Lecture given at the

WCS Workshop on Land Change Modeling for REDD

October 25– 29, 2010

Wildlife Conservation Society - Bronx Zoo
Bronx, New York, USA

Hosted by

Clark Labs and the Wildlife Conservation Society

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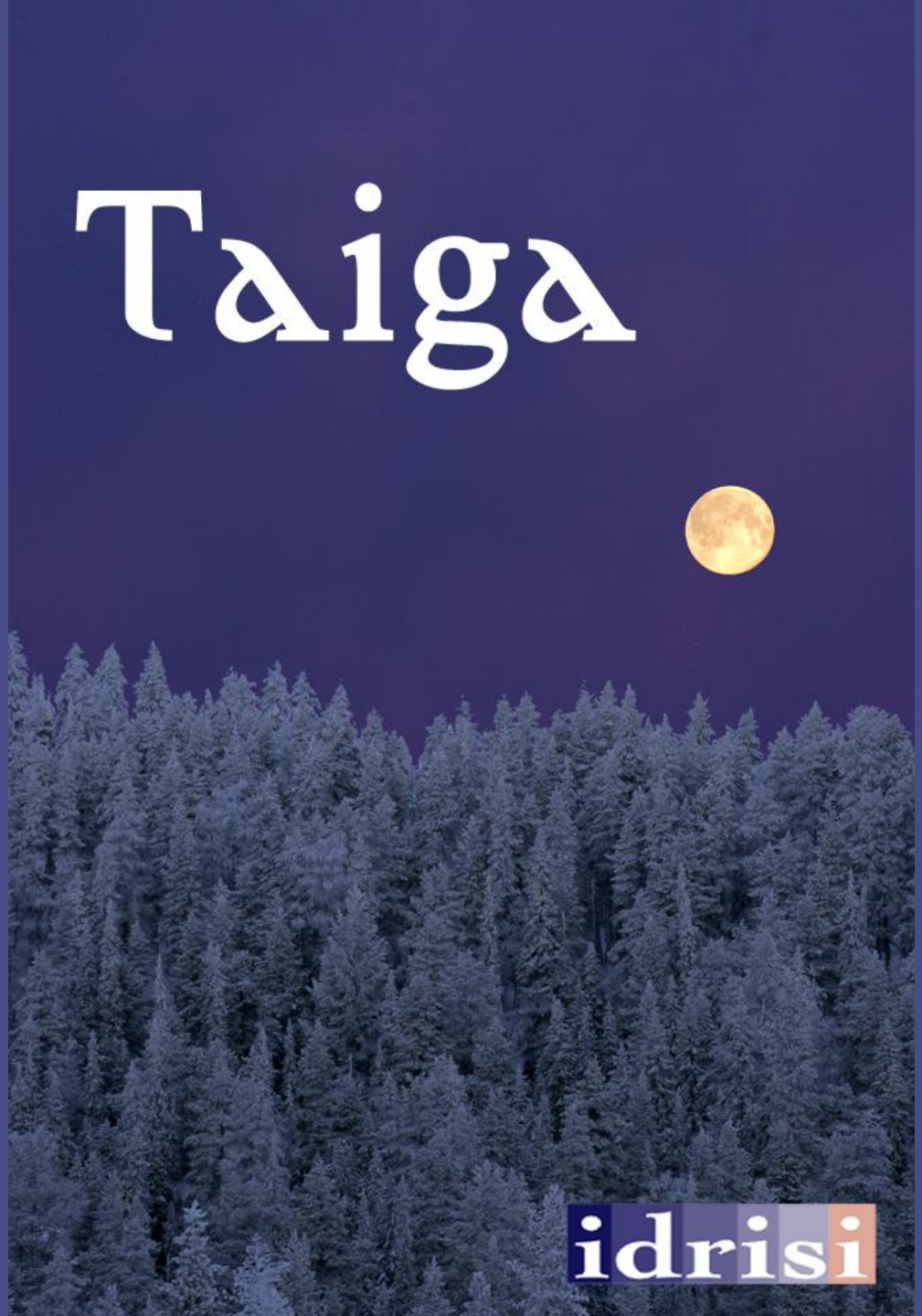
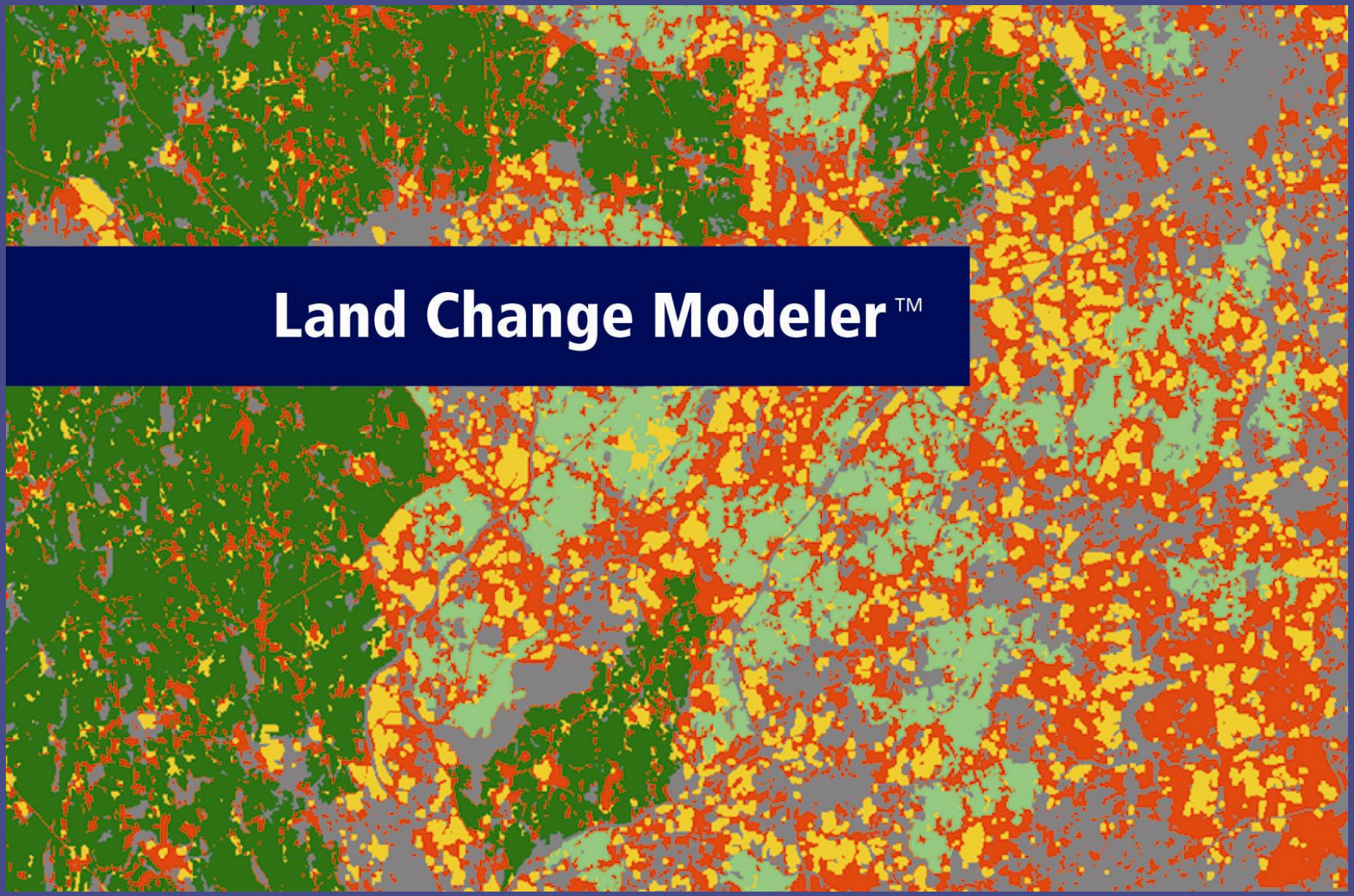
Taiga




Land Change Modeler™

LCM Change Analysis Tab

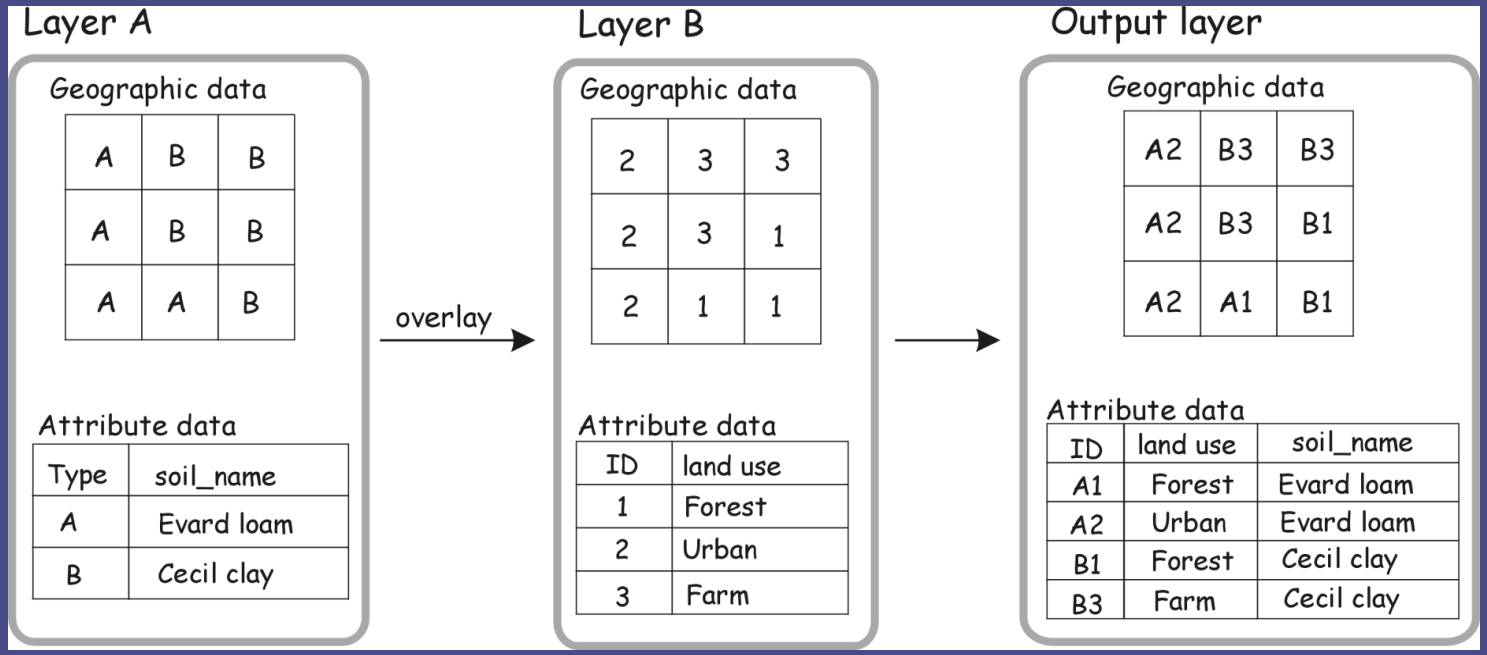
In this section you will learn:

- **Cross-tabulation**
- **Visualizing Land Cover Change**
- **Steps in LCM**

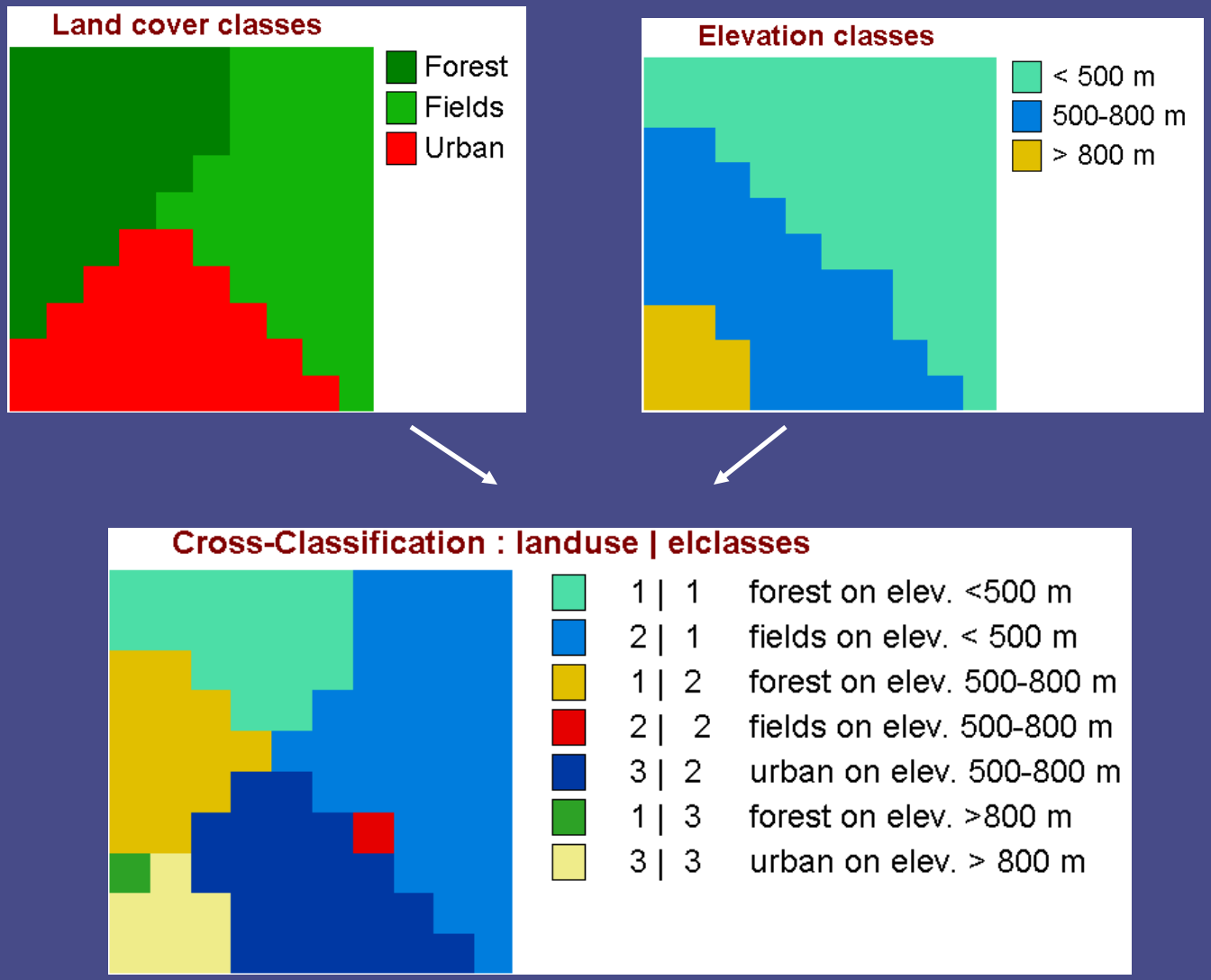
Cross-tabulation

•Cell – by – cell combination of two or more data layers with the same resolution and extent

