PhD Thesis proposal[1]

General Information		
PhD Thesis Title	**Development of a Water Quality Index as a tool for sustainable water quality monitoring: Nahr Ibrahim (Lebanon)**	
USEK Doctoral Degree	PhD in Agriculture and Food Sciences	
Research Unit	NA	
Laboratory	NA	
Axis	Hydrology, Hydrochemistry, Soil and Environment	
PhD Supervisor	Desiree El Azzi, Ph.D (60%) Email: desireeelazzi@usek.edu.lb	University Address: Holy Spirit University of Kaslik- USEK
Co-Advisors	Naim Ouaini, Professor (10%) Paula EL Najjar, Ph.D. (30%)	University Address: Holy Spirit University of Kaslik- USEK
Location (s)	Location 1: USEK	Work shift calendar /per year (%): 100
Potential funding and scholarship	-	
Applicant Profile and/or Special Requirements	Agricultural Engineer, Environmental Engineer or holder of a master's in Environmental Sciences or in Hydrology.	
Subject's national or worldwide Context, Objectives & Research lines		

Water is essential to life and access to freshwater with quality that suits social sustainable development is crucial (Yan *et al.*, 2015). There are many sources of freshwater on earth. Rivers are the most readily available sources for human consumption (Tripathi & Singal, 2019). However, the contribution of agricultural, urban and industrial pollutants to rivers in various parts of the world have led to the deterioration of water resources (Britto *et al.,* 2018).

The water quality index (WQI) technology has been tested on rivers in many countries including Lebanon. This technology is a rating that reflects the compound effect of various water quality determinants on the total quality of water (Kizar, 2018).

Many studies examined water quality in the Litani River (Haydar *et al.,* 2014; USAID *et al.,* 2013), as others examined the Ibrahim river (Daou *et al.,* 2013; Saab *et al.,* 2007). In a recent study, El Najjar *et al.,* (2019) assessed the quality at the outlet of the Ibrahim River by analyzing twenty-three physico-chemical parameters and five microbiological tests to propose a new WQI for the river. The WQI values ranged between 63.1 and 73.1 referring to medium to good water quality.

The objective of the thesis is thus a continuity of this work and aims to improve the efficiency of this WQI by testing it on different sampling points from upstream to downstream of the Ibrahim River. A multiparameter probe will be installed at the outlet

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[1] Thesis proposal should not exceed two pages

to facilitate the monitoring and a follow up of all the sampling points will be done during one hydrological year. Then, the parameters proposed by El Najjar *et al. (2019)* as well as trace metals will be analyzed. This will allow a study of the spatial and temporal evolution of WQI to conclude on its efficiency. This WQI will provide decision makers with an easy tool for water management and can be extrapolated to other similar coastal rivers.

Outcomes (OCs): What do we wish to achieve?	
OC1:	Master the skills needed in WQI methodology
OC2:	Build an efficient WQI to respond to local and national needs, creating positive impact in the community
OC3:	Demonstrate specialized insight into the possibilities and limitations of WQI, its role in river basin management and the responsibility of the individual for how it is used
OC4:	Communicate the results to stakeholders in a clear and effective manner

References (R) (5 most recent peer-reviewed publications)	
R1:	El Najjar, P., Kassouf, A., Probst, A., Probst, J.-L., Ouaini, N., Daou, C., & El Azzi, D. (2019). High-frequency monitoring of surface water quality at the outlet of the Ibrahim River (Lebanon): A multivariate assessment. *Ecological Indicators*, *104*, 13–23.
R2:	Tripathi, M., & Singal, S. K. (2019). Allocation of weights using factor analysis for development of a novel water quality index. Ecotoxicology and Environmental Safety, 183, 109510.
R3:	Britto, F. B., Vasco, A. N. do, Aguiar Netto, A. de O., Garcia, C. A. B., Moraes, G. F. O., & Silva, M. G. da. (2018). Surface water quality assessment of the main tributaries in the lower São Francisco River, Sergipe. *RBRH*, *23*(0).
R4:	Kizar, F. M. (2018). A comparison between weighted arithmetic and Canadian methods for a drinking water quality index at selected locations in shatt al-kufa. IOP Conference Series: Materials Science and Engineering, 433, 012026.
R5:	Yan, F., Liu, L., Li, Y., Zhang, Y., Chen, M., & Xing, X. (2015). A dynamic water quality index model based on functional data analysis. *Ecological Indicators*, *57*, 249–258.