

Dissertation Title	Spatio-Temporal Analysis of Haze Problem by Integrating Remote Sensing and GIS Application: A Case Study of the Northern Thailand
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ABSTRACT

The aim of this thesis required to test that the regional burning has influence to the increment of PM10 concentration, measured at each station in the Northern Thailand, and the smoke-haze problem in Chiang Rai province is trans-boundary problem. Thailand, Myanmar, and Laos were chosen as case studies. The study is divided into 2 parts, which are the regional burning level and local burning level in case Chiang Rai Province. 2009, 2010, and 2012 were year chosen for case studies. Hotspots detected by the by the MODIS Rapid Response System were used to represent burning in the region. Hotspots were filtered through fire confidence with confidence levels of 80% or more. The spatial analysis by GIS was used as the main tool for analyzing the location of burning at study sites. Simple Regression Analysis was used to determine the correlation between the number of hotspots in the region and PM10 concentration.

The result of this study showed that the regional burning has influence to the increment of PM10 concentration especially at four stations located along the border areas, Mae Sai, Mae Hong Son Chiang Rai and Nan stations. The coefficients of determination (R^2) for these stations were 0.99, 0.92, 0.83 and 8.98 respectively. The result for the local burning level in case Chiang Rai Province showed smoke- haze problem in Chiang Rai was mainly caused by short range transport from open burnings, mostly conducted within the province, in the radius of 50 km from Chiang Rai monitoring station. From the field survey showed the majority of burning conducted in Chiang Rai was concerning agricultural activities special for corn filed in the high land. Local agriculturists generally burn agro-residues in order to prepare lands and the burning activities were conducted many more in March, while the lack of making fire breakers in the areas was resulting in fires spreading and finally becoming major forest fires. The smoke-haze problem was considered as a local impact enhancing by meteorological and topographical factors. The low humidity, high temperature, low dew point temperature and calm wind with the speed of 12.8 – 19.2 km/hr., resulting in stagnant air condition this resulting in inhibiting the vertical dispersion of smoke and pollutants. Besides, Chiang Rai was surrounded by high mountains that were not conducive to emitting of smoke caused by open burnings. As a consequence, the accumulation of PM10 level was gradually higher. Once there was an impact from long range transport from open burning, via southwestern wind which passed by burning areas in neighboring countries and provinces, PM10 level was substantially higher. The daily backward trajectories in March demented impact from long range transport from biomass burning, via southwestern wind which passed by burning areas in neighboring countries and provinces, PM10 level was substantially higher.

Therefore Thailand especially Chiang Rai should be primarily focused in agricultural burning conducted on highlands in the forest areas. First of all, the

government may cancel price assurance especially for the corns which harvested from the intentionally burned areas by using hotspots in monitoring process. Secondly, agencies involved in this issue, for instance, Land Development Department should provide agriculturists knowledge for farming in highlands and also alternative solution instead of burning their lands. Additionally, in cooperation with local administration, the make use of agricultural residues should be supported. At the same time, government may offer incentives to local agriculturists who seriously reduce their burnings by continuously providing price insurance for their produces.

Keywords: PM10/Hotspot/Open burning/GIS/Short range transport/Long range transport

