



Impact of Ecological and Climatic Changes on Vectors of Malaria in Four North-Eastern States of India

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Abstract: A study was conducted during 2010-2013 to assess the impact of climatic and ecological changes on the abundance of the Anopheline species in four endemic North-Eastern states of India namely Assam, Meghalaya, Manipur and Sikkim. Districts and villages were selected on the basis of change in land use pattern using remote sensing classification of images with gap of at least 6 years and availability of Anophelines species surveys carried out before 2000. Seven entomological and epidemiological surveys in pre and post monsoon seasons were conducted in 287 villages of 16 districts. Ecological and climatic changes like deforestation, development of irrigation channels, change in crop pattern, use of pesticides in tea gardens and increase in annual mean temperature was observed. A total of 29,059 specimens of 29 Anopheline species were collected from entire study area. Pair-wise comparison of *An. culicifacies* and *An. minimus* using Chi square with Yates correction ($\chi^2 = 11443.451$, $p < 0.001$) was statistically significant indicating that *An. culicifacies* is replacing *An. minimus*. Among non vector species *An. ahomi*, *An. aitkenii*, *An. bengalensis*, *An. insulaeflorum*, *An. lindsayi* and *An. umbrosus* were not recorded in the current surveys whereas species namely *An. turkhudi*, *An. karwari*, *An. theobaldi*, *An. dthali*, *An. jamesii*, *An. kochi*, *An. nivipes*, *An. subpictus* *An. nilgircus*, *An. psuedowillmori* reported for the first time in these areas. There is an urgent need to establish the role of *An. culicifacies* as malaria vector to facilitate the policymakers to update malaria control strategies in NE states of India.

Key Words: Anophelines, Deforestation, Ecological changes, Malaria, Remote sensing