•Restricted to NOMINAL data, where the numbers refer to categorical variables



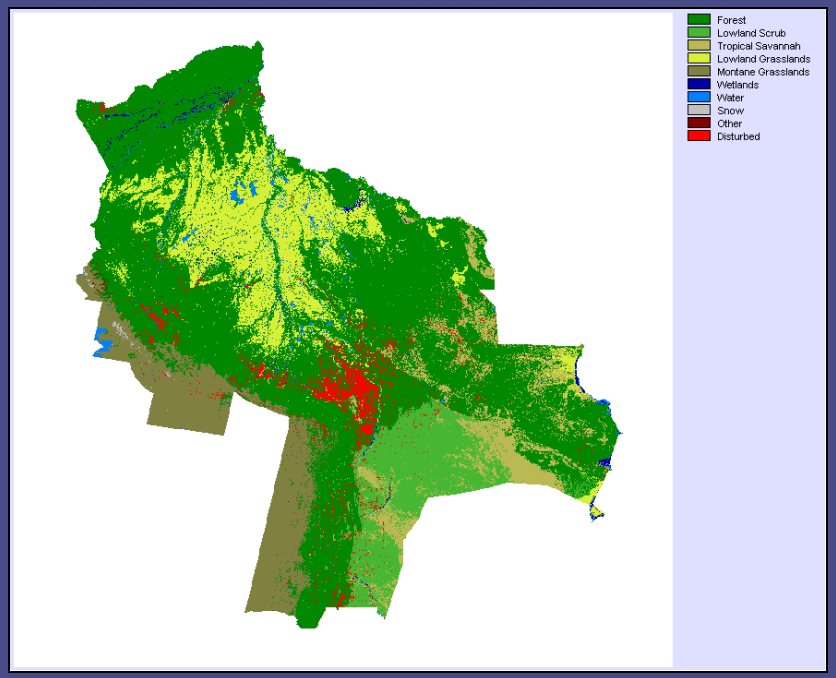
Cross-tabulation



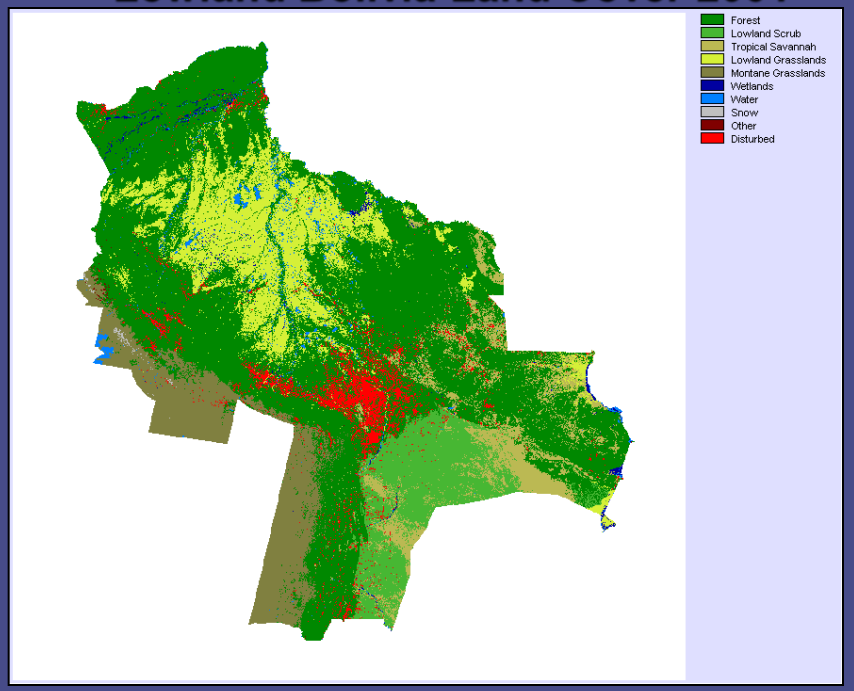
Visualizing Land Cover Change

- Requires two prior landuse maps

Lowland Bolivia Land Cover 1992



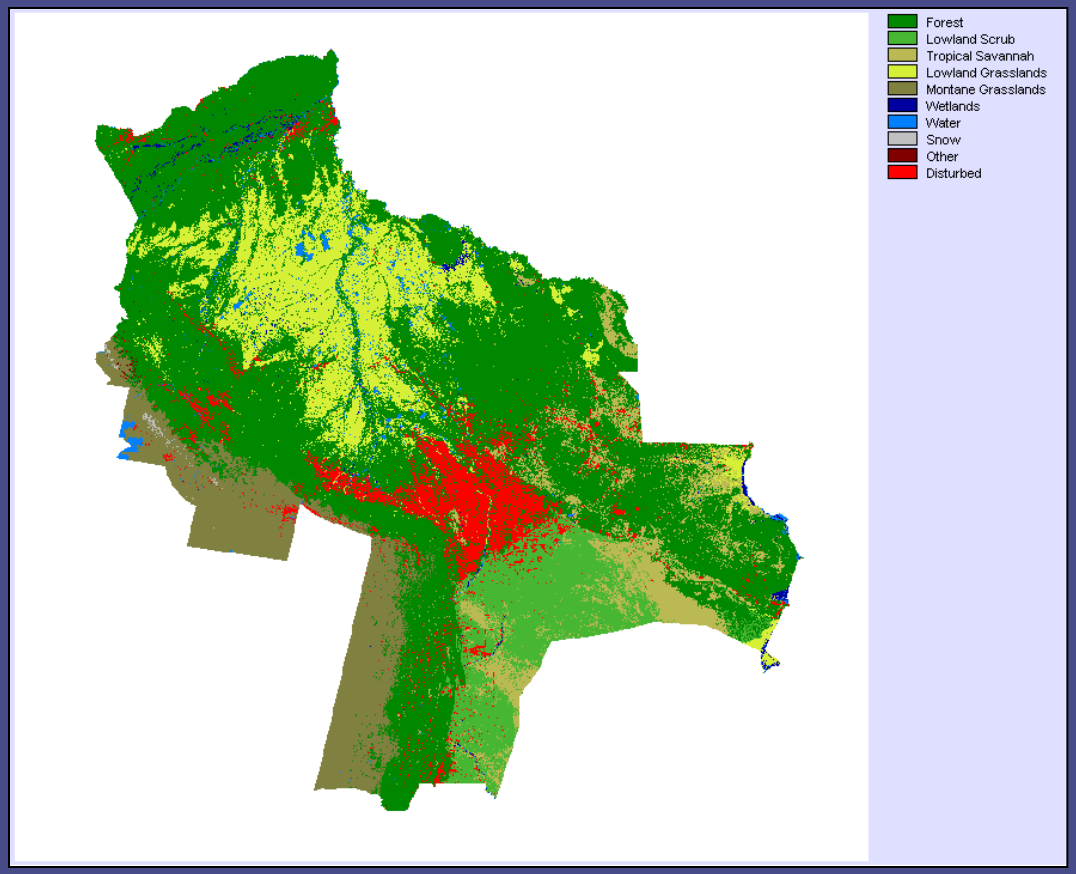
Lowland Bolivia Land Cover 2001



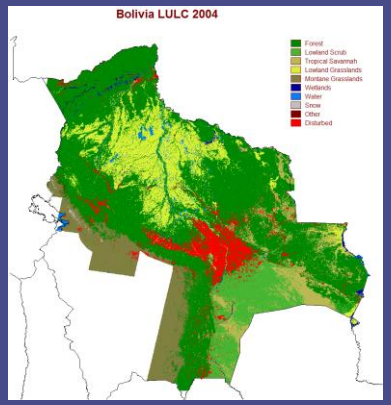
Visualizing Land Cover Change

- Ideally a third landuse map is used for validation of model

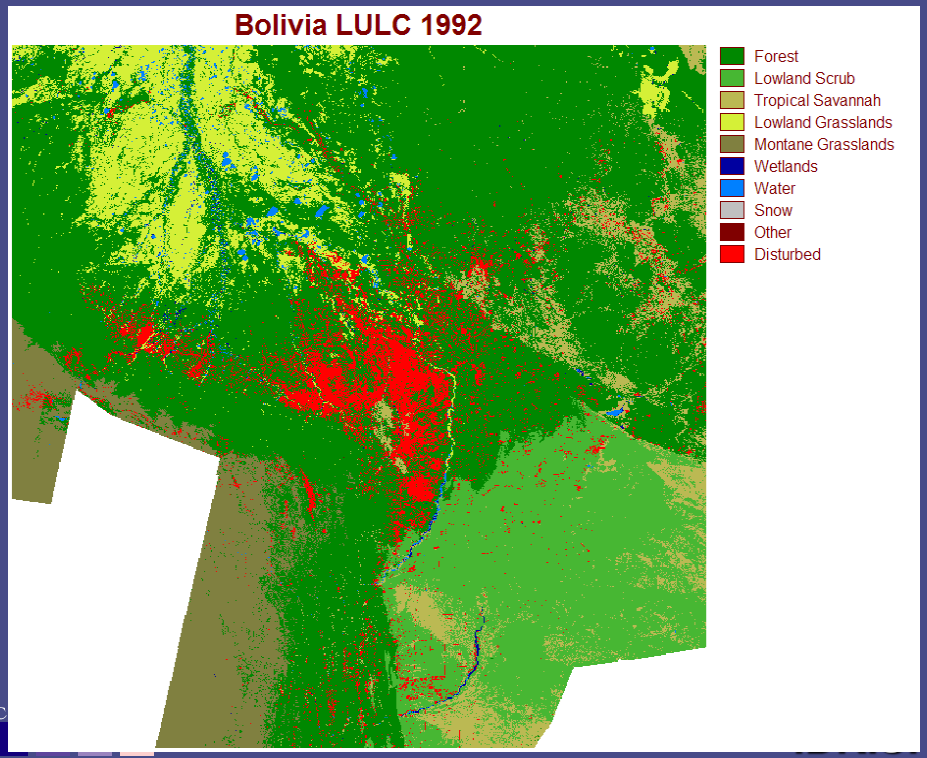
Lowland Bolivia Land Cover 2004

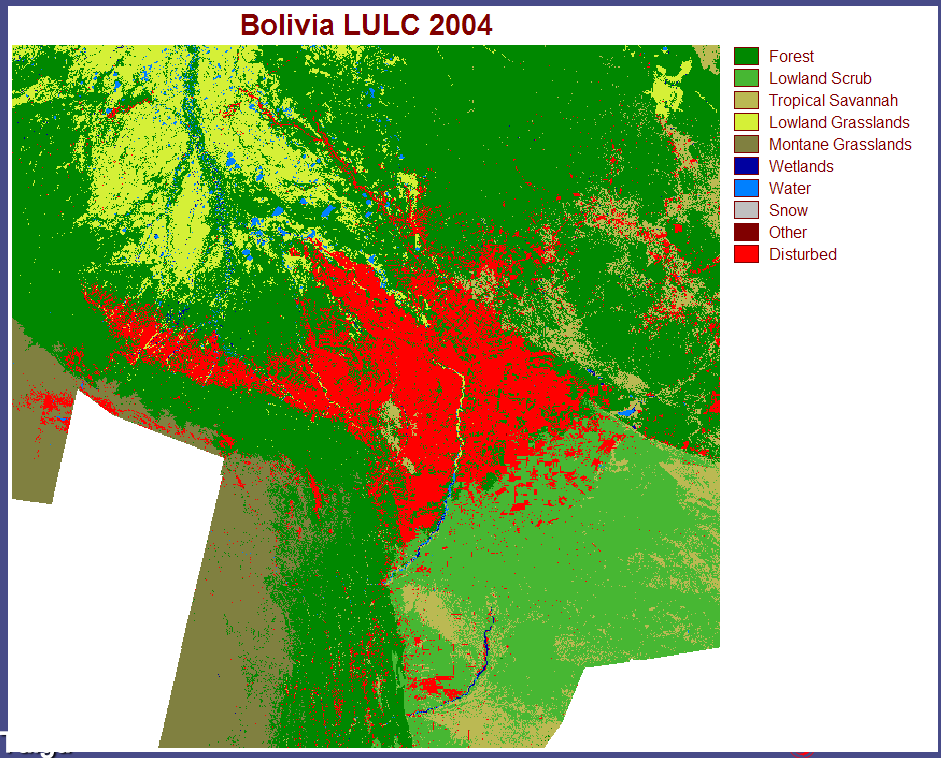


Land Cover Change



Land Cover Change (km^2)	1992	2004	Change
Forest	484875	461087	-23788 (5%)
Lowland Shrub	75822	73097	-2725 (4%)
Tropical Savannah	59877	58138	-1739 (3%)
Disturbed	27804	56773	**+28969 (104%)**

