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## Areas of expertise

My research interest is in ecology of microorganisms in freshwaters. I graduated in Botany at University of Liège, Belgium, I began my research career with a PhD on the ecology of benthic diatoms in lowland rivers and their use for monitoring water quality. In the beginning of the 1980s, I became involved in research on potamoplankton, in the framework of impact assessment of nuclear plants on the R. Meuse. This is when I began collaborating with a team of modellers and discovered these techniques.

In 1986, I moved to University of Namur and began teaching biology and ecology of plants, while pursuing my research in potamoplankton. Later on I got involved in research on African lakes, with the supervision of a PhD in lake Muhazi, Rwanda, and with a first "discovery" of Lake Kivu in 1990. In 1996, I did a sabbatical at University of Wisconsin, Madison, where I learned everything on HPLC analysis of pigments.

The 2000s began with a research program on Lake Tanganyika and the coordination of the CLIMLAKE project, involving collaboration of the Belgian teams with African teams. At the same time, I went back to Lake Kivu and we started studying this lake. That's where our interest for picoplankton and heterotrophic protists, and the microbial loop, developed, with several projects carried out with my graduate and PhD students.

Ongoing research is on ecology of great tropical lakes, as influenced by climate change and by species introductions, on cyanobacteria blooms in reservoirs, on microbial diversity and function, and on invasive clams in rivers, in collaboration with teams from Belgium and abroad.

My expertise in algal ecology and biological assessment of water quality is still useful for the determination of the ecological status of water bodies.

Since I was a young boy, I have been fishing, mainly in rivers, using different techniques, from the worm to the fly, but I have specialised in fly-fishing since the 1970s: I tie flies and cast nymphs and dry flies in running waters.

- Etude des relations trophiques en milieu fluvial et lacustre (interaction phytoplancton-zooplancton ; boucle microbienne)
- 2. Qualité des eaux courantes
- Etat écologique des eaux de surface
- Utilisation des algues benthiques (en particulier diatomées) comme indicateurs de pollution des eaux courantes
- Contribution à la modélisation intégrée des bassins versants

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## Projects

### **B-BLOOMS: Algal blooms: emerging problem for health and sustainable use of surface waters**

Descy, J., Gosselain, V. & Leporcq, B.

1/04/03 → 31/10/06

### **FRFC: Analyse des communautés bactériennes en milieu lacustre : relations entre diversité génétique et activité**

Descy, J.

1/06/09 → 1/06/11

### **IBD: Application of the Diatom Biological Index (IBD) to water quality evaluation networks in Wallonia**

Descy, J. & Fauville, C.

1/09/98 → 1/09/00

### **LABORELEC: Assessment of the effect of climate change on the River Meuse**

Descy, J. & Viroux, L.

1/01/05 → 31/12/05

### **BELLA: Belgian cluster on lake research in the framework of global climate change**

Descy, J. & Gosselain, V.

1/01/05 → 31/12/07

### **Biological baseline of Lake Kivu,**

Descy, J.

1/01/12 → 31/12/14

### **Caractérisation complémentaire des masses d'eau dont le bon état dépend d'interactions entre les eaux de surface et les eaux souterraines (ESO-ESU) - Convention de collaboration**

Descy, J.

1/04/13 → ...

### **CAKI: Carbon and nutrient cycles in Lake Kivu**

Descy, J., Darchambeau, F. & Leporcq, B.

16/04/07 → 31/12/10

### **CLIMLAKE: Climate variability as recorded in lake Tanganyika**

Descy, J.

1/01/02 → 31/10/05

### **Contribution to the drafting of a management plan for surface water quality in the Haine catchment**

Descy, J.

1/01/99 → 31/12/02

### **Contribution to the study of the microbial food web in Lake Tanganyika**

Descy, J. & Pirlot, S.

30/09/01 → 30/03/06

### **MON - CIM: Coordination of the "monitoring" working group within the international Meuse commission (CIM)**

Descy, J.

11/10/12 → 10/10/14

### **B-BLOOMS: Cyanobacterial blooms: toxicity, diversity, modelling and management**

Descy, J., Leporcq, B. & Verniers, G.

1/01/07 → 31/12/10

**Development and standardisation of a biotic index based on diatoms in Wallonia**

Descy, J., Fauville, C. & Gosselain, V.

1/09/98 → 1/09/00

**EAGLES: East African Great Lake ecosystem Sensitivity to changes (EAGLES)-Belspo**

Descy, J., GRYSEELS, G., WAER, M., Rentier, B. & Van Cauwenberge, P.

15/12/10 → 31/03/15

**Etablissement d'une typologie et d'une classification écologique des réservoirs wallons pour répondre aux exigences de la directive cadre 2000/60/CE sur l'eau**

Descy, J. & Preto De Morais Sarmiento, H. M.

9/02/06 → 8/02/07

**Etude du potentiel d'eutrophisation et de prolifération des cyanobactéries dans les eaux de baignade (lacs, étangs) en Région Wallonne et proposition de mesures à entreprendre**

Descy, J. & Tabart, A.

1/01/10 → 1/01/11

**Evaluation du potentiel écologique des réservoirs de barrage en Wallonie sur base de l'étude du phytoplancton - campagne 2009**

Descy, J.

1/01/09 → 1/01/10

**FRFC: Fluorimeters**

Descy, J.

1/06/08 → 1/06/10

**Groundwater quality characterization using macro-invertebrates**

Descy, J., Bonniver, I. & Hallet, V.

1/09/04 → 1/09/05

**Impacts of epilimnetic metazooplankton on recycling and sedimentation of carbon, nitrogen and phosphorus in a pelagic stratified ecosystem**

Descy, J., Micha, J. & Darchambeau, F.

1/01/97 → 31/08/03

**FRFC: Implication des accumulations de litière de posidonies et de leurs communautés microbiennes et détritivores dans le cycle du carbone**

Descy, J.

1/06/09 → 1/06/12

**PIRENE: Integrated Research Program on Environment and Water : characterization of ecological quality of surface water and part of riparian zones (RW)**

Descy, J., Fauville, C. & Gosselain, V.

1/11/00 → 31/12/04

**OBSTACLES: Inventaire complet des obstacles à la libre circulation des poissons sur l'ensemble des cours d'eau du bassin hydrographique de la Dendre et de la Senne, la Grande Gette et la Petite Gette**

Descy, J.

1/01/10 → ...

**inventory**

Descy, J.

1/05/06 → 14/12/06

**KIVUWATT: KivuWatt Plankton Monitoring**

Descy, J.

1/09/12 → 31/03/13

**Lake Kivu phytoplankton**

Descy, J. & Preto De Morais Sarmento, H. M.

15/09/02 → 30/09/06

**Microbial diversity and ecological processes in Lake Kivu, Eastern Africa**

Descy, J.

1/01/11 → 31/12/13

**Oxygen budget and biological processes in the regulated rivers Moselle et de la Sarre**

Descy, J. & Gosselain, V.

1/01/93 → 31/12/96

**Picoplankton and key grazers in a large tropical lake (Lake Tanganyika, East Africa)**

Descy, J. & Tarbe, A.

1/10/05 → 30/09/09

**PAEQANN: Predicting Aquatic Ecosystem Quality using Artificial Neural Networks: Impact of Environmental characteristics on the Structure of Aquatic Communities (Algae, Benthic and Fish Fauna) (EVK1-CT1999- 00026)**

Descy, J. & Gosselain, V.

1/03/00 → 28/02/03

**PNSB II: Production de bactéries pourpres**

Descy, J. & Marche, C.

1/09/13 → 1/09/15

**PURPLE II: Production de bactéries pourpres (PNSB) et de Daphnies par consommation des PNSB**

Descy, J. & Marche, C.

1/09/11 → 1/09/13

**Projected system for structuring the information collected in the framework of various 'river contracts'**

Descy, J.

1/06/00 → 31/12/01

**CLIMFISH: PSF STEREO : CLIMFISH**

Descy, J.

1/01/04 → 31/12/06

**GENOSCOPE: Sequencing the genome de novo of the bdelloid rotifer species Adineta vaga.**

Descy, J., Van Doninck, K. & Pontarotti, P.

1/01/09 → ...

**Study and modelling of phyto-benthos in different streams of the Rhine-Meuse basin (France)**

Descy, J.

1/05/96 → 1/05/99

**Study of metazooplankton dynamics in Lake Kivu (East Africa)**

Descy, J. & Micha, J.

1/09/02 → 30/10/06

**Study of microbial biomass and diversity in Lake Tanganyika FRFC project2.4.580.05 F**

Descy, J. & Stenuite, S.

1/01/05 → 31/12/07

**Study of phytoplankton grazing by small zooplankton in the Meuse and Moselle rivers**

Descy, J. & Gosselain, V.

1/05/94 → 16/11/98

**Study of picoplankton of a large African lake**

Descy, J. & Stenuite, S.

30/09/03 → 1/01/09

**Study of the biological quality of wallon rivers on the basis of Diatom Biotic indices**

Descy, J., Fauville, C. & Gosselain, V.

1/09/98 → 31/08/10

**Study of the diet of *Limnothrissa miodon* (Boulenger, 1906) and of nutritional quality within the food web of lake Kivu**

Descy, J., Darchambeau, F. & Masilya Mulungula, P.

1/09/06 → 31/08/10

**ECOSYKI: Study of the functioning of Lake Kivu ecosystem for its sustainable management**

Descy, J., Nyina-Wamwiza, L. & Darchambeau, F.

1/06/04 → 31/05/09

**Study of the seasonal and longitudinal dynamics of zooplankton in large lowland rivers : demography and modelling**

Descy, J. & Viroux, L.

1/10/95 → 10/01/00

**Study on trophic relationships within river plankton: the microbial loop**

Descy, J.

1/01/99 → 31/12/02

**ENCODAGE RIVIERE: Technical assistance for encoding data of water carts**

Descy, J.

7/12/06 → 31/12/08

**Transformations de la biogéochimie aquatique dans le Fleuve Congo (TRANS-CONGO)**

Descy, J. & Borges, A.

1/07/13 → 30/06/15

**Use of chlorophyll and carotenoid pigments as biomarkers : algal pigments as biomarkers of phytoplankton composition**

Descy, J.

1/01/99 → ...

**WALPHY: WALPHY : Conception d'un outil d'aide à la décision pour la restauration hydro-morphologique des masses d'eau en Région Wallonne**

Descy, J.

1/01/09 → 31/03/16

**Research output**

**Long-term change of phytoplankton in Lake Kivu: The rise of the greens**

Rugema, E., Darchambeau, F., Sarmiento, H., Stoyneva-Gärtner, M., Leitao, M., Thiery, W., Latli, A. & Descy, J. P., 1 Nov 2019, In : *Freshwater Biology*. 64, 11, p. 1940-1955 16 p.

**Variations in dissolved greenhouse gases (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O) in the Congo River network overwhelmingly driven by fluvial-wetland connectivity**

Borges, A. V., Darchambeau, F., Lambert, T., Morana, C., Allen, G. H., Tambwe, E., Toengaho Sembaito, A., Mambo, T., Wabakhangazi, J. N., Descy, J. P., Teodoru, C. R. & Bouillon, S., 7 Oct 2019, In : *Biogeosciences*. 16, 19, p. 3801-3834 34 p.

**Variations in dissolved greenhouse gases (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O) in the Congo River network overwhelmingly driven by fluvial-wetland connectivity**

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**Pilot application of drone observations and pigment marker detection by HPLC in studies of cyanobacterial harmful algal blooms in Bulgarian inland waters**

Stoyneva-Gärtner, M. P., Uzunov, B. A., Descy, J. P., Gärtner, G., Draganova, P. H., Borisova, C. I., Pavlova, V. & Mitreva, M., 1 Jan 2019, In : *Marine and Freshwater Research*.

**Anaerobic methane oxidation and aerobic methane production in an east African great lake (Lake Kivu)**

Roland, F. A. E., Morana, C., Darchambeau, F., Crowe, S. A., Thamdrup, B., Descy, J. P. & Borges, A. V., 1 Dec 2018, In : *Journal of Great Lakes Research*. 44, 6, p. 1183-1193 11 p.

