Eutrophication and eutrophication indexes according to WFD and MSFD; Biogeochemical cycles and nutrient dynamics in marine environments (coastal and open sea)

**Alexandre R. Péry**, AgroParisTech, Paris, France  
Toxicokinetic modelling; Toxicodynamic modelling; Ecotoxicology; Mixtures; Integrated risk assessment

**Maria Pignata**, Universidad Nacional de Cordoba (Argentina), Cordoba, Argentina  
Human Health Effects: pesticides, endocrine disruptors, pharmaceutical residues, organics, analytical, surveys

**Xavier Querol**, Consejo Superior de Investigaciones Científicas (CSIC), Barcelona, Spain  
Environmental geochemistry; Air quality; Atmospheric aerosols; Tropospheric ozone; Black carbon; Ultrafine particles; Metals; Organic pollutants; Inorganic gaseous pollutants, NO<sub>2</sub>, NO, NO<sub>x</sub>, SO<sub>2</sub>, SO<sub>3</sub>, CO, NH<sub>3</sub>; Source apportionment; Urban and regional pollution; Atmosphere and climate change; Air quality policy; Mobile, industrial, domestic and agricultural emissions of air pollutants; Leaching of industrial wastes; Impact of mining on environment; Recycling of industrial wastes; Coal use related pollution

**Clemens Reimann**, Norges geologiske undersøkelse - NGU, Trondheim, Norway  
Geochemistry; Environmental Geochemistry; Biogeochemistry; Hydrogeochemistry; Regional Geochemistry; Geochemical mapping; Critical Zone Research; Soil chemistry

**Eric Reiner**, Ontario Ministry of the Environment and Climate Change, Toronto, Ontario, Canada  
Gas Chromatography, Liquid Chromatography, mass spectrometry, Quality Control / Quality Assurance, Environmental Analysis.

**Tiina Reponen**, University of Cincinnati, Cincinnati, Ohio, USA  
Indoor air pollution; Exposure assessment; Bacteria; Fungi; Microorganisms; Microbiome; Biohazards; Monitoring

**Robert Risebrough**



**Anacleto Rizzo**, IRIDRA, Florence, Italy  
Constructed Wetland; Nature-Based Solution for Wastewater Treatment; Sustainable Water Management; Sustainable Sanitation Modelling; Sustainable Urban Drainage Systems; Water Sensitive Urban Design; Low Impact Development; Green Infrastructure; Ecosystem Service

**Teresa Rocha-Santos**, Universidade de Aveiro, Aveiro, Portugal  
Micro(nano)plastic; Plastic; Microfibres; Organic contaminants; Marine monitoring; Environmental monitoring; Wastewater treatment; Biodegradation of microplastics; Sensors; Biosensors

**Chelsea M. Rochman**, University of Toronto, Toronto, Ontario, Canada  
Marine debris; Plastic debris; Persistent organic pollutants; Aquatic toxicology; Marine ecotoxicology

**David Roser**, UNSW Australia, Sydney, New South Wales, Australia

**M<sup>a</sup> Jesús Sánchez-Martín**, IRNASA, CSIC, Salamanca, Spain  
Pesticides, soil, water, organic amendments; Adsorption, desorption, degradation, mobility; Soil and water contamination by pesticides and emerging pollutants; Behaviour of pesticides in soils; Influence of organic amendments

**Nan Sang**, Shanxi University, Taiyuan, Shanxi, China  
Environmental exposure and health risk of chemicals; Biological effect and toxic mechanism of environmental chemicals

**Ralf Bernhard Schäfer**, Universität Koblenz-Landau, Landau, Germany  
Water quality; Rivers; Ecological effects; Chemicals; Aquatic toxicology; Invertebrates; Microorganisms; Modelling; Statistics

**Gabriele E. Schaumann**, Universität Koblenz-Landau, Landau, Germany  
Soil quality in agricultural practices; Engineered nanoparticles in the Environment Soil Chemistry; Soil organic matter fate; Transformation of organic and inorganic pollutants

**Jianwen She**, California Department of Public Health, Richmond, California, USA  
Environmental analysis; Persistent organic chemical analysis; Biomonitoring; Source apportionment; Non target analysis; Endocrine disruptors; Mass spectrometry

**Wei Shi**, Nanjing University, Nanjing, China  
Environmental fate of emerging organic pollutants; Effect directed analysis based on instrumental analysis and bioassays

**Luis Felipe Silva Oliveira**, Universidad de la Costa (CUC), Barranquilla, Colombia  
Nanotechnology in Real Samples (in special nanominerals and advanced electron beam); Soil and water researches; Atmosphere impacts (in special particulate matter)

**Andreas Skouloudis**

**Athanasios S. Stasinakis**, University of the Aegean, Mytilene, Greece  
wastewater treatment and reuse; Sludge management; Emerging contaminants; Aquatic pollution; Biodegradation; Ecotoxicity; Risk assessment

**Marianne Stuart**, British Geological Survey, Wallingford, England, UK  
Groundwater pollution; Agrochemicals; Emerging contaminants in groundwater; Industrial contaminants in groundwater; Shale gas exploitation

**Qian Sui**, East China University of Science and Technology, Shanghai, China  
Pharmaceuticals and personal care products; Micro-plastics; Emerging contaminants; Analytical methods; Environmental behaviors; Source apportionment; Advanced oxidation processes; Treatment processes