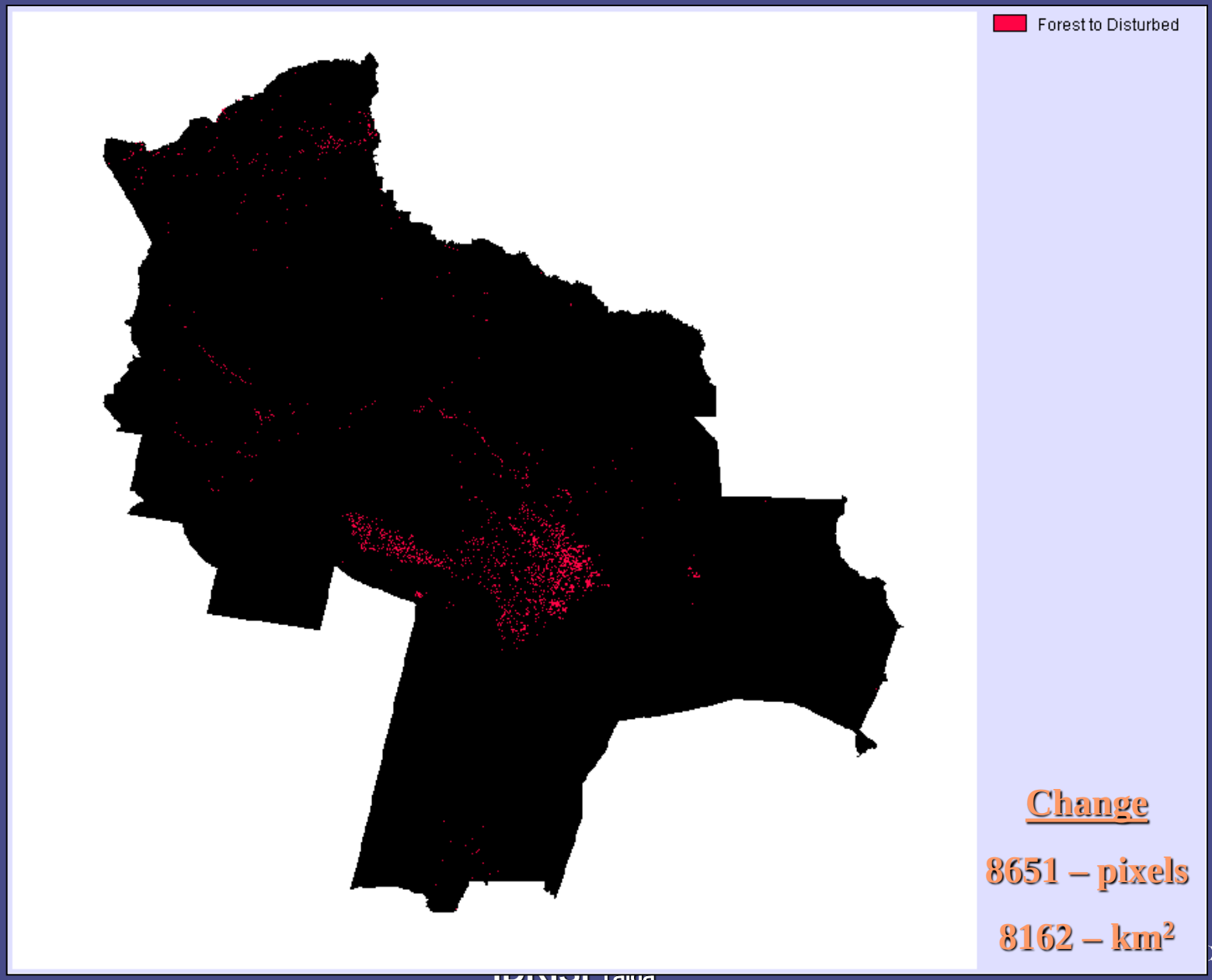




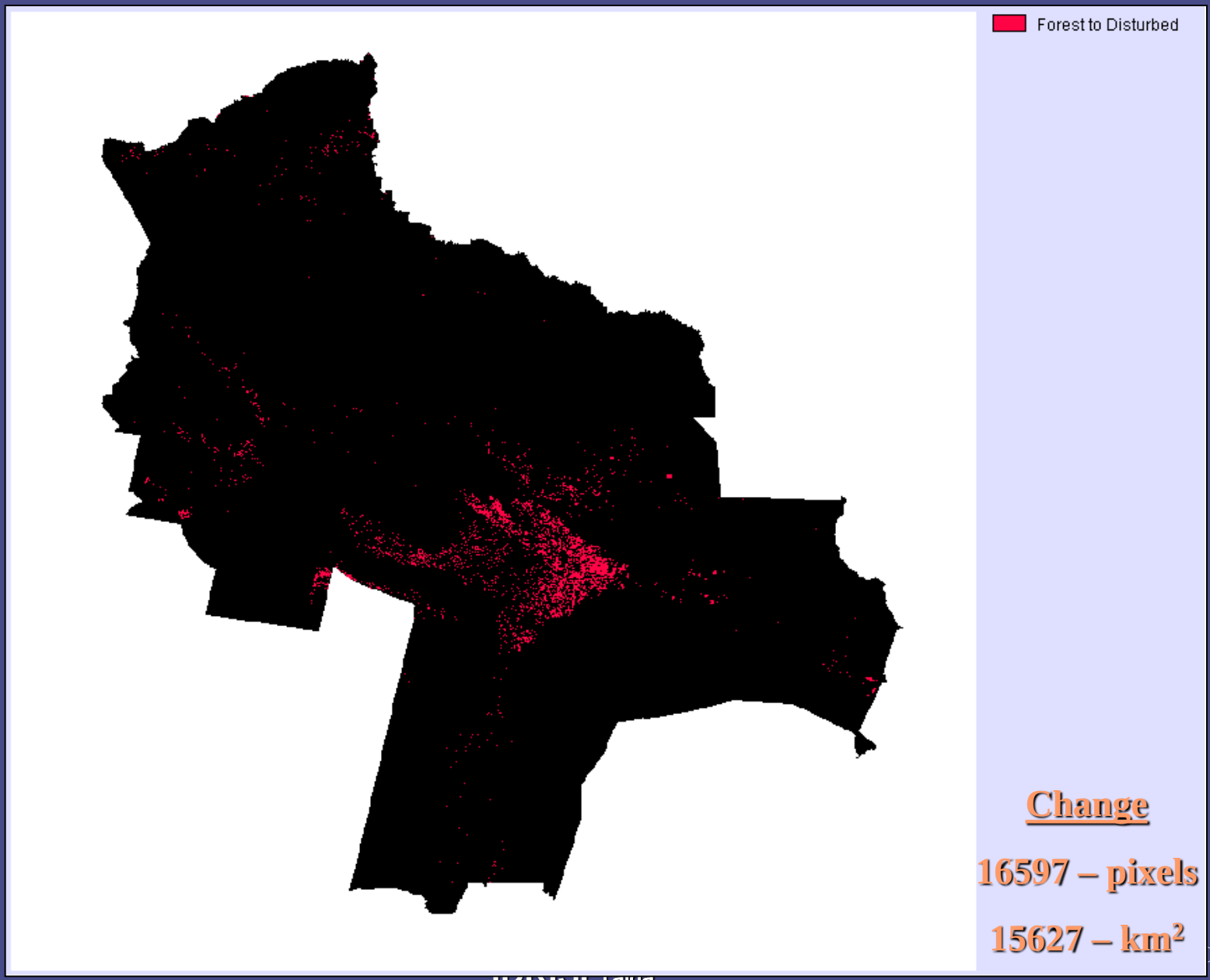
LCM – Approach to Land Use Change Modeling

- Cross-tabulation between T1 and T2 to understand past exchange among landuse classes

