



Ecole Doctorale - 104

Sciences de la Matière, du Rayonnement
et de l'Environnement

ESTABLISHMENT : Université de Lille, UFR des Sciences de Santé et du Sport (UFR3S)

Laboratory(ies) of affiliation : ULR4515 Laboratoire de Génie Civil et géoEnvironnement (LGCgE) - ER4 :
Fonctionnement des écosystèmes terrestres anthropisés

Scientific field, Speciality:

DS10 | Biology of the environment, organisms, populations, ecology

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Co-director:

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Affiliate programme(s): SIGLES research axis ; Program MRC-PE (Malade Rénale Chronique et Profils
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Title of the thesis: Territorial environmental health: how to mobilize open environmental data to analyze territorial profiles of multi-contamination and assess their impact on spatial health inequalities?

THESIS SUBJECT (ABOUT 1/2 PAGE)

The thesis project is situated within the growing context of understanding the interrelations between the environment and human health. Globally, the impacts of air, water, and soil pollution, along with other environmental factors, on human health are increasingly recognized as major determinants of morbidity and mortality. The World Health Organization (WHO) emphasizes that 23% of premature deaths worldwide can be attributed to environmental factors, and this proportion continues to rise, particularly for non-communicable diseases. In France, air pollution is associated with approximately 40,000 deaths annually from PM2.5, and nearly 7,000 for nitrogen dioxide (NO2). These impacts extend well beyond the realm of health, incurring significant economic costs related to healthcare, absenteeism, and other socio-economic aspects.

One of the major gaps in current research concerns the multidimensional characterization of the physical environment to which the population is exposed. Focusing on mobilizing open environmental data, the thesis project aims to develop robust composite indices reflecting profiles of environmental multi-contamination at the territorial level.

The methodology will involve the collection, aggregation, and analysis of environmental data from various sources, using advanced tools and techniques, including geographic information systems (GIS), spatial analysis, multidimensional statistical analysis, and artificial intelligence. These composite indices will be designed to provide a holistic view of the physical environment, considering various anthropogenic pressures such as air, water, and





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soil pollution, as well as environmental amenities like access to green spaces or biodiversity.

Applying these composite indices in the context of health will enable the study of spatial associations with the incidence of health events, including the incidence of Crohn's disease, chronic kidney disease, and certain cancers, as well as the prevalence of preterm births. These pathologies have been identified as significant spatially variable issues, emphasizing the importance of studying them at the local level.

Expected results include the characterization of profiles of environmental multi-contamination at the municipal level across the entire French territory, the development of methodological tools to ensure the appropriate use of composite indices in epidemiological studies, and the creation of an interactive interface for visualizing data for territorial planning.

In summary, this project aims to enhance the characterization of the physical environment of territories and its impact on human health. By adopting an integrated approach, it aspires to provide crucial information for public health decision-making and to raise awareness of environmental issues that shape our collective well-being.

Expected date of recruitment : October 2024

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Additional remarks/comments:

