DEVELOPMENT OF COCEPTUAL GEOLOGICAL MODEL FOR THE FORMATION OF HOT WATER SPRINGS IN SRI LANKA

MASTER OF PHILOSHOPHY

HITIHAMI MUDIYANSELAGE RANJITH PREMASIRI

UNIVERSITY OF MORATUWA
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THIS THESIS WAS SUBMITTED TO THE DEPARTMENT OF EARTH RESOURCES ENGINEERING OF THE UNIVERSITY OF MORATUWA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PHILOSOPHY

HITIHAMI MUDIYANSELAGE RANJITH PREMASIRI

DEPARTMENT OF EARTH RESOURCES ENGINEERING
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DECLARATION

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contain no materials previously published or written by another person no material which, to substantial extent, has been accepted for the award of any other degree or diploma of a university or other institute of higher learning, except where an acknowledgement is made in the text.

UOM Verified Signature

H.M. R. Premasiri

Certified by

Supervisors

Prof. D.S.Wijesekara
Mr. S. Weerawarnakula
Dr. U.G.A. Puswewala
Dr.A.M.K.B. Abeysinghe

UOM Verified Signature

Abstract

As natures wonderful gift, several hot water springs occur in Sri Lanka though it does not fall within very active tectonic zone in the earth. They are mostly confined to the eastern sector of the island. However, hot water springs at Mahapelassa off Embilipitiya, Kanniyai off Trincomalee and Mahaoya are well known to people. These thermal springs show their out flow temperature ranging between 34^0C to 56^0C . The hottest springs lie at Kapurella (56 ^{0}C), followed by Mahaoya (55^0C), Marangala-Wahawa close to Padiyatalawa (42-45 ^{0} C), Mahapelassa (44-46 ^{0}C) and Nelumwewa, which was known earlier as Madawewa and now under a lake, records 45^0 C in mud samples (Fonseka 1994). The present research was aimed out mainly to model the formation of hot water springs in Sri Lanka based on geological and tectonic settings using geological, geophysical and Remote Sensing techniques while evaluating the hot water springs for their potential as energy resources or development as places for eco-tourism.

Geological, structural and tectonic setting of the areas have been studied using geological, geochemical and geophysical techniques. Both field and libratory studies were carried out in order to compile geological and geophysical profiles and to determine geochemical and physical parameters of hot water springs in Sri Lanka.

According to the results of this study, the major boundary between Highland Complex and Vijayan Complex show multiple thrust planes and shear zones showing imbrecated lithological slices of both Highland Complex and Vijayan Complex. Other than the ductile structures, brittle fractures, joints and fault planes extend as mega lineament for several kilometers . These lineaments produce good secondary aquifer conditions with adequate porosity. The surface mapping and geophysical evidence of the lineaments show that they are very deep and are interconnected. Therefore, they offer better pathways for surface water to percolate deep levels and return upwards with adequate pressure to reach the surface after heating. These structurally controlled hot water springs in Sri Lanka are associated with deep geologically weak zones of fracture or fault systems within the tectonically active thrust boundary.

According to geochemical parameters and field evidence, hot water springs in Sri Lanka can be divided into three groups, Group1: Mahapelassa Group 2: Kapurella, Mahaoya, Padiyatalwa , Palanoya and other around the Mahiyangana, Ampara and Group 3: Kannyai, Rathkhiriya and Adampane areas.). According to the chemical and physical parameters of hot water it can be concluded that Group (1) and Grou (3) are more suitable for therapeutic uses and have a good potential for development for eco-tourism. The Group (2) has hot water with low contaminations of salt, and show fairly high potential for generation of geothermal energy.

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Ga	Billion years ago
GPS	Global Positioning System
HC	Highland Complex
Ma	Million Years ago
TM	Thematic Mapper
VC	The Vijayan Complex
WC	The Wanni Complex