



Vulnerability of Groundwater Quality to Pollutant Infiltration through the Unsaturated Zone

Louise braille*

Department of Environmental Plant Ecophysiology, University of Wisconsin, Madison, US

*Corresponding author: Louise braille, Department of Environmental Plant Ecophysiology, University of Wisconsin, Madison, US, E-mail: brallielouise@yahoo.com

Received date: 01 February, 2022, Manuscript No. JPPP-22-59394;

Editor assigned date: 04 February, 2022; Pre QC No. JPPP-22-59394 (PQ);

Reviewed date: 14 February, 2022, QC No. JPPP-22-59394;

Revised date: 18 February, 2022, Manuscript No: JPPP-22-59394 (R);

Published date: 28 February, 2022, DOI:10.4172/2329-955X.1000254.

Introduction

Direct aquifer recharge and vulnerability to pollution are therefore markedly influenced by the lithologies of these layers and their stratigraphic order. An accurate assessment of the various areas of the vamoose zone is therefore an important step for hydrological characterization of the media overlying any aquifer, especially a coastal aquifer. Quantitative monitoring system region-wide. Inaccurate data in such assessment can result from unsaturated zone complexity, involving alterations of soil types and lithology, aquifer confinement, key subaquifers of the study area, depth to groundwater when referring to sub-aquifers and to the layer to which it belongs, etc. For that reason, hydro-geological cross-sections which are a result of synthetic and logical deduction as regards connection of lithology layers can be considered relevant, improving the artificial intelligence at this regard. Thus, considering the high importance of unsaturated zone lithology regarding assessment of the rate of downward percolation of water from the ground surface to the water table of the aquifer, this present study focuses mainly upon the mapping of such media Owing to lithologic heterogeneity of the unsaturated zone, there is a consequent lack of accurate data as regards this media's permeability and/or coefficient of conductivity. A number of approaches have been undertaken worldwide to assess the vulnerability of groundwater quality to pollutant infiltration through the unsaturated zone. Beside mathematical model, other approaches estimate groundwater vulnerability on the basis of maps, or aquifer vulnerability index tables. In most cases, groundwater vulnerability estimation has been mainly based upon a specific parameter, such as depth to groundwater or to an pervious layer, the thickness of the sedimentary layers composing the unsaturated zone above the water table, and/or by general estimation of the hydraulic conductivity of these layers.

Inaccurate data in such assessment can result from unsaturated zone complexity, involving alterations of soil types and lithology, aquifer confinement, key sub aquifers of the study area, depth to groundwater when referring to sub-aquifers and to the layer to which it belongs, etc. For that reason, hydro-geological cross-sections which are a result of synthetic and logical deduction as regards connection of lithology layers can be considered relevant, improving the artificial intelligence at this regard. Thus, considering the high importance of unsaturated zone lithology regarding assessment of the rate of downward percolation of water from the ground surface to the water table of the aquifer, this present study focuses mainly upon the mapping of such media.

The final product is a digital 2-D map which supplies 3-D information. Such a map produces a more accurate assessment of the lithology between the aquifer's groundwater table and the ground surface. Information obtained by such maps can delineate geographic locations where the aquifer's unsaturated zone is "open" or hydrologically "phreatic", to highlight areas where the porous media coastal aquifer unsaturated zone acts as a filter to recharge the aquifer, as well as unconfined to semi-confined areas where the connection with the aquifer questionable.

Such mapping can lead to better understanding of this part of the aquifer; enabling more intelligent manipulation of data and better calibration of hydrological parameters. This can lead to more accurate assumptions and thus to more efficiency of the models, to resolve environmental and hydrological problems. In some way, this can be considered as an additional step towards understand a process to formalize the knowledge that provides a basis from which decisions can be made or pattern discerned. This mapping can also be a basis for construction of algorithms to be integrated in formatic programmes and numerical modelling for advancement of the artificial intelligence for optimal management of aquifers

Geologically, the aquifer is composed of wedge-shaped layers of dune sand, sandstone, calcareous sandstone, and silty loams, as well as intervening clay lenses. The top of the aquifer is covered by thin layers (of 0 to 2 meters) of sandy to silty and/or clayey soils. The aquifer's layers and aquitard lenses are at their thickest along the coast and feather out between two and five km from the sea, separating the aquifer into subaquifers. Within around 12 km of the coast, the aquifer is built upon the Saqiya sea clays of Neocene age. Further east, the aquifer rests upon limestone rocks of Eocene, Senonian, Turonian, and Cenomanian age steadily increasing urban population as well as relatively high frequency of drought years has led to sustained increases in pumpage as well as anthropogenic stress, particularly inland, due to urbanization. Industrial and agriculture leachates percolate from the ground surface to the water table.