**Effects of agricultural land use on fluvial carbon dioxide, methane and nitrous oxide concentrations in a large European river, the Meuse (Belgium)**

Borges, A. V., Darchambeau, F., Lambert, T., Bouillon, S., Morana, C., Brouyère, S., Hakoun, V., Jurado, A., Tseng, H. C., Descy, J. P. & Roland, F. A. E., 1 Jan 2018, In : *Science of the Total Environment*. 610-611, p. 342-355 14 p.

**Studies on cyanoprokaryotes of the water bodies along the Bulgarian Black Sea Coast (1890-2017): A review, with special reference to new, rare and harmful taxa**

Descy, J. P., Stoyneva-Gärtner, M. P., Uzunov, B. A., Dimitrova, P. H., Pavlova, V. T. & Gärtner, G., 1 Jan 2018, In : *Acta Zoologica Bulgarica. Supplementum* 11, p. 43-52 10 p.

**Long-term trends in trait structure of riverine communities facing predation risk increase and trophic resource decline**

Latli, A., Descy, J. P., Mondy, C. P., Floury, M., Viroux, L., Otjacques, W., Marescaux, J., Depiereux, E., Ovidio, M., Usseglio-Polatera, P. & Kestemont, P., 1 Dec 2017, In : *Ecological applications*. 27, 8, p. 2458-2474 17 p.

**Effects of human land use on the terrestrial and aquatic sources of fluvial organic matter in a temperate river basin (The Meuse River, Belgium)**

Lambert, T., Bouillon, S., Darchambeau, F., Morana, C., Roland, F. A. E., Descy, J. P. & Borges, A. V., 1 Nov 2017, In : *Biogeochemistry*. 136, 2, p. 191-211 21 p.

**Iron-dependent nitrogen cycling in a ferruginous lake and the nutrient status of Proterozoic oceans**

Michiels, C. C., Darchambeau, F., Roland, F. A. E., Morana, C., Lliros, M., García-Armisen, T., Thamdrup, B., Borges, A. V., Canfield, D. E., Servais, P., Descy, J. P. & Crowe, S. A., 1 Mar 2017, In : *Nature Geoscience*. 10, 3, p. 217-221 5 p.

**Assessment of cyanoprokaryote blooms and of cyanotoxins in Bulgaria in a 15-years period (2000-2015)**

Stoyneva-Gärtner, M. P., Descy, J. P., Latli, A., Uzunov, B. A., Pavlova, V. T., Bratanova, Z., Babica, P., Maršálek, B., Meriluoto, J. & Spoof, L., 1 Jan 2017, In : *Advances in Oceanography and Limnology*. 8, 1, p. 131-152 22 p.

**Phytoplankton dynamics in the Congo River**

Descy, J-P., Darchambeau, F., Lambert, T., Stoyneva-Gaertner, M. P., Bouillon, S. & Borges, A. V., Oct 2016, In : *Freshwater Biology*.

**Assessing filtration rates of exotic bivalves: dependence on algae concentration and seasonal factors**

Marescaux, J., Falisse, É., Lorquet, J., Van Doninck, K., BEISEL, J-N. & Descy, J-P., 15 Apr 2016, In : *Hydrobiologia*.

**Identifying the factors determining blooms of cyanobacteria in a set of shallow lakes.**

Descy, J-P., Leprieur, F., Pirlot, S., Leporcq, B., Van Wichelen, J., Peretyatko, A., Teissier, S., Codd, G. A., Triest, L., Vyverman, W. & Wilmotte, A., 2016, In : Ecological Informatics . 34, 129-138

**Pelagic photoferrotrophy and iron cycling in a modern ferruginous basin**

Llirós, M., García-Armisen, T., Darchambeau, F., Morana, C., Triadó-Margarit, X., Inceoğlu, Ö., Borrego, C. M., Bouillon, S., Servais, P., Borges, A. V., Descy, J. P., Canfield, D. E. & Crowe, S. A., 8 Sep 2015, In : Scientific Reports. 5, 13803.

**Biogeochemistry of a large and deep tropical lake (Lake Kivu, East Africa Insights from a stable isotope study covering an annual cycle**

Morana, C., Darchambeau, F., Roland, F. A. E., Borges, A. V., Muvundja, F., Kelemen, Z., Masilya, P., Descy, J. P. & Bouillon, S., 19 Aug 2015, In : Biogeosciences. 12, 16, p. 4953-4963 11 p.

**Comparison of ecological state/potential assessment of 19 Bulgarian water bodies based on macrophytes and phytoplankton (2011 2012)**

Stoyneva, M., Traykov, I., Tosheva, A., Uzunov, B., Zidarova, R. & Descy, J. P., 21 Jul 2015, In : Biotechnology and Biotechnological Equipment. 29, p. S33-S38

**Vertical Distribution of Functional Potential and Active Microbial Communities in Meromictic Lake Kivu**

Inceoğlu, Ö., Llirós, M., Crowe, S. A., García-Armisen, T., Morana, C., Darchambeau, F., Borges, A. V., Descy, J. P. & Servais, P., 26 Apr 2015, In : Aquatic Microbial Ecology.

**Methanotrophy within the water column of a large meromictic tropical lake (Lake Kivu, East Africa)**

Morana, C., Borges, A. V., Roland, F. A. E., Darchambeau, F., Descy, J-P. & Bouillon, S., 7 Apr 2015, In : Biogeosciences. 12, 7, p. 2077-2088 12 p.

**Acquisition des données pour l'interprétation de la pression associée des prélèvements d'eau souterraine sur l'état et le fonctionnement écologique des cours d'eau**

Descy, J-P., Viroux, L., Latli, A. & Leporcq, B., 27 Mar 2015, HGE-ULg. 31 p. (Caractérisation complémentaire des masses d'eau dont le bon état dépend d'interactions entre les eaux de surface et les eaux souterraines)

**Distribution of Bacteria and Archaea in meromictic tropical Lake Kivu (Africa)**

Inceoğlu, Ö., Llirós Dupre, M., García-Armisen, T., Crowe, S. A., Michiels, C., Darchambeau, F., Descy, J. P. & Servais, P., 2015, In : Aquatic Microbial Ecology. 74, 3, p. 215-233 19 p.

**East African Great Lake Ecosystem Sensitivity to changes: Final Report**

Descy, J-P. & Luc André, Claire Delvaux, Laurence Monin, Steven Bouillon, Cédric Morana, Alberto V. Borges, François Darchambeau, Fleur Roland, Evelien Van de Vyver, Elie Verleyen, Claas Steigüber, Wim Vyverman, Yves Cornet, Nadia Poncelet, Igor Tomazic, Nicole van Lipzig, Wim Thiery, Jean Guillard, David Docquier, Niels Souverijns, Pascal Isumbisho, Parfait Yongabo, Laetitia Nyinawamwiza, 2015, Brussels: Belgium Science Policy . 151 p. ( Research Programme Science for a Sustainable Development)

**Bacterial community composition in three freshwater reservoirs of different alkalinity and trophic status**

Llirós, M., Inceoğlu, Ö., García-Armisen, T., Anzil, A., Leporcq, B., Pigneur, L. M., Viroux, L., Darchambeau, F., Descy, J-P. & Servais, P., 26 Dec 2014, In : PLoS ONE. 9, 12, p. e116145 e116145.

**Carbon cycling of Lake Kivu (East Africa): Net autotrophy in the epilimnion and emission of CO<sub>2</sub> to the atmosphere sustained by geogenic inputs**

Borges, A. V., Morana, C., Bouillon, S., Servais, P., Descy, J. P. & Darchambeau, F., 14 Oct 2014, In : PLoS ONE. 9, 10, e109500.