**Piotr Szefer**, Medical University of Gdańsk, Gdańsk, Poland  
Biomagnification of major and minor elements along the sequential trophic levels of the marine biosphere; Bioavailability of metallic pollutants to benthic organisms as potential biomonitors in relation to the adjacent sediments and sea water; Analytical and chemometric assessment of food quality

**Phong Thai**, University of Queensland, Woolloongabba, Queensland, Australia  
Wastewater analysis; Sewer-based epidemiology; Air quality monitoring; Air pollution epidemiology; Environmental monitoring

**Maria Concetta Tomei**, Consiglio Nazionale delle Ricerche (CNR), Rome, Italy  
Processes and Technologies for Urban and Industrial Wastewater Treatment; Modelling and Control of Biological Processes, Removal of Xenobiotic Compounds, Two-Phase Partitioning Bioreactors (TPPBs); Sludge Treatment; Soil Bioremediation

**Ashley Townsend**, University of Tasmania, Hobart, Tasmania, Australia  
Environmental analysis; Geochemistry; Oceanography; Marine and Antarctic science; Materials science; Human health areas

**Richard Van Curen**, University of California, Davis, Davis, California, USA  
Aerosol Science, atmospheric pollution, climate science, atmospheric modeling

**Fang Wang**, Chinese Academy of Sciences (CAS), Nanjing, China

Soil pollution and remediation; Persistent organic pollutants; Polycyclic aromatic compounds; Antibiotics; Antibiotic resistance; Phthalate ester; Emerging Contaminants; Biochar; Bioavailability; Biodegradation and biotransformation of organic pollutants; Biofilms; Signaling molecules; Analytical method; Environmental monitoring

**Wei (Vivienne) Wang**, Zhejiang University, Hangzhou, China

Radio-isotopic tracing and photographing; Pesticides; Organic pollutants; Bioavailability; Degradation; Metabolism: chemical analysis

**Xiaoping Wang**, Chinese Academy of Sciences (CAS), Beijing, China

Global cycling of POPs; Mechanism of long range atmospheric transport; POPs accumulation in polar region; Risk assessment of POPs, Brown carbon; Emerging contaminants; Tibet Plateau

**Shaun Watmough**, Trent University, Peterborough, Ontario, Canada

Ecosystem biogeochemistry; ecological impact of trace metals; ecosystem acidification; air pollution impacts on ecosystems

**Jianming Xue**, New Zealand Forest Research Institute Ltd., Christchurch, New Zealand

Biowaste and wastewater reuse; Emerging contaminants in biowaste and soil; Fate and transport of contaminants in terrestrial ecosystems; Antibiotic pollution and remediation; Biochar for environmental management; Plant uptake and translocation of contaminants; Plant-soil-microbe interactions; Phytoremediation of contaminated soils and water; Biowaste management and climate change

**Ishwar Chandra Yadav**, Tokyo University of Agriculture and Technology, Tokyo, Japan

Persistent organic pollutants; Brominated and phosphate flame retardants; Heavy metal pollution; Aerosols; South Asia; PM2.5; Solid waste; E-waste; Himalayas

**Kun Yang**, Zhejiang University, Hangzhou, China

Organics, adsorption, organic matter

**Samantha Ying**, University of California, Riverside, Riverside, California, USA

Trace elements; Soil; Biogeochemistry; Redox processes; X-ray spectroscopy

**Jing You**, Jinan University, Guangzhou, China

Organics; Ecotoxicology; Bioavailability; Sediment; Pesticides

**Teng Zeng**, Syracuse University, Syracuse, New York, USA

Occurrence and fate of organic micro-pollutants; Formation and control of disinfection by-products

**Chaosheng Zhang**, National University of Ireland, Galway, Ireland

Geographical Information System (GIS); Spatial analysis of environmental variables; Heavy metals; Organic carbon in soils/sediments; Precision Agriculture; E-Waste; Big Data in Environmental Sciences

**Xiaowei Zhang**, Nanjing University, Nanjing, China

Toxicogenomics of chemicals, Ecogenomics of pollution, Ecotoxicology

**Yong Zhang**, Xiamen University, Xiamen City, Fujian 361102, China

PAHs; Organic matter; Marine environments

## GUIDE FOR AUTHORS

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## INTRODUCTION

### *Aims and Scope*

*Science of the Total Environment* is an international journal for publication of original research on the **total environment**, which includes the **atmosphere, hydrosphere, biosphere, lithosphere, and anthroposphere**.

[totalenvironment.gif](http://totalenvironment.gif)-Total Environment

The total environment is characterized where these five spheres overlap. Studies that focus on at least two or three of these will be given primary consideration. Papers reporting results from only one sphere will not be considered. Field studies are given priority over laboratory studies. The total environment is studied when data are collected and described from these five spheres. By definition total environment studies must be multidisciplinary.

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[stoten-banners.jpg](#)-The five spheres of the total environment

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- Environmental remediation
- Environmental sources, processes and global cycling
- Groundwater hydrogeochemistry and modeling
- Human health risk assessment and management
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- Noise in the environment
- Persistent organic pollutants
- Plant science and toxicology
- Remote sensing
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