LANDSCAPE EPIDEMIOLOGY OF MALARIA IN TUMKUR (KARNATAKA), INDIA, AS DEDUCED FROM SATELLITE REMOTE SENSING

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Malaria is a local and focal disease and its transmission dynamics is affected to a large extent by changes in ecological conditions leading to suitability/unsuitability for anopheline vectors. Ground surveys for monitoring of breeding habitats, mosquito vector density and parasite load in the community are labour intensive, time consuming and expensive therefore remain confined to limited areas. Satellite remote sensing has recently been found helpful in identification of breeding habitats, density of vector species, and even malaria seasons in different parts of the world. Study was conducted to find out elements of landscape elements critical to malaria endemicity at village level using satellite remote sensing in Tumkur district of Karnataka in Southern India.

Ten villages in each of 3 Primary Health Centres,, viz. highly malarious (Annual Parasite incidence – 16), moderately malarious (API-3.3) and non- malarious were selected for detailed entomological and ecological surveys in highest peak (May/June) and low peak (December/January) of malaria. Ground data on the presence of breeding habitats, monitoring of larval density, adult *Anopheles culicifacies* (malaria vector) from indoor resting sites and ecological features within 1.5 km radius from the centre of each village were generated in 2001 and 2002. Data of Indian Remote Sensing satellite (IRS 1C /D with LISS III and PAN sensors with 23.8 metre and 5.8 metre resolution respectively) were procured for the dates of ground survey and analyzed for generation of False Colour Composite/ Hybrid Colour Composite images and supervised classification for generation of statistics of land use features within a buffer zone of 1.5 km around each village.

It was found that delineation of tanks, streams, ponds, marshy areas, the main breeding habitats of *An. culicifacies* at village level was possible by Remote sensing by merging LISS III and PAN products. Irrigation wells, whose positivity for *An. culicifacies* was insignificant, were not detectable. May/June month were found critical in differentiating entomological and ecological parameters supporting *An. culicifacies* populations.

The difference in extent of land use features in villages of high and least malaria categories indicated that in villages of high malarious area, presence of water in water bodies (0.36 – 35.78%), permanent vegetation cover ranging from 24.9 –85.72 %, less barren area & scrub (0-12.9%), less barren rocks (0.13-9.68%) as compared to 1.44 –3.2% water bodies, 15.07 - 34.19% vegetation cover; 8.57-30.21% barren

area & scrub and 0.35-20.33% barren rocks in least malarious area (Byalya).

The breeding habitats in vicinity of human settlements were found more productive for *An. culicifacies*. Regrouping of villages from non-malarious to malaria –risk prone areas and vice versa is desirable to plan village specific preparedness and control strategy.

Remote sensing may be used as a rapid tool for ecological change detection and stratification of high/low malarious areas.