**Decadal trends and common dynamics of the bio-optical and thermal characteristics of the African Great Lakes**

Loiselle, S., Cózar, A., Adgo, E., Ballatore, T., Chavula, G., Descy, J-P., Harper, D. M., Kansime, F., Kimirei, I., Langenberg, V., Ma, R., Sarmiento, H., Odada, E. & Descy, J-P., 3 Apr 2014, In : PLoS ONE. 9, 4, e93656.

### **Impact of invasive Asian clams, *Corbicula* spp., on a large river ecosystem**

Pigneur, L.-M., Falisse, E., Roland, K., Everbecq, E., Deliège, J. F., Smitz, J. S., Van Doninck, K. & Descy, J.-P., 1 Mar 2014, In : *Freshwater Biology*. 59, 3, p. 573-583 11 p.

### **Primary production in a tropical large lake: The role of phytoplankton composition**

Darchambeau, F., Sarmento, H. & Descy, J. P., 1 Mar 2014, In : *The Science of the total environment*. 473-474, 178-188, p. 178-188 11 p.

### **Understanding the performance of the FLake model over two African Great Lakes**

Thiery, W., Martynov, A., Darchambeau, F., Descy, J. P., Plisnier, P. D., Sushama, L. & Van Lipzig, N. P. M., 18 Feb 2014, In : *Geoscientific Model Development*. 7, 1, p. 317-337 21 p.

### **Production of dissolved organic matter by phytoplankton and its uptake by heterotrophic prokaryotes in large tropical lakes**

Morana, C., Sarmento, H., Descy, J.-P., Gasol, J. M., Borges, A. V., Bouillon, S., Darchambeau, F. & Descy, J.-P., 1 Jan 2014, In : *Limnology and Oceanography*. 59, 4, p. 1364-1375 12 p.

### **Climate change in tropical fresh waters (comment on the paper 'Plankton dynamics under different climatic conditions in space and time' by de Senerpont Domis et al.)**

Preto de Morais Sarmento, H., Amado, A. M. & Descy, J.-P., 1 Oct 2013, In : *Freshwater Biology*. 58, 10, p. 2208-2210 3 p.

### **Establishing expectations for pan-European diatom based ecological status assessments**

Kelly, M. G., Gómez-Rodríguez, C., Pardo, I., Kahlert, M., Almeida, S. F. P., Bennett, C., Bottin, M., Delmas, F., Rosebery, J., Descy, J.-P., Dörflinger, G., Kennedy, B., Marvan, P., Opatrilova, L., Pfister, P., Schneider, S. & Vilbaste, S., 1 Sep 2012, In : *Ecological Indicators*. 20, p. 177-186 10 p.

### **Is the fishery of the introduced Tanganyika sardine (*Limnothrissa miodon*) in Lake Kivu (East Africa) sustainable?**

Guillard, J., Darchambeau, F., Masilya Mulungula, P. & Descy, J.-P., 1 Sep 2012, In : *Journal of Great Lakes Research*. 38, 3, p. 524-533 10 p.

### **Phytoplankton of the River Loire, France: A biodiversity and modelling study**

Descy, J.-P., Leitao, M., Everbecq, E., Delige, J.-F. & Smitz, J. S., 1 Feb 2012, In : *Journal of Plankton Research*. 34, 2, p. 120-135 16 p.

### **The queer Tetraëdron minimum from Lake Kivu (Eastern Africa): Is it a result of a human impact?**

Stoyneva, M. P., Descy, J.-P., Balagué, V., Sarmento, H., Compère, P. & Leitao, M., 1 Jan 2012, In : *Hydrobiologia*. 698, 1, p. 273-283 11 p.

### **Lake Kivu: Limnology and biogeochemistry of a tropical great lake**

Descy, J.-P., Darchambeau, F. & Schmid, M., 2012, Dordrecht: Springer. 190 p. (Aquatic Ecology Series)

### **Lake Kivu: past and present**

Descy, J.-P., Darchambeau, F. & Schmid, M., 2012, *Lake Kivu: Limnology and biogeochemistry of a tropical great lake*. Descy, J.-P., Darchambeau, F. & Schmid, M. (eds.). Springer, p. 1-11 (Aquatic Ecology Series; vol. 5).

### **Lake Kivu Research: Conclusions and Perspectives**

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