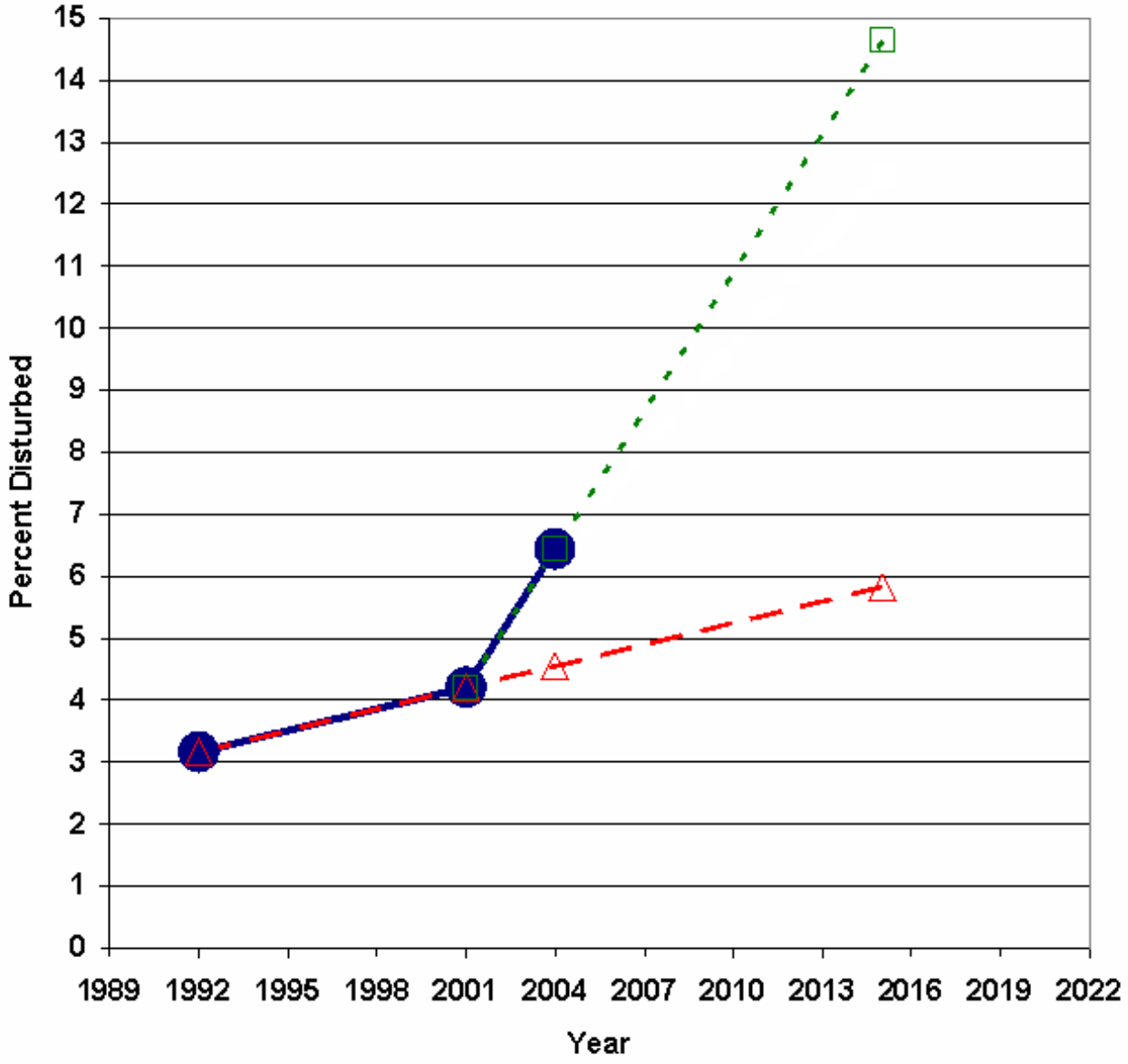
Cross-tabulation - 1992 - 2001



Cross-tabulation - 2001 - 2004



Prediction of Future Quantity



1992 - 2001

8651 – pixels

8162 – km²

2001 - 2004

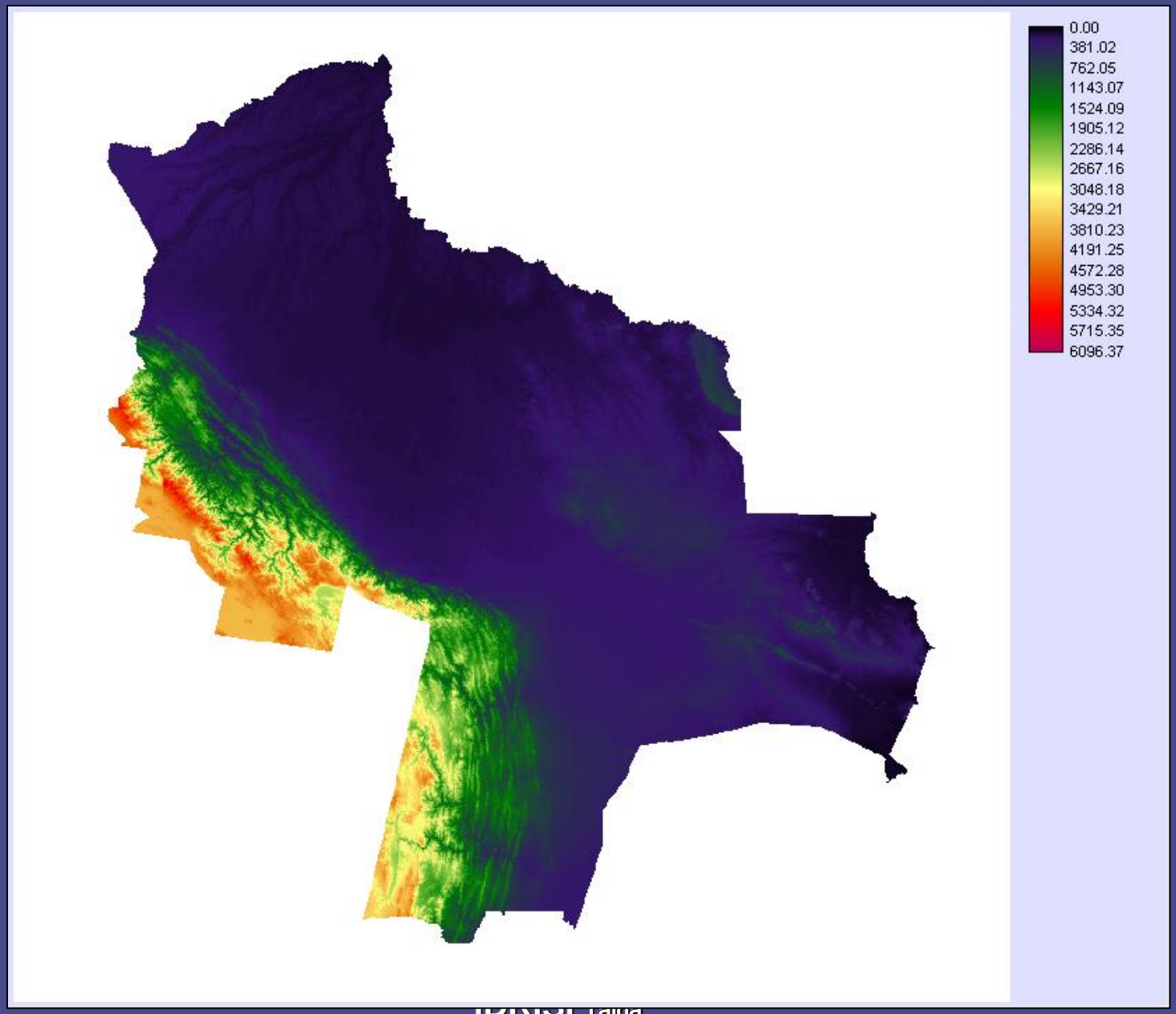
16597 – pixels

15627 – km²

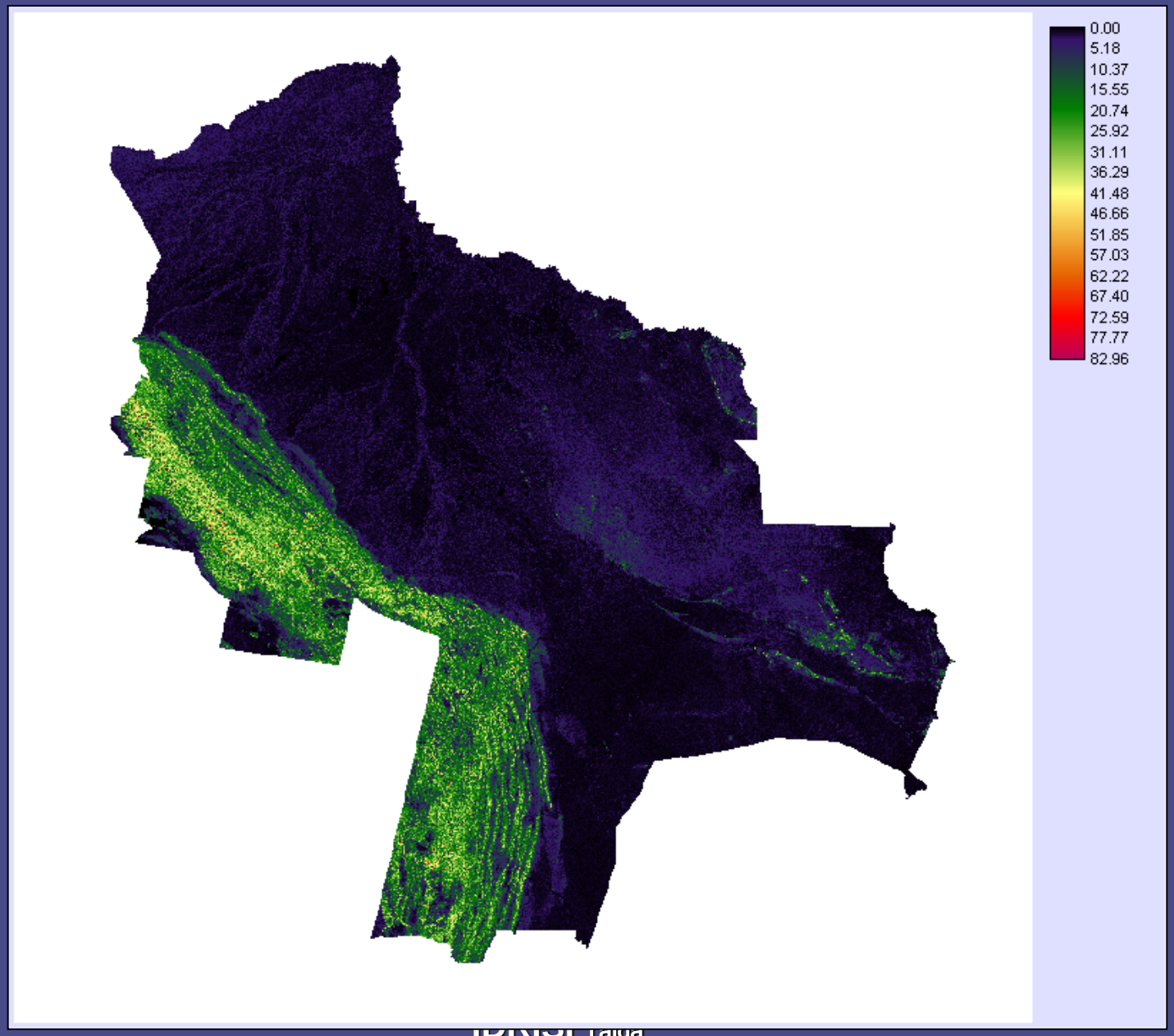
LCM – Approach to Land Use Change Modeling

- **Explanatory variables - Drivers**
  - **Static variable – is a variable that does not change over time**

Variable - DEM



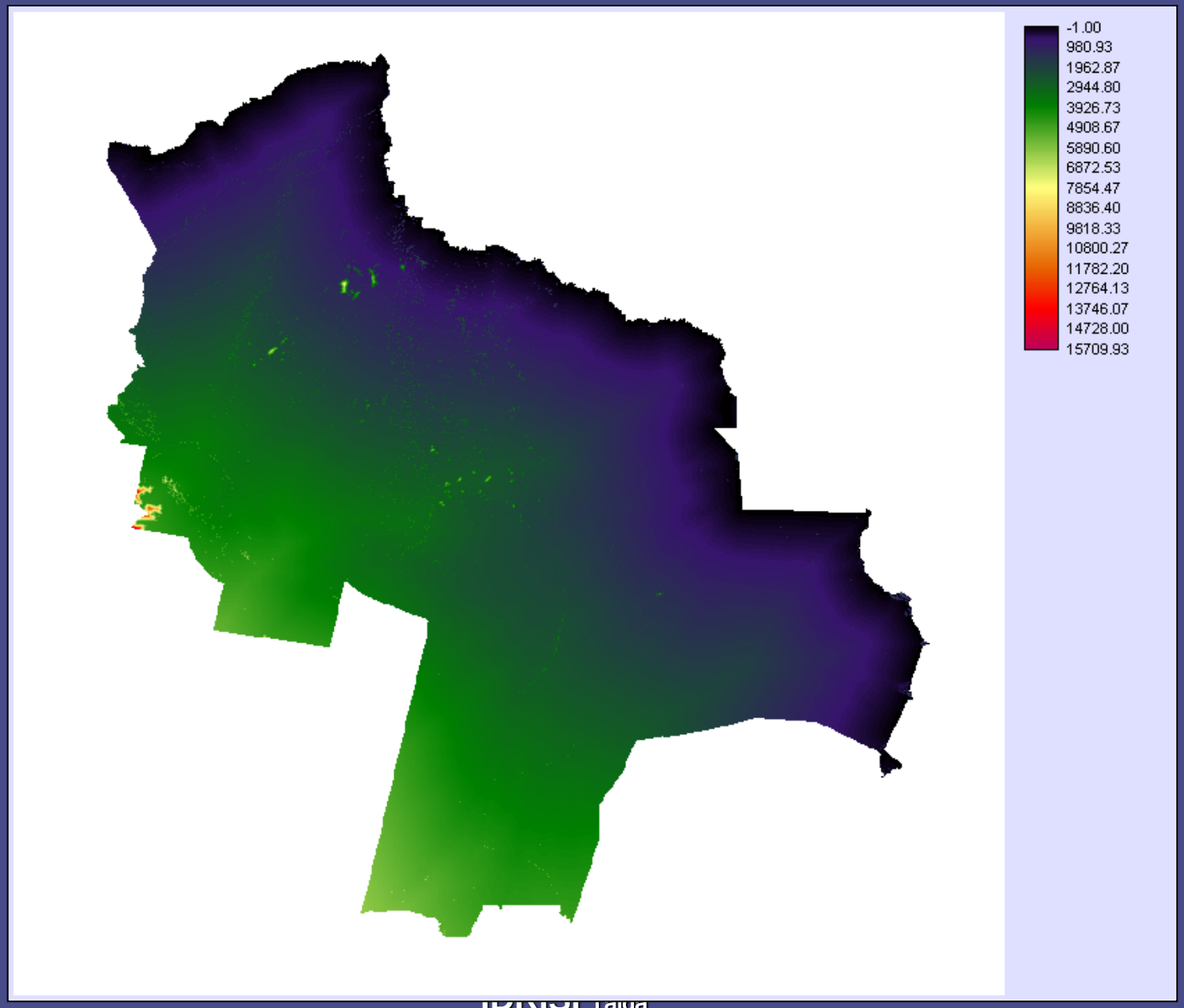
Variable - Slopes



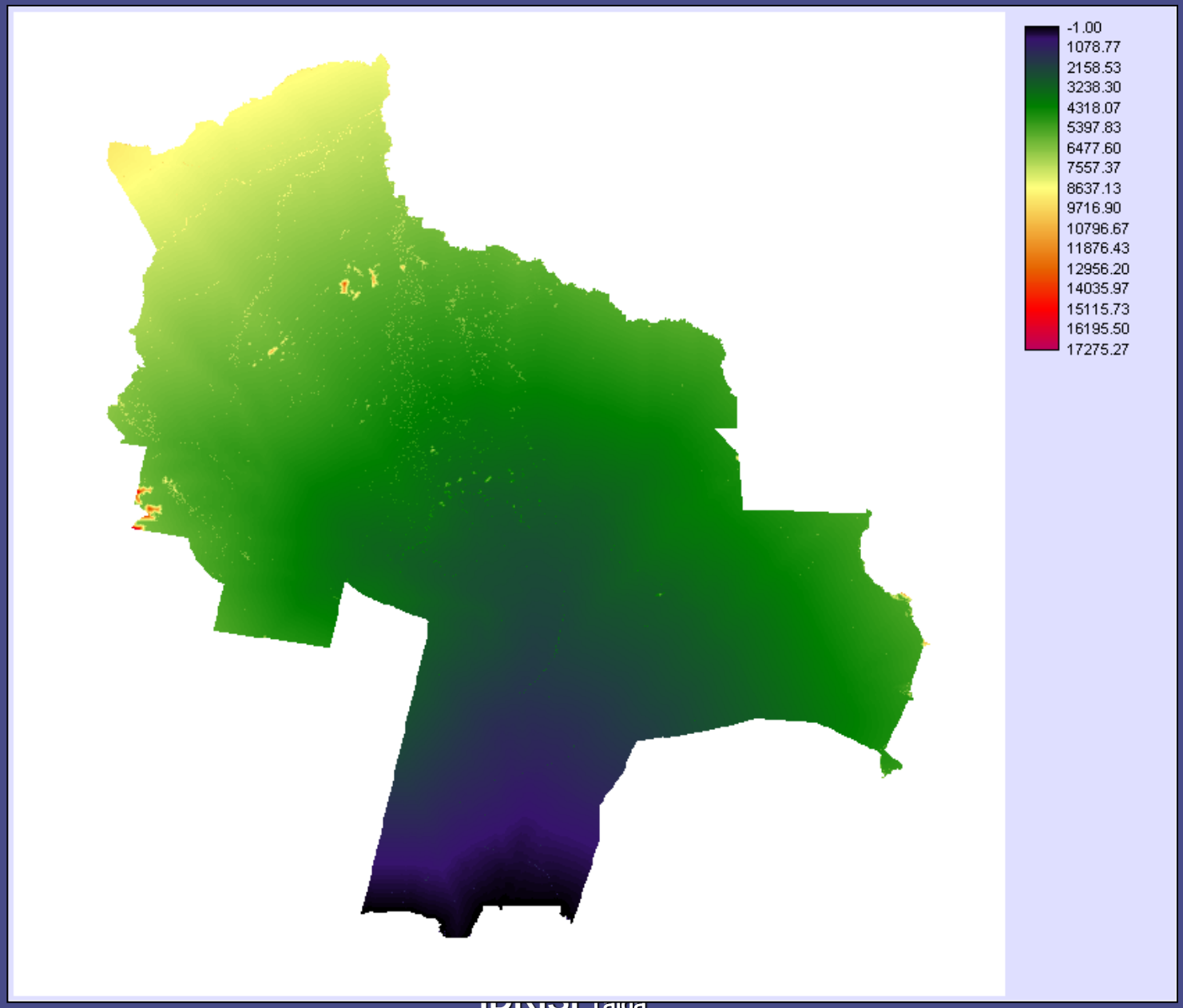
LCM – Approach to Land Use Change Modeling

- **Explanatory variables - Drivers**
  - **Dynamic variables – is a variable that changes over time**

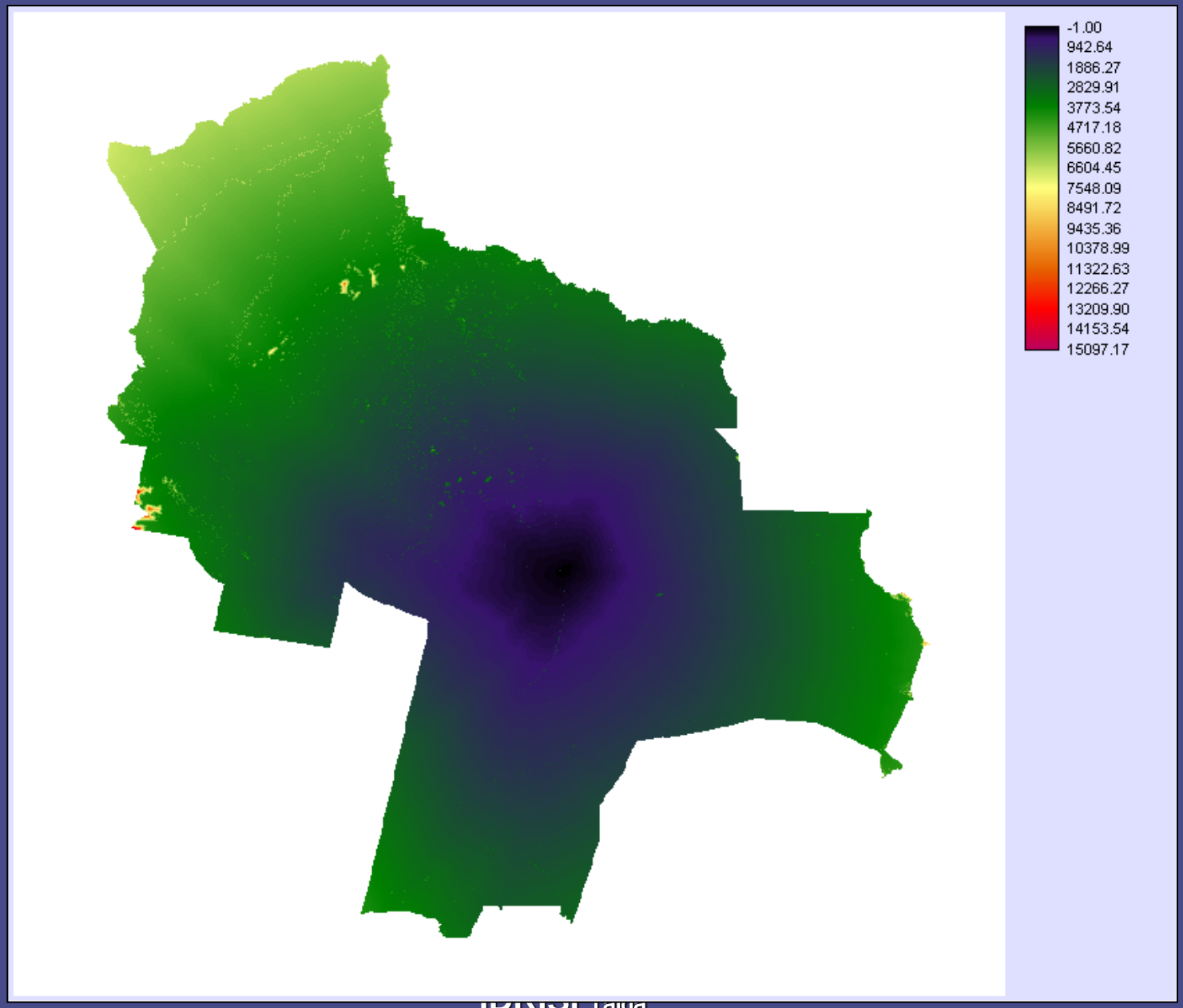
Variable – Cost Distance from Brazil



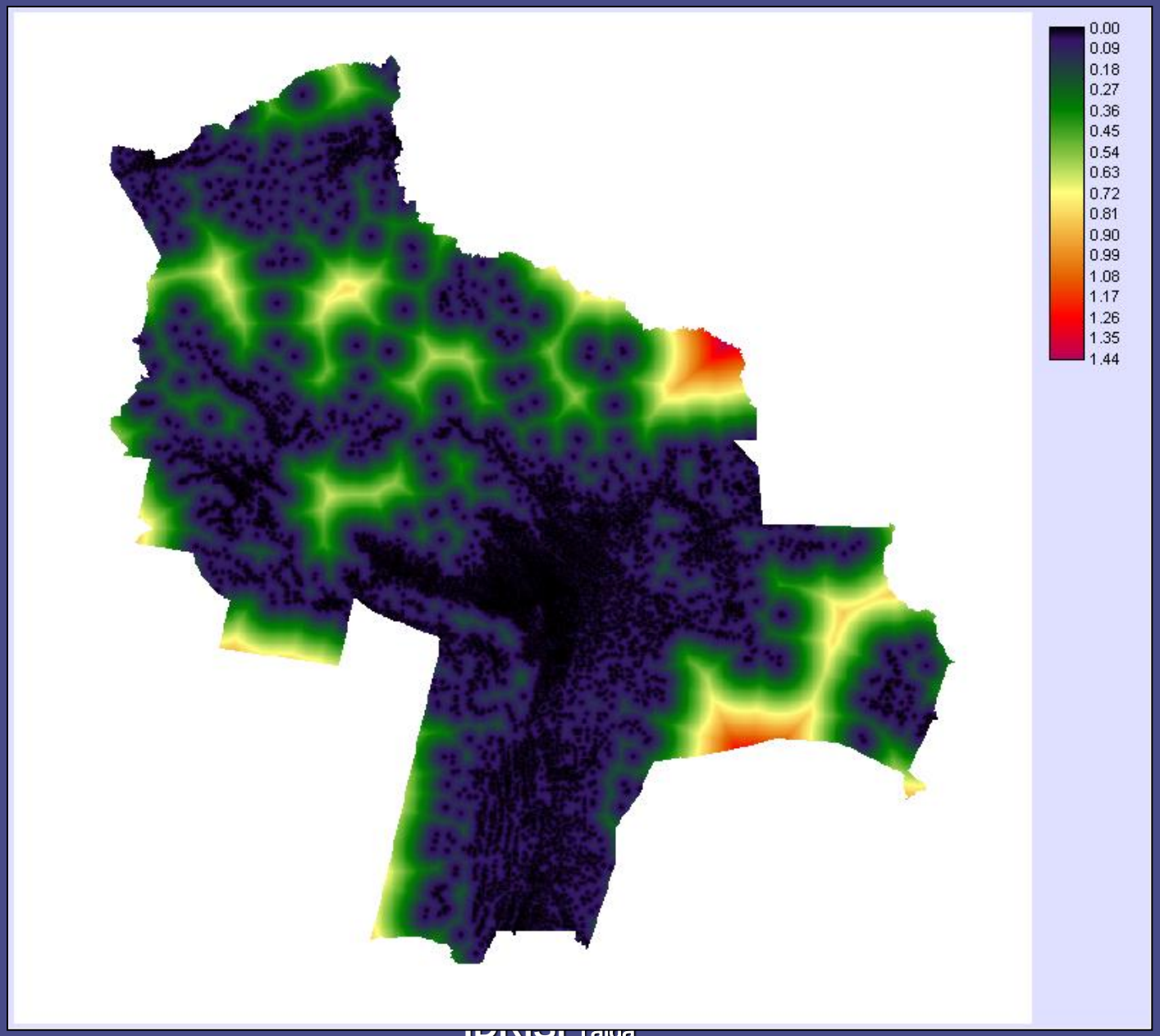
Variable – Cost Distance from Argentina



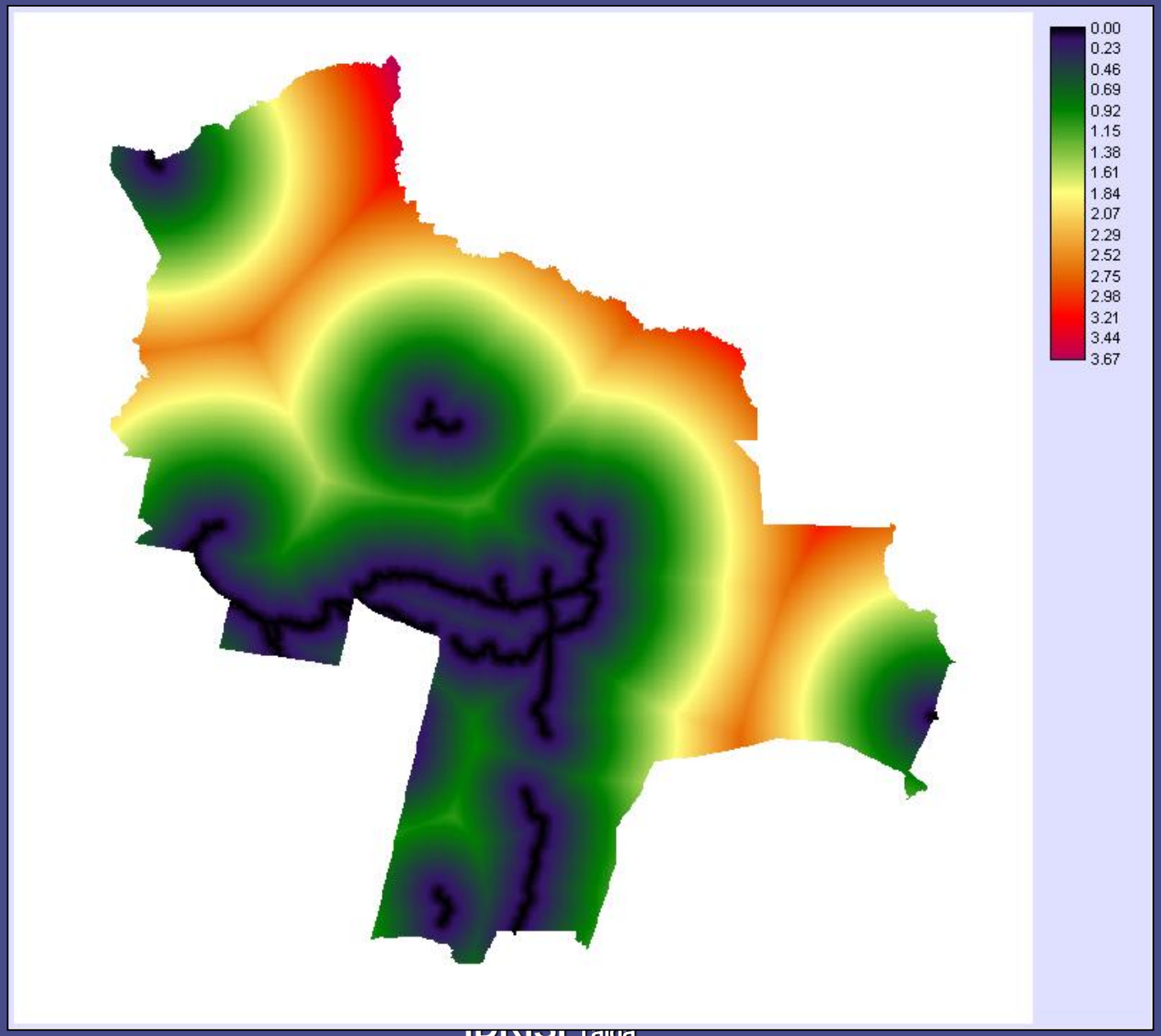
Variable – Cost Distance from Santa Cruz



Variable – Cost Distance from Disturbance



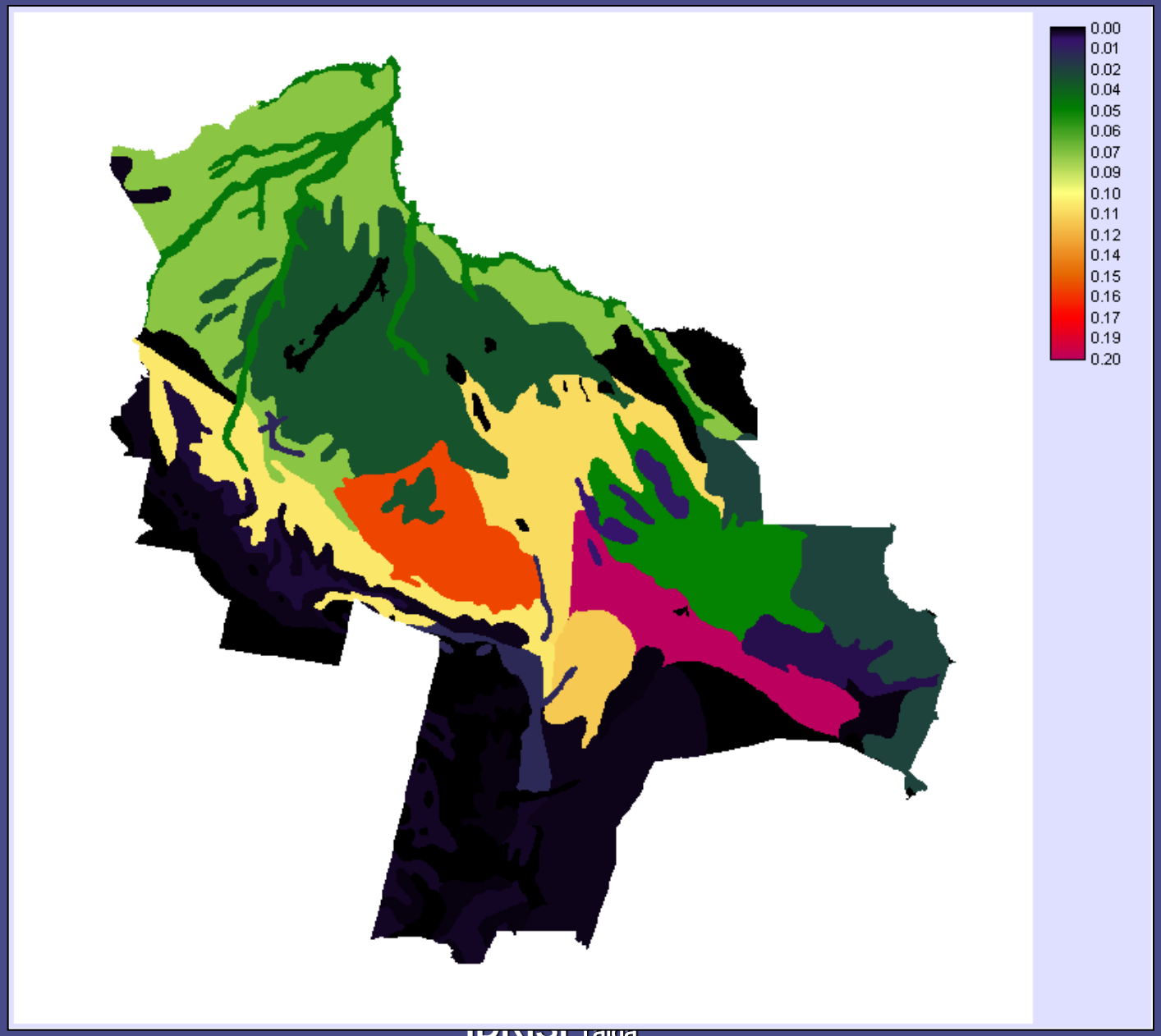
Variable – Distance from Paved Roads



LCM – Approach to Land Use Change Modeling

- **Explanatory variables - Drivers**
  - **Qualitative variables – empirical likelihood**

Variable – Empirical Likelihood - Soils



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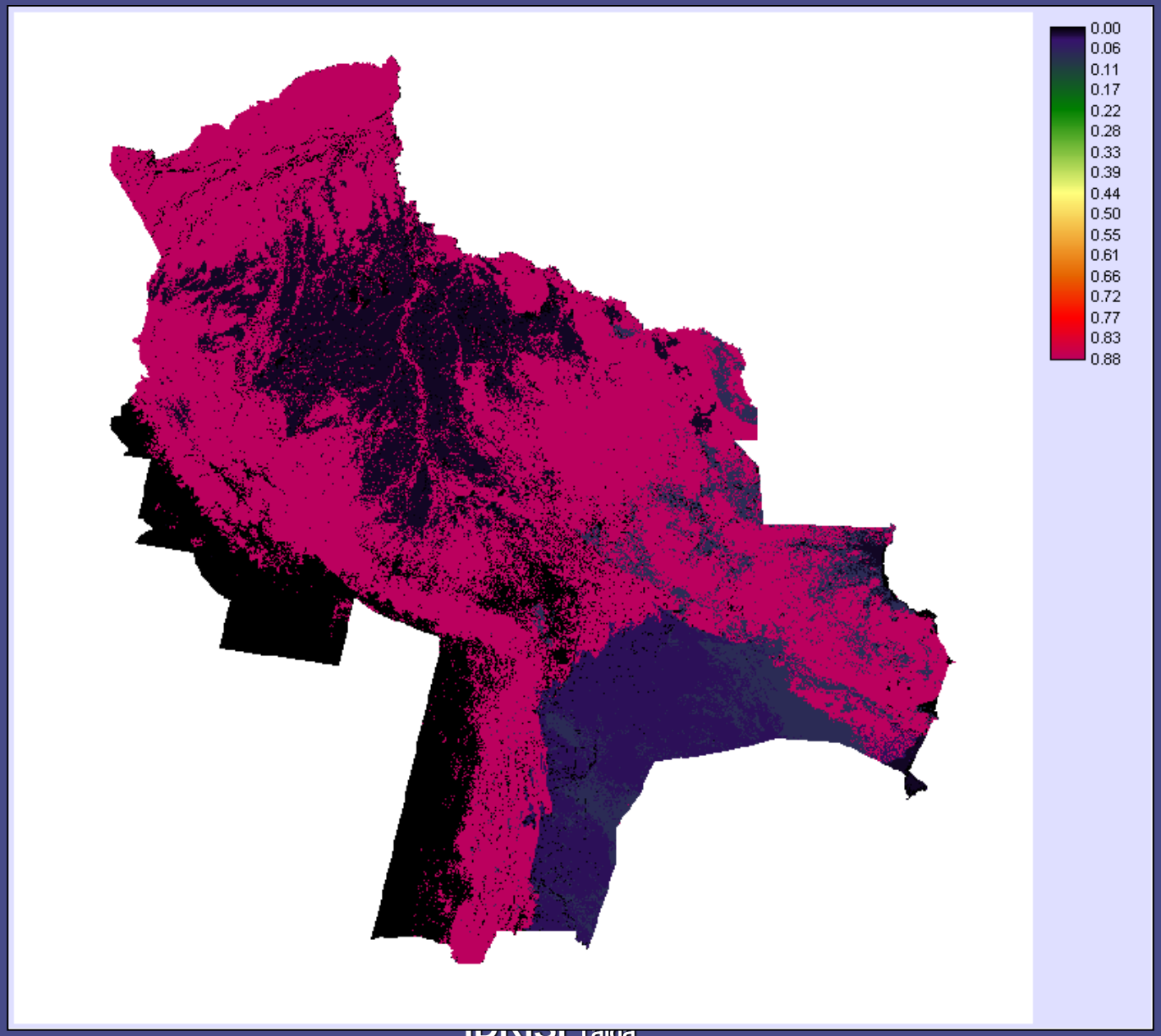
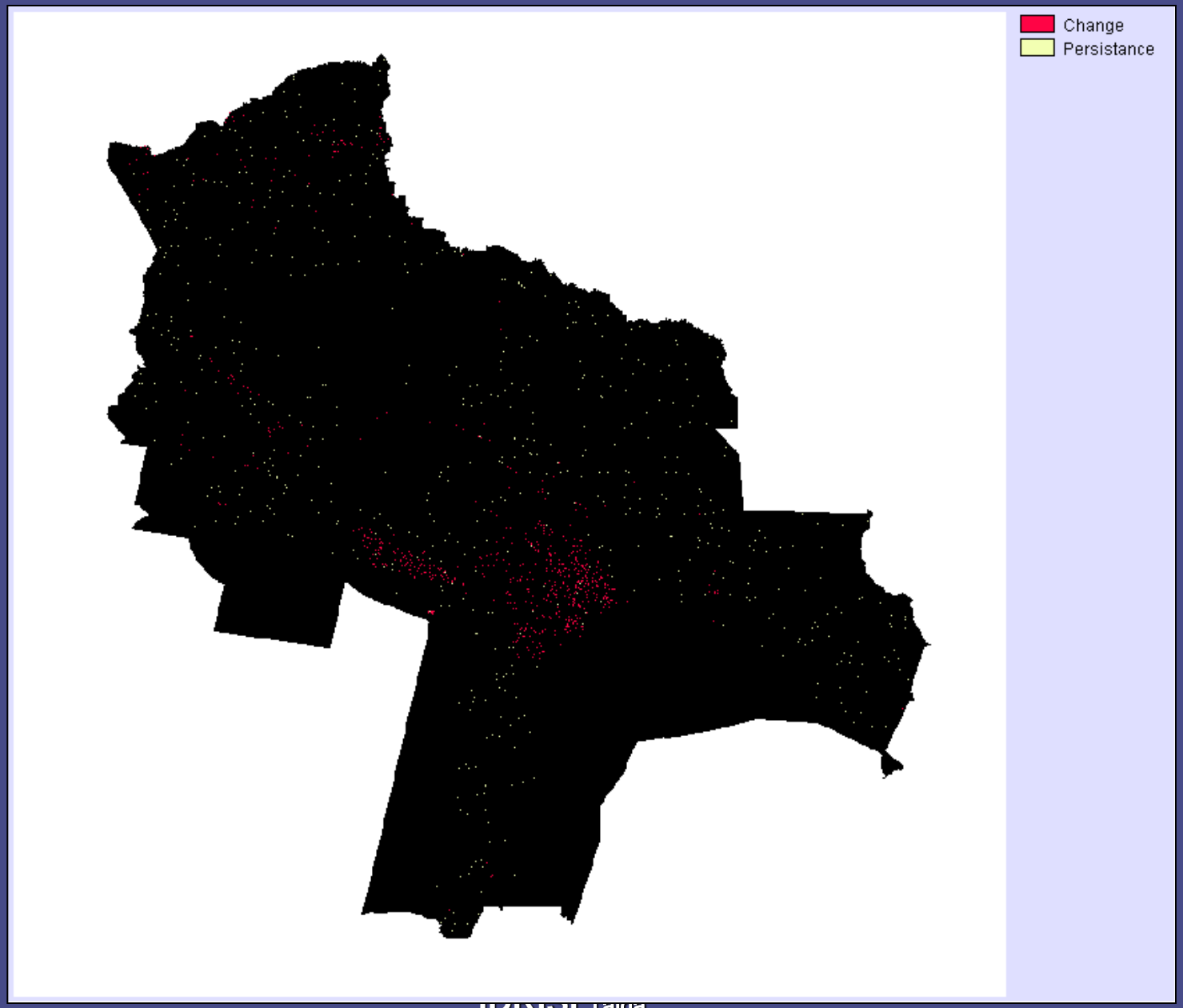
Variable – Empirical Likelihood – 92/01



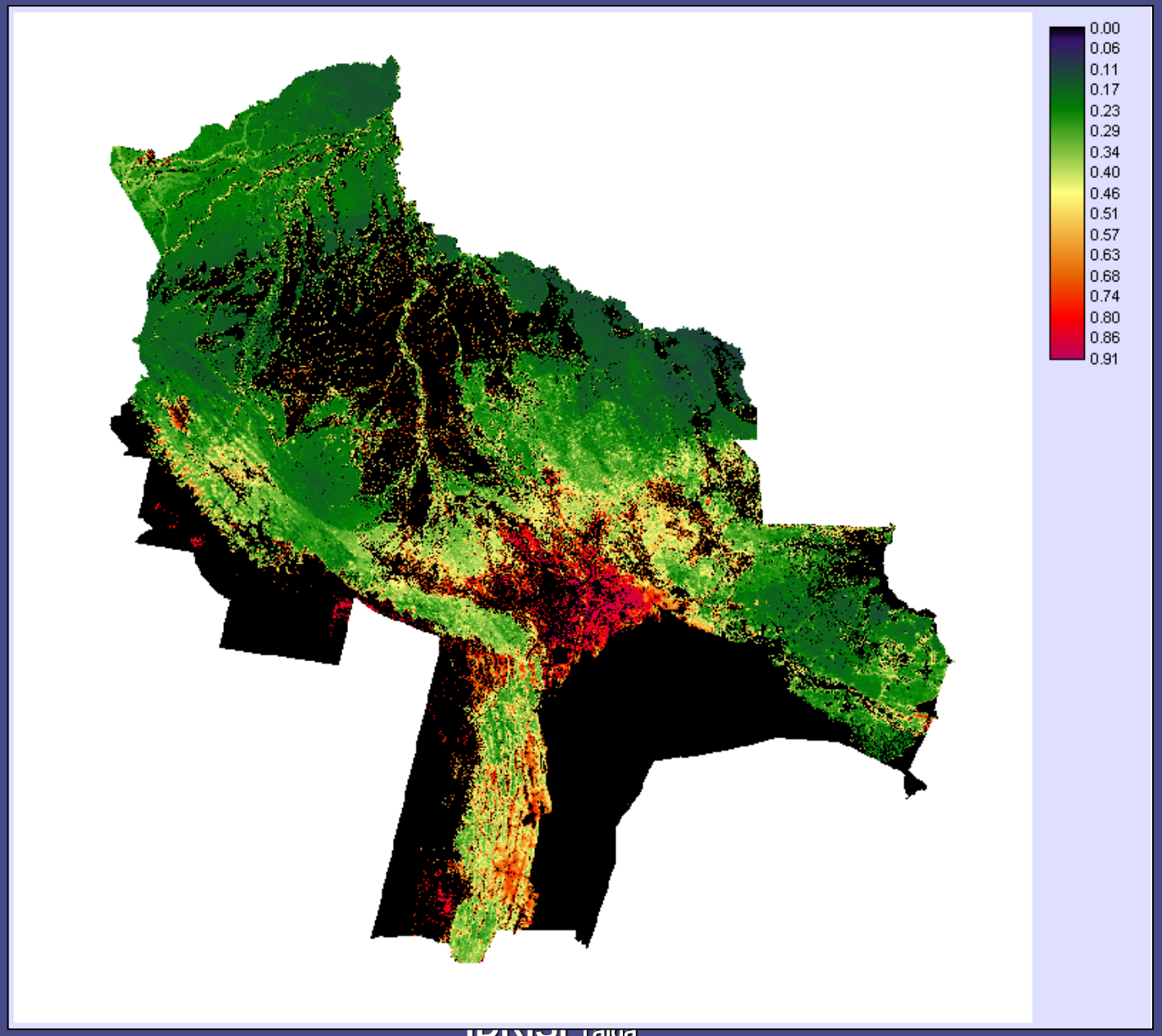
LCM – Approach to Land Use Change Modeling

