ESTIMATING THE EFFECT OF BIOFUEL ON LAND COVER CHANGE USING MULTI-YEAR MODIS LAND COVER DATA.

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1. INTRODUCTION

There has been a growing debate on the effects of the increase in demands of biofuels on land use land cover (LULC) change with apprehension in some quarters that the growing popularity of bioenergy as a clean fuel will result in widespread direct and indirect LULC change. Perlack *et al.* [1] estimated in the billion ton study that approximately 1 billion dry ton of biomass per year would be required to meet this goal and approximately 1.3 billion dry ton of biomass is available just from forest (.3 billion) and agricultural resources (1 billion) under a set of scenarios with 'relatively modest land use changes'. However there have been concerns that to meet the bioenergy goals, extensive LULC will occur which will result in increased greenhouse emissions. These changes will involve conversion of forest and grassland into bioenergy crops [2,3] and replacement of traditionally grown crops like wheat and soybeans by bioenergy crops. Apart from the direct land use changes due to production of bioenergy crops researchers have also raised concerns about indirect land use change (i.e. land use change which occurs somewhere in the world to meet the demands of biofuel in a different place) which is more difficult to estimate and quantify. Consequently, in the absence of any well-defined parameter to quantify direct and indirect land use changes there has been ongoing debate as to the nature and extent of these changes. [2,3,4].

2. METHODOLOGY

In this study MODIS Land Cover (MCD12Q1) data from 2001 to 2008 is being used to estimate land cover change in the conterminous United States. Two land cover classes cropland (class 12 of IGBP) and grassland (class 10 of IGBP) are being used to investigate the relationship of biofuels and land cover change as these are two of the classes where significant changes are expected to occur as a result of the demand for biofuel [2,5] . The spatial pattern of these changes for this time frame is being used to correlate these changes to the production of biofuels. The land cover is being reclassified to 3 classes i.e. cropland, grassland and others and then by simple raster subtraction changes are being estimated for 2001-2002, 2002-2003,2003-2004,2004-2005,2005-2006 and 2007-2008. This results in six possible changes i.e. grassland being converted to cropland, cropland converted grassland, and both these classes being converted into other classes and vice versa. The changes of grassland to cropland and cropland to

grass land are being analyzed to estimate how much of this change is being driven by the demand for biofuel by estimating what type of crops are being planted in these areas by using the Cropland Data Layer (CDL) data

3. PRELIMINARY RESULTS

Figure 1 shows the counties where the maximum change from grassland to cropland has occurred from 2002-2008. There is an increasing trend in this conversion for this time period; this is also the time frame when ethanol production in the US has increased from around 2000 million gallon to around 9000 million gallon. Analysis is being done to see if there is a positive correlation in between these changes, the distinct spatial pattern of these changes is also being investigated. This will help to answer some questions like what type of LULC changes are driven by biofuels and whether new biofuel crops displaces other crops and forests or can it be sustained on underutilized land without causing widespread LULC changes.

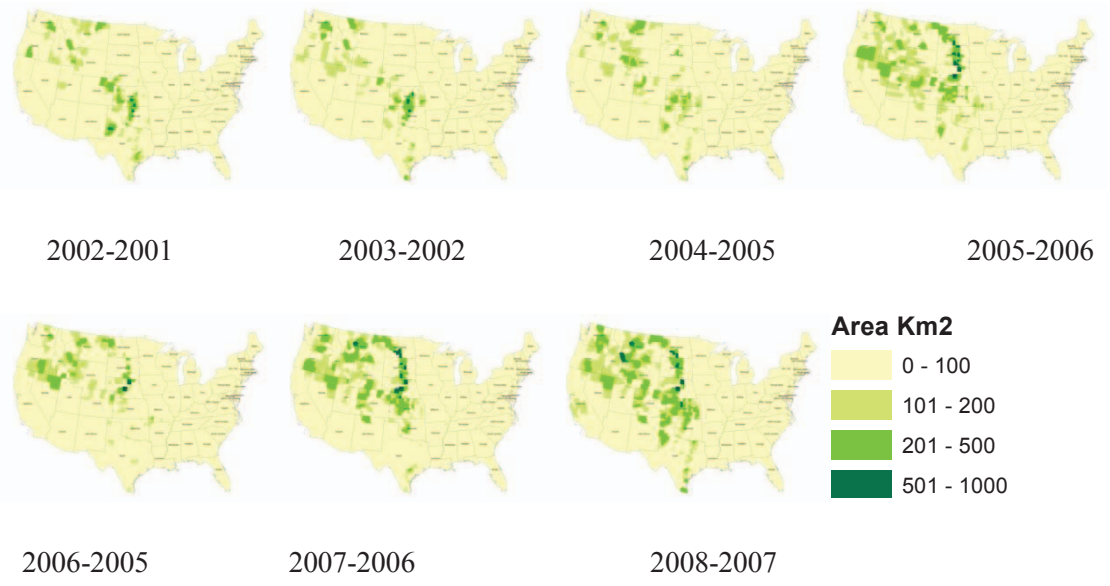

Figure 1-Change from grassland to cropland area for the time period 2001-2008

4. REFERENCES

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