



PROCEEDINGS:

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BIOGEOSCIENCE IN SRI VENKATESWARA UNIVERSITY, TIRUPATI

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The ancient scientific Sanskrit texts, such as Ayurveda and Jyotissastra (i.e.science of light involving astronomy-cum-astrology),represented by Varahamihira’s “Brihat Sanhitha”(Master Compilation),deal with ecological and environmental sciences to tackle various problems of practical importance. Based on this ancient Indian traditional sciences, detailed researches on biogeoscience have been initiated and vigorously pursued in the ;post graduate and research department of geology in Sri Venkateswara university since last 25 years. Thus the three day, UGC sponsored national seminar held on February 4-6, 1999 in the department geology at sri YSRR degree college, Pulivendla, marks the silver jubilee celebrations of biogeoscience in sri venkateswara university.

These biogeoscience studies with inter- and trans-disciplinary approach, commenced in S.V.University with geobotanical and biogeochemical surveys, based on 125 ‘slokas’ (verses) and ‘sutras’ (aphorisms) given in the discourse, entitled “Dkargalam” (Key to water) in Brihat Samhita. This text deals with environmental indicators –geological and biological, for rapid and successful location and development of groundwater resources with ecological equilibrium even in hard areas of the arid and semi arid regions.

As pointed out in this text, these eco –indicators of groundwater are also applicable in mineral exploration. These details have been presented in the book, entitled “groundwater in Varahamihira’s Brihat Samhita “published In 1981 by SV university. Further, an international seminar, entitled “geobotany and biogeochemistry of groundwater and mineral resources”, based on Brihatsamhita, inaugurated by the governor and chancellor, Dr Sankardayal Sharma, was held on November24-27, 1984 in SV University.

The modern groundwater science is recently developed based on the costly and complex and ineffective oil-well technology which is not appropriate for water well technology. Hence several thousands borewells are quite often indiscriminately drilled for water supply with enormous wastage of human and material resources particularly in the drought prone areas like Rayalaseema and Rajasthan. With the help of the bioindicators, such as plants and termite mounds pointed out in Brihat samhita, several bore wells were successfully located for groundwater resource development for drinking/domestic, agricultural and industrial purposes in the drought prone Rayalaseema region of A.P and in several other parts of country including the drought-hit Gujarat under “Technology machine” on drinking water supply for problem villages”.



It may be noted that the bioindicators of groundwater, described in Brihatsamhita are easily understandable to the general public, including the illiterate rural and tribal masses. Further, these bioindicators, which are commonly worshiped in rural India, provide the scientific basis for "water divining" (Dousing or water witching) which is generally considered as magical and mystical.

In the Cuddapah district, biogeological studies, based on Brihatsamhita and Ayurveda were employed in the mining and mineralized zones mainly consisting of barite deposits of Mangampet and Vemula, asbestos of Brahmanapalli and uranium deposits of Thummalapalli. The samples collected in these studies mainly include different organs of the individual plant species, termite mounds and their adjoining surface soils, poultry eggs, dung, urine and milks of the grazing cattle (cows, bulls, He and she Buffaloes, male and female goats and sheep) and of the humans. These samples were divided into two types consisting of (a) dry type which is free from moisture and (b) ignited or ashed type which is free from organic matter.

Multi element analysis of all these samples, digested in appropriate acid medium (HCl, HNO₃ or aquaregia), were carried out by AAS or Inductively coupled plasma spectrometry (ICP). The analytical data is employed to determine the biogeochemical parameters such as biological absorption co-efficient (BAC) and co-efficient of apparent organic binding (CAOB) and also to determine the degree of solubility or insolubility or volatility of each element during the chemical analysis. Biogeochemical significance of a plant species either for mineral exploration or for use in ayurvedic medicine is determined by (a) plant habitat (b) seasonal variation (c) sample type whether ash or dried (d) specific plant organ (e) the medium in which the sample is digested and (f) the instrumental technique. The geobotanical and biogeochemical studies of the mining areas of Cuddapah district in S.V University revealed the indicator plants for mineral exploration, and accumulator plants for use in the reclamation and revegetation of the adversely affected mining areas.

Termite mounds

The termites, popularly called "white ants", developed earthen mounds with wide variation in size, shape, and architecture. These insects, controlled by its queen, are differentiated into workers and soldiers forming perfect cast system and harmonious society. These mounds, generally located at the base of a tree, are classified into three types. These are (1) "barren type devoid of any vegetation, (2) monophytic type, i.e the mounds colonized exclusively by only one type of plant species, and (3) polyphytic type which supports two or more plant species. These insects underground galleries and shafts to reach water table no matter how deep it is. The mineralogical and geochemical character of the mound soil is modified to expel the toxic elements in to supporting plant species. Hence ayurveda specifically points out that the plants developed on termite mounds are prohibited for medicinal use. The termite modifies the physical, chemical and biological properties of their mounds, according to season, to maintain homeostatic equilibrium under influence of the earth's magnetic field. The ecological character of these mounds provides the clues to determine the scientific validity of "Vaastu Sastra" (i.e tenants of house building).

Red sanders



A unique tree species, occurring exclusively in Cuddapah basin but nowhere in the world, is “Red Sanders” (*Pterocarpous santalinus*) It is locally called “Raktha Chandanam” which is used in Ayurvedic, medicine for the treatment of blood disorders. Further, it has the capability to absorb very high concentrations of strontium, one of its isotope is a byproduct of nuclear fission. Hence enormous quantities which state that this wood is used in the manufacture of musical instrument. But its actual use is kept as a top military trade secret as it finds applications in medical and nuclear science and technology.

Coconut and banana trees

In India, coconut and banana trees more significant from both soci-economic and spiritual points of view. Hence geochemical aspects of this tree in Mangampet basin was studied and compared with the tree from the non-mineralized Tirupati area. Trace element analysis of the coconut (microcosm) revealed biogeochemical differentiation of the outer layer(epicarp) with fibrous part(mesocarpy),har rigid shell(endocarpy), and the interior endosperm(located with water),It serves as it model of microcosm to reflect the geochemical differentiation of the Earth into crust, mantle and fluid core as a macrocosm. Banana is another plant which plays a very important role in Indian society because f its economic importance and philosophical significance. The leaves of the banana trunk contained uranium. The BARC scientists also determined the significance of the pith of banana based on the determination of its radio-isotopes.

Effect of nuclear radiations

In recent years, geological surveys of the Atomic Minerals Division revealed the occurrence of the uranium deposits associated with lime stone formations in Thummalapalli area of the Cuddapah basin. The yolk or yellow part of the interior of the poultry eggs, collected from this village when allowed to stand for a few days turned black while the yolk of the eggs collected away from this mineralized zone remain unaffected. Further the toes of the goats, particularly the black ones, in this uraniumiferous Thummalapalli village are fund to be adversely affected. It is interesting to note that from historical times, the villages located in this radioactive limestone belt of Cuddapah Basin are faction-ridden with frequent classes and social unrest. It is worth probing the influence of the nuclear radiations on the human diet and the consequent neuro-physiological nature of the people in this uraniumiferous limestone belt consisting of the faction-riddenvillagessuch as Mydukur,Tadipatri,Pulivendula,Allagadda,Jammalamadugu etc.,

Conclusion

It is well known that inactive and imported science and technology, unrelated to the necessitates and compulsions of our natural environment are primarily responsible for the determination of the socioeconomic conditions not only of the Rayalaseema region but also of the whole country. The Indian traditional sciences of applied ecology and environment, such as biogeoscience involved in Brihat Sanihita and Ayurveda, harmoniously integrated with modern/western science and technology, most effectively helps in the rapid socioeconomic progress of this region.