

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

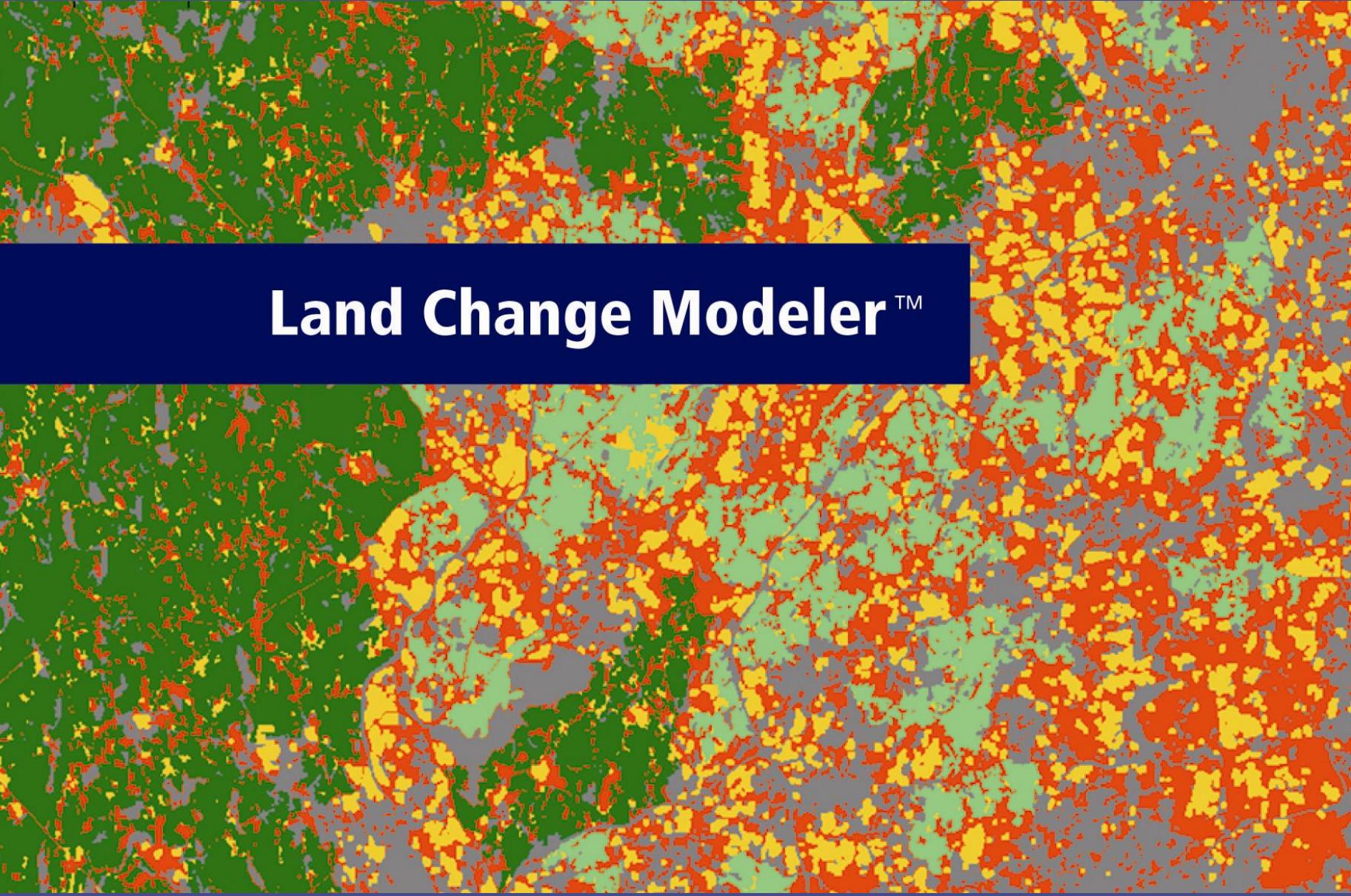


This workshop was generously supported by the American people through the United States Agency for International Development (USAID), under the terms of the TransLinks Cooperative Agreement No.EPP-A-00-06-00014-00 to the Wildlife Conservation Society (WCS). TransLinks is a partnership of WCS, The Earth Institute, Enterprise Works/VITA, Forest Trends and the Land Tenure Center. The contents are the responsibility of the authors and do not necessarily reflect the views of USAID or the United States government.

Taiga

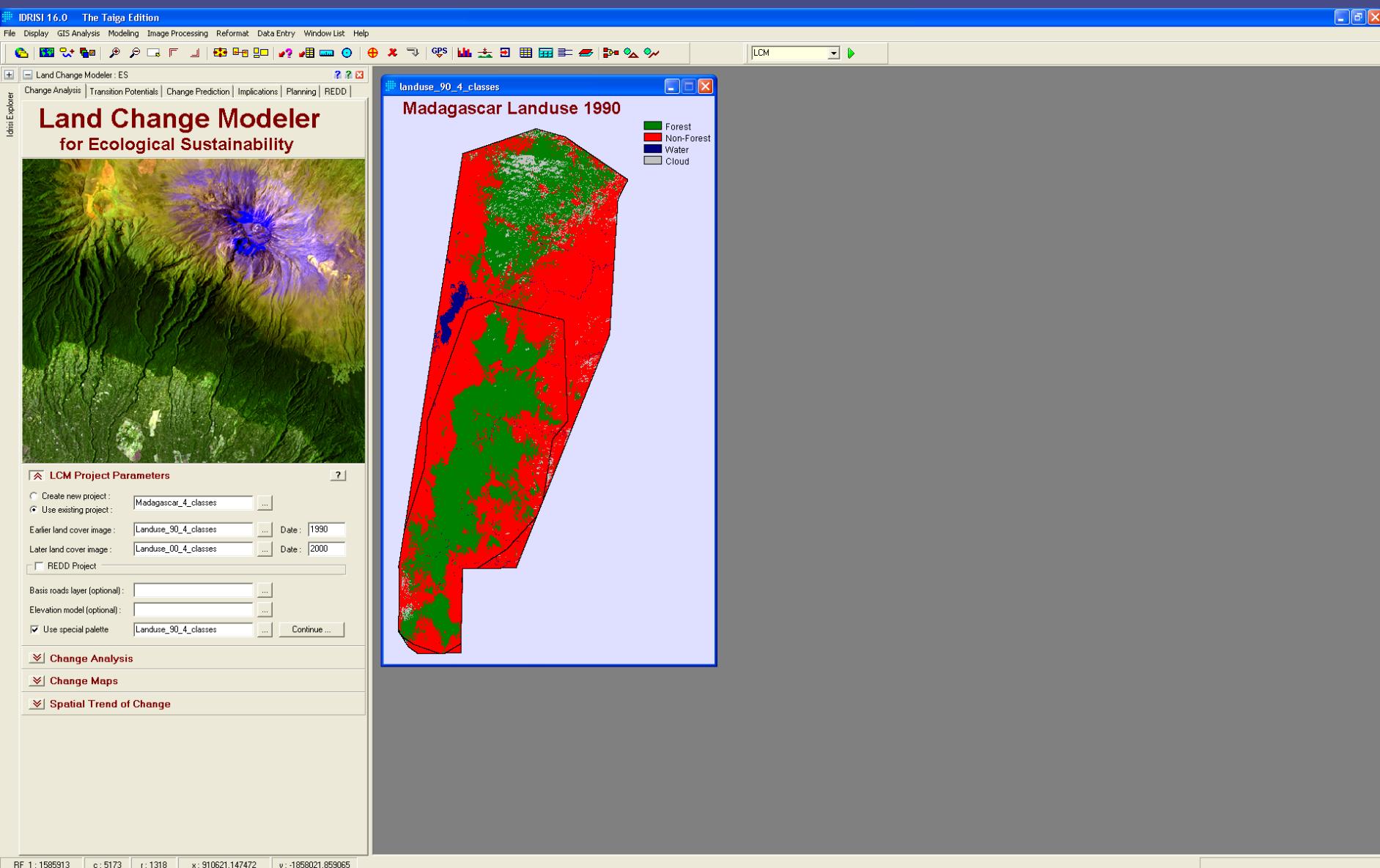


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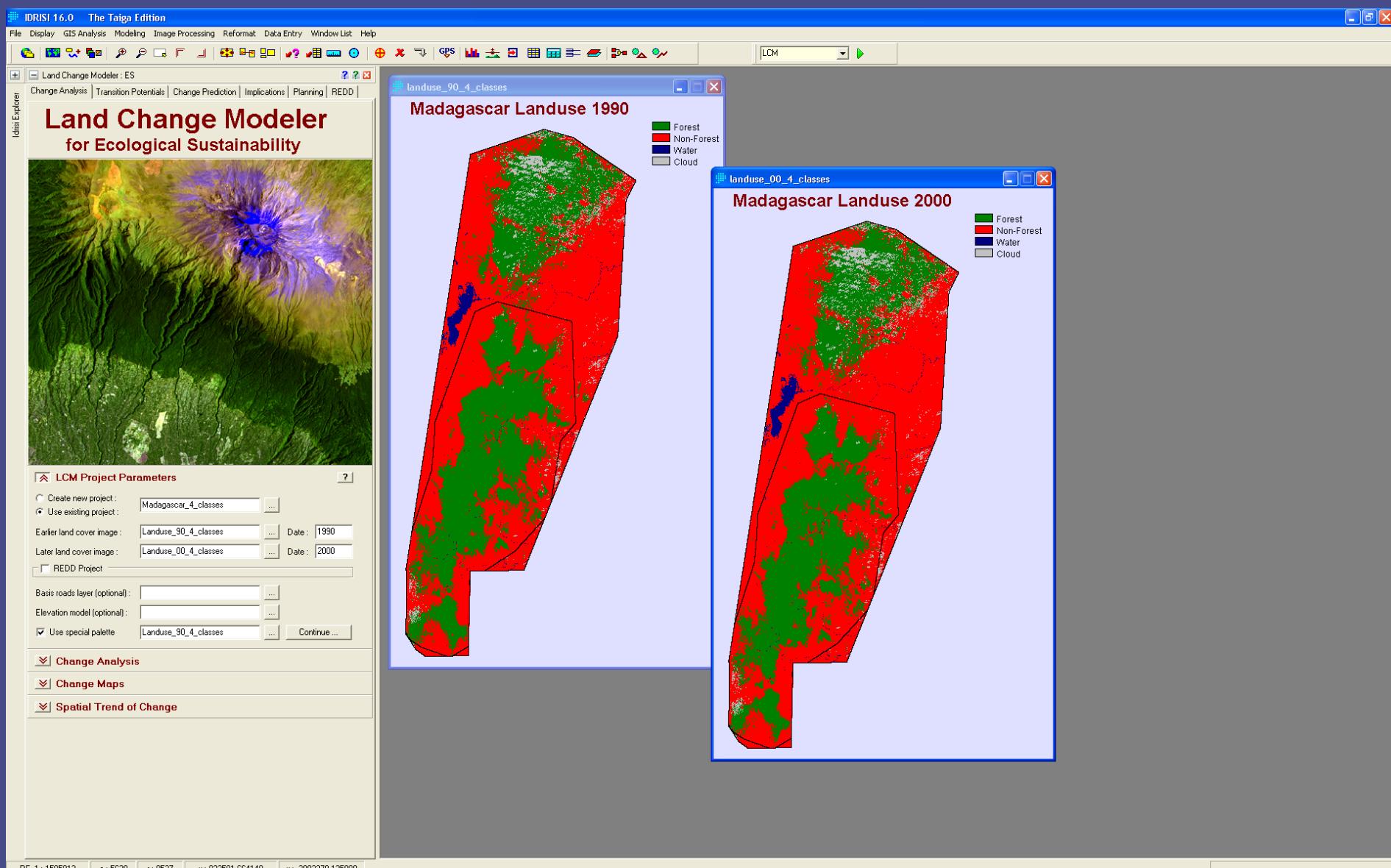


Land Change Modeler™

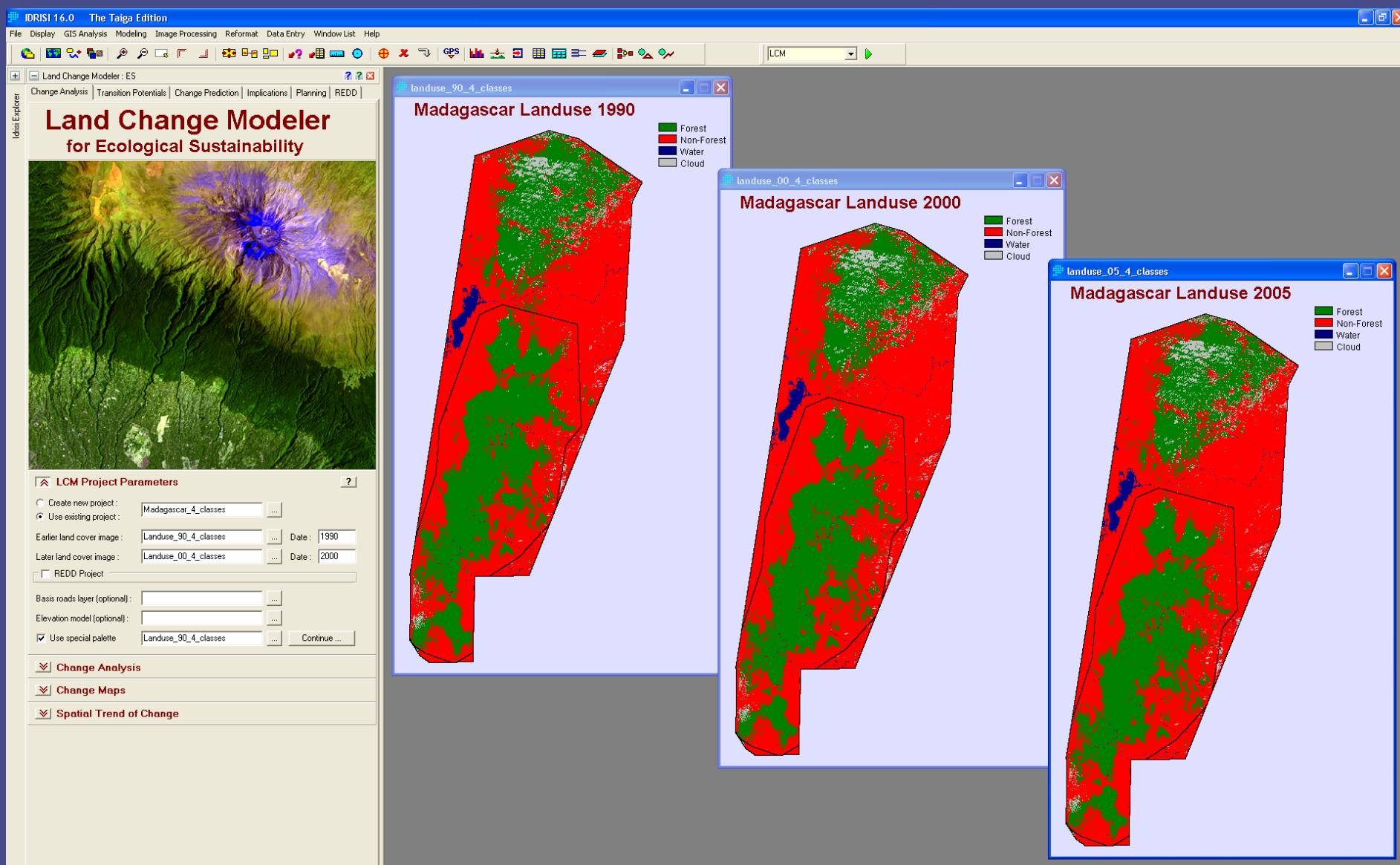
Change Analysis – Project Parameters – Validation



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Change Analysis – Project Parameters – Validation



Change Analysis – Change Analysis – Validation

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Land Change Modeler : ES

Change Analysis | Transition Potentials | Change Prediction | Implications | Planning | REI | Current LCM tab | Help

LCM Project Parameters

Create new project : Madagascar_4_classes ...

Use existing project : Madagascar_4_classes ...

Earlier land cover image : Landuse_90_4_classes ... Date : 1990

Later land cover image : Landuse_00_4_classes ... Date : 2000

REDD Project

Basis roads layer (optional) : ...

Elevation model (optional) : ...

Use special palette : Landuse_90_4_classes ... Continue ...

Change Analysis

Gains and losses by category Units : cells

Net change by category

Contributors to net change experienced by : Forest

Gains and losses between 1990 and 2000

Category	Gain / Loss	Value
Cloud	Gain	~800,000
Water	Loss	~100,000
Non-Forest	Gain	~800,000
Forest	Loss	~800,000

Change Maps

Map changes Ignore transitions less than 1000 cells

Map persistence

Map gains / losses in : Non-Forest Include Persistence

Map the transition from : Forest to : Non-Forest

Exchanges between : Non-Forest and Non-Forest

Output name (optional) : ... Create Map

Spatial Trend of Change

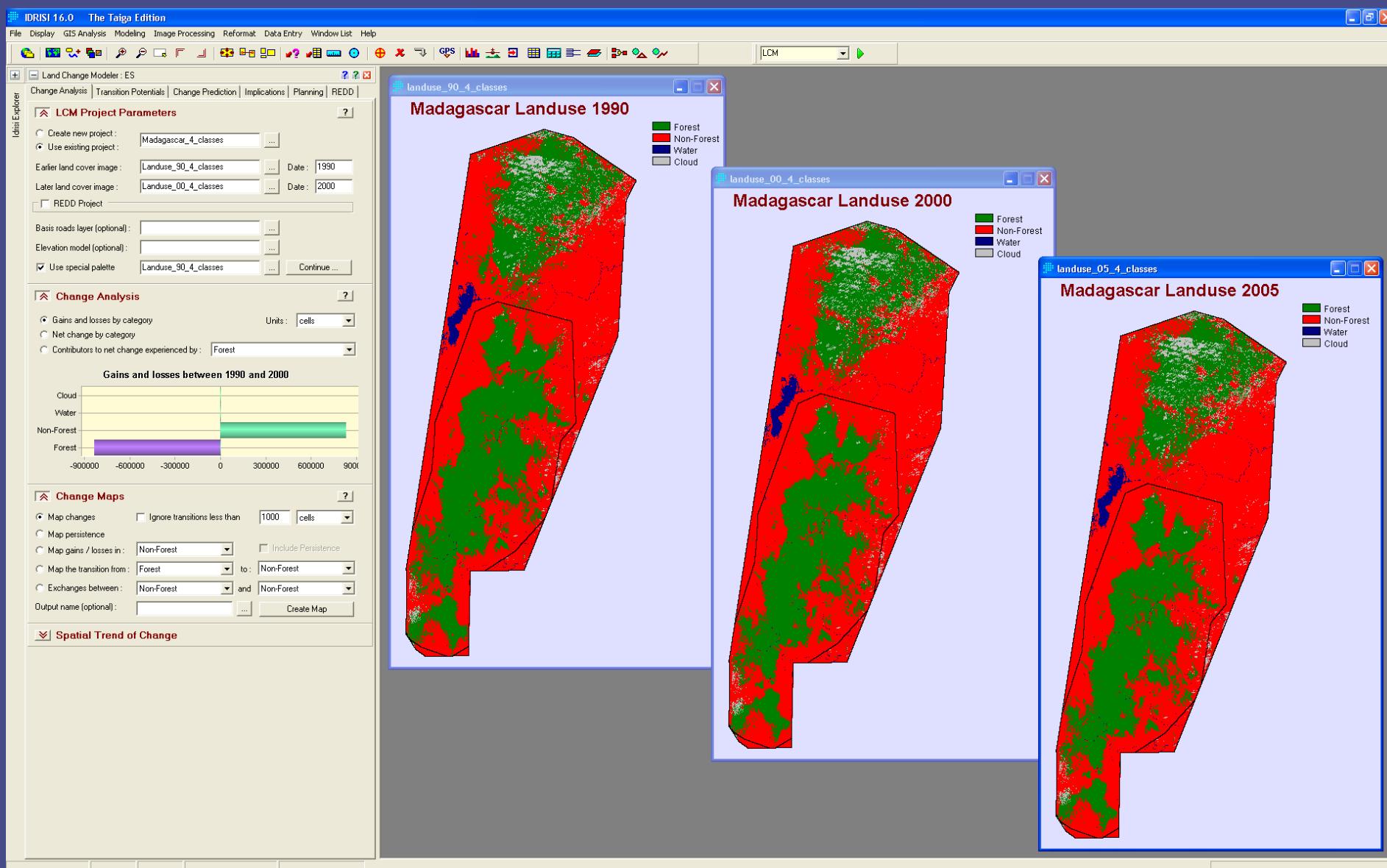
Landuse_90_4_classes

Madagascar Landuse 1990