- **Aggregation of variables – MLP - Transition probability image**

MLP – Training Samples



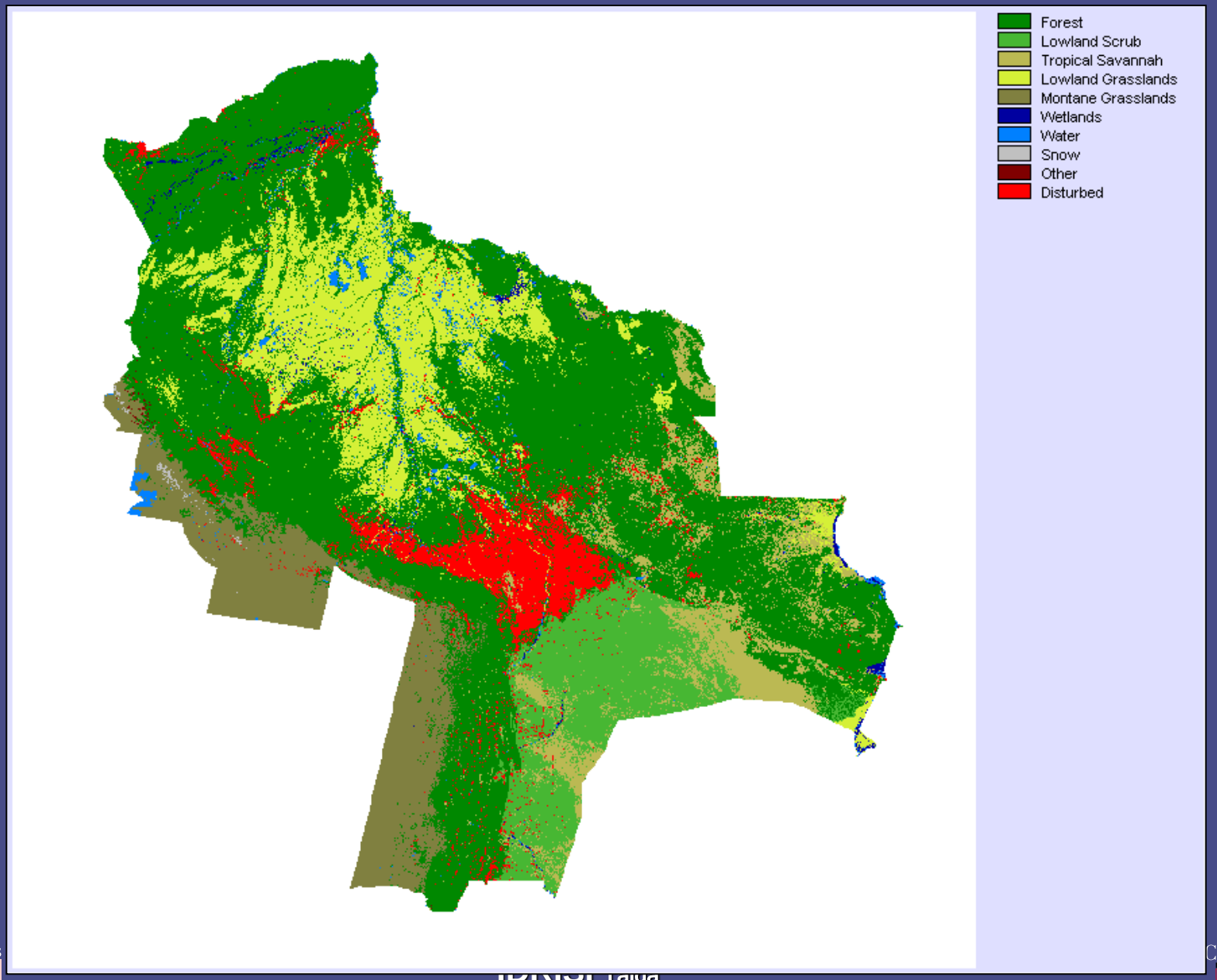
MLP – Transition Potential



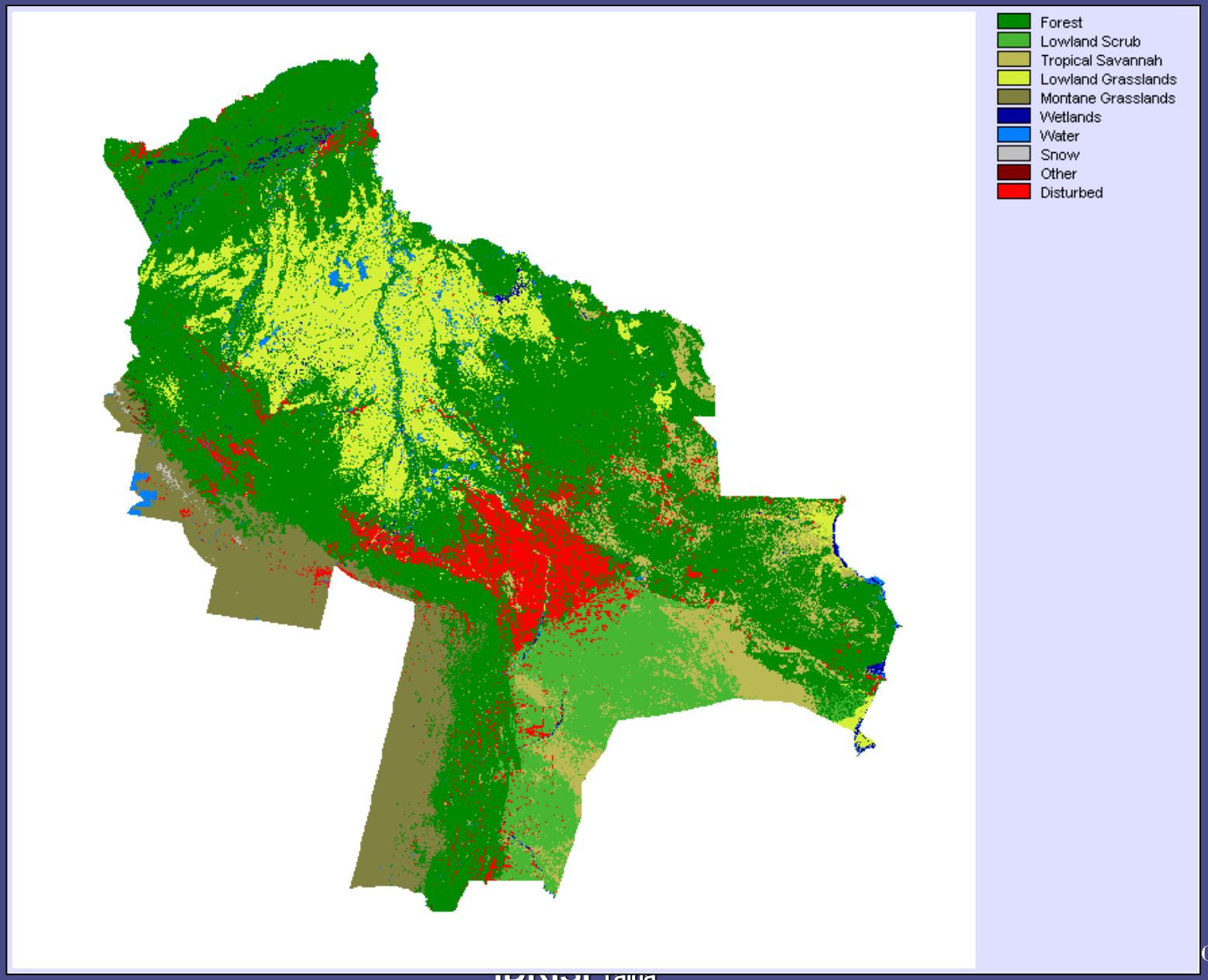
LCM – Approach to Land Use Change Modeling

- **Amount of change into the future – Markovian process**

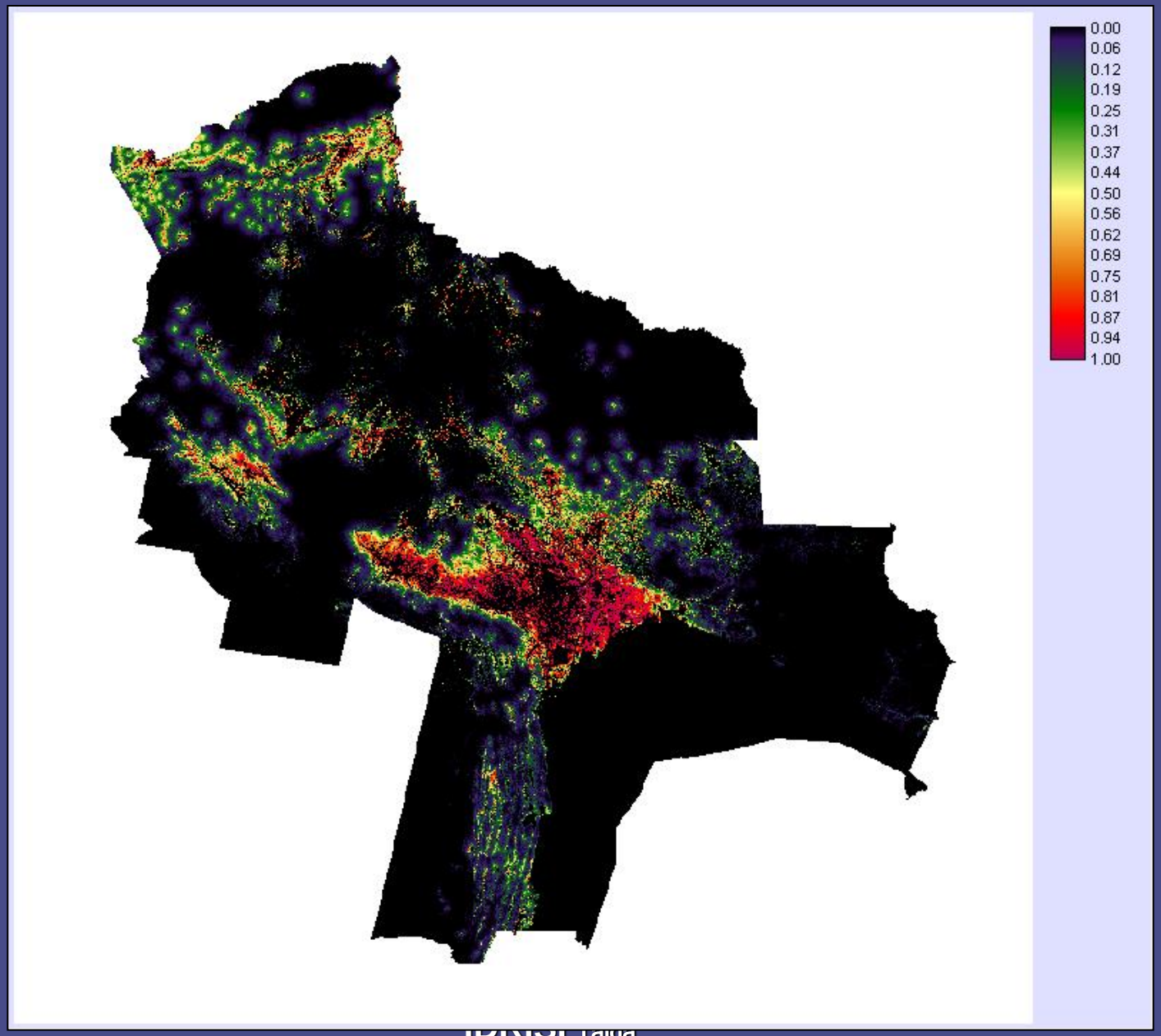
Modeled – 2004



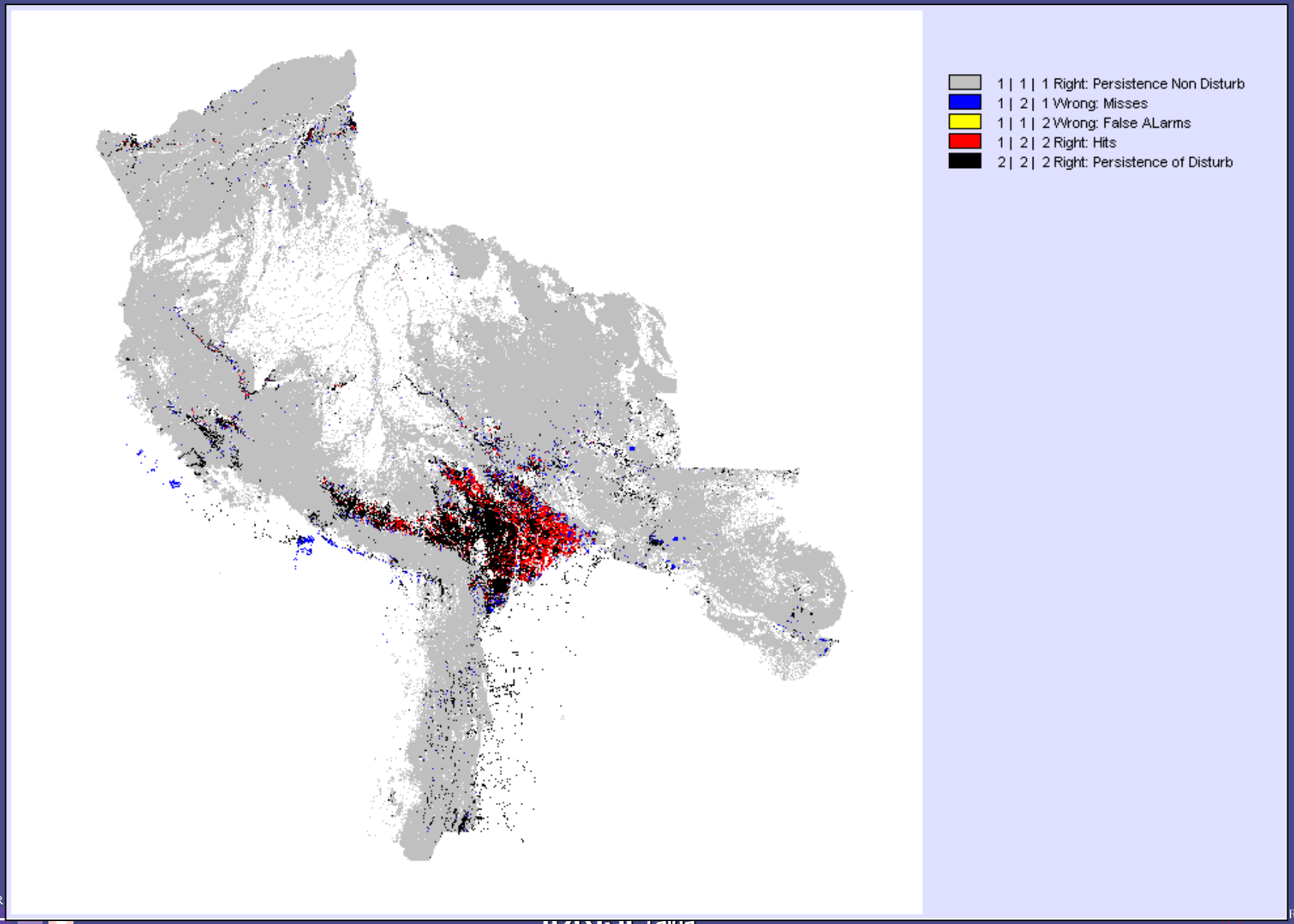
Truth – 2004


Forest
Lowland Scrub
Tropical Savannah
Lowland Grasslands
Montane Grasslands
Wetlands
Water
Snow
Other
Disturbed

Modeled Soft – 2004



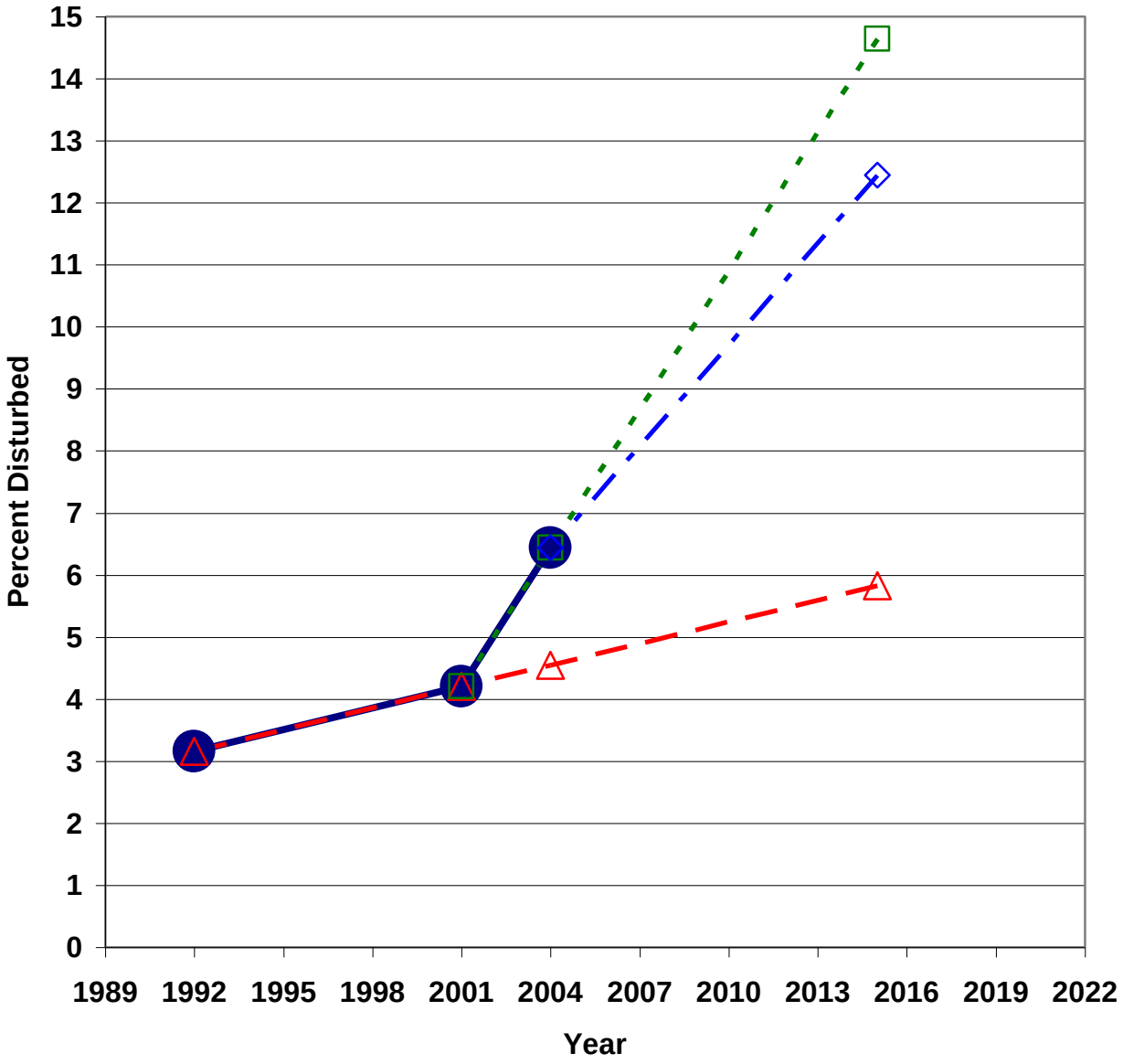
Cross-tabulation – 2001 | 2004 | 2004 Modeled



LCM – Approach to Land Use Change Modeling

- **Change allocation process**
  - **Apply infrastructure changes**
  - **Zoning – Constraints/Incentives**

Prediction of Future Quantity



1992 - 2001

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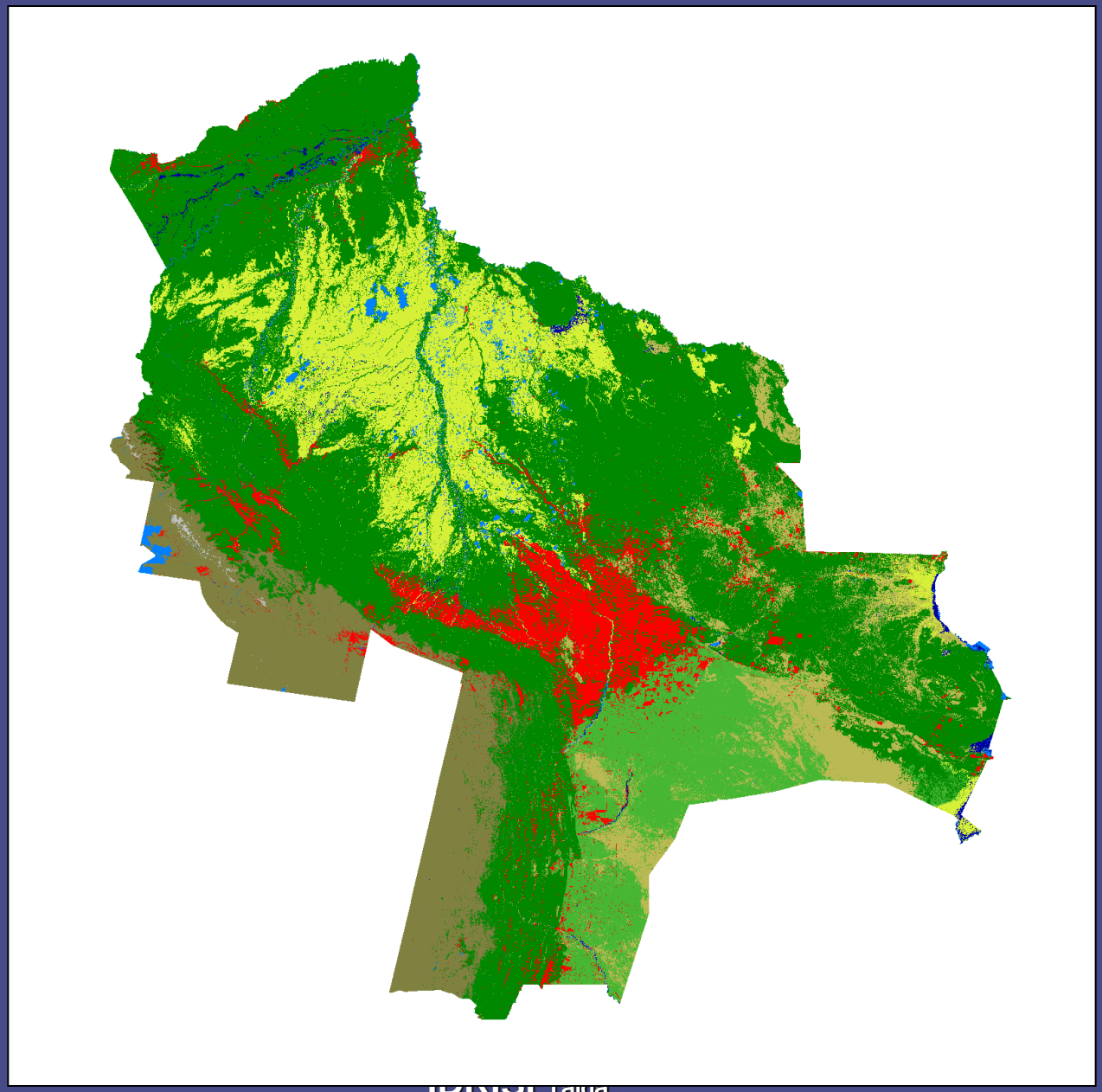
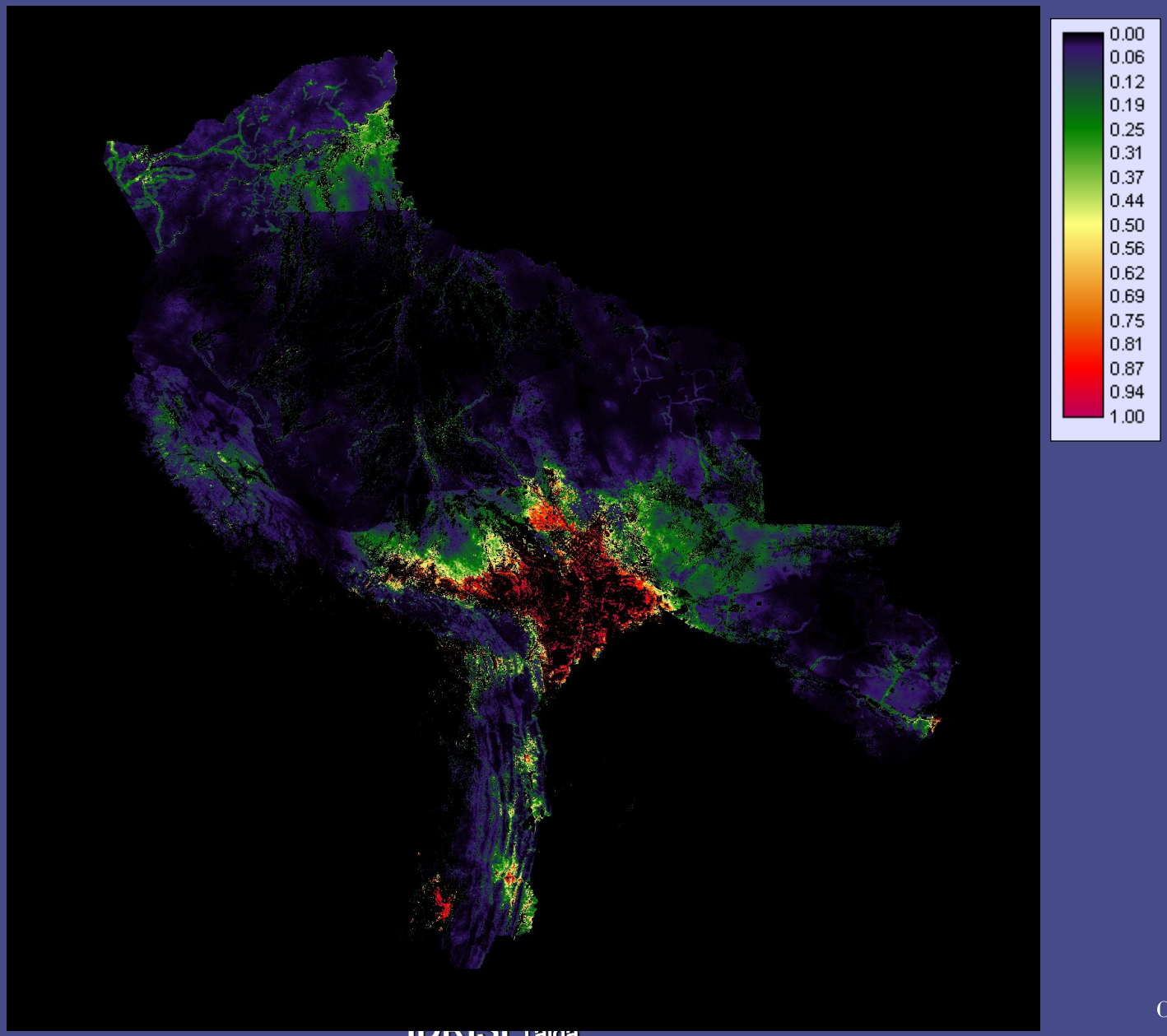
Modeled – 2004 to 2015



Modeled Soft – 2004 to 2015



LCM Change Analysis Tab

You have learned:

- **Cross-tabulation**
- **Visualizing Land Cover Change**
- **Steps in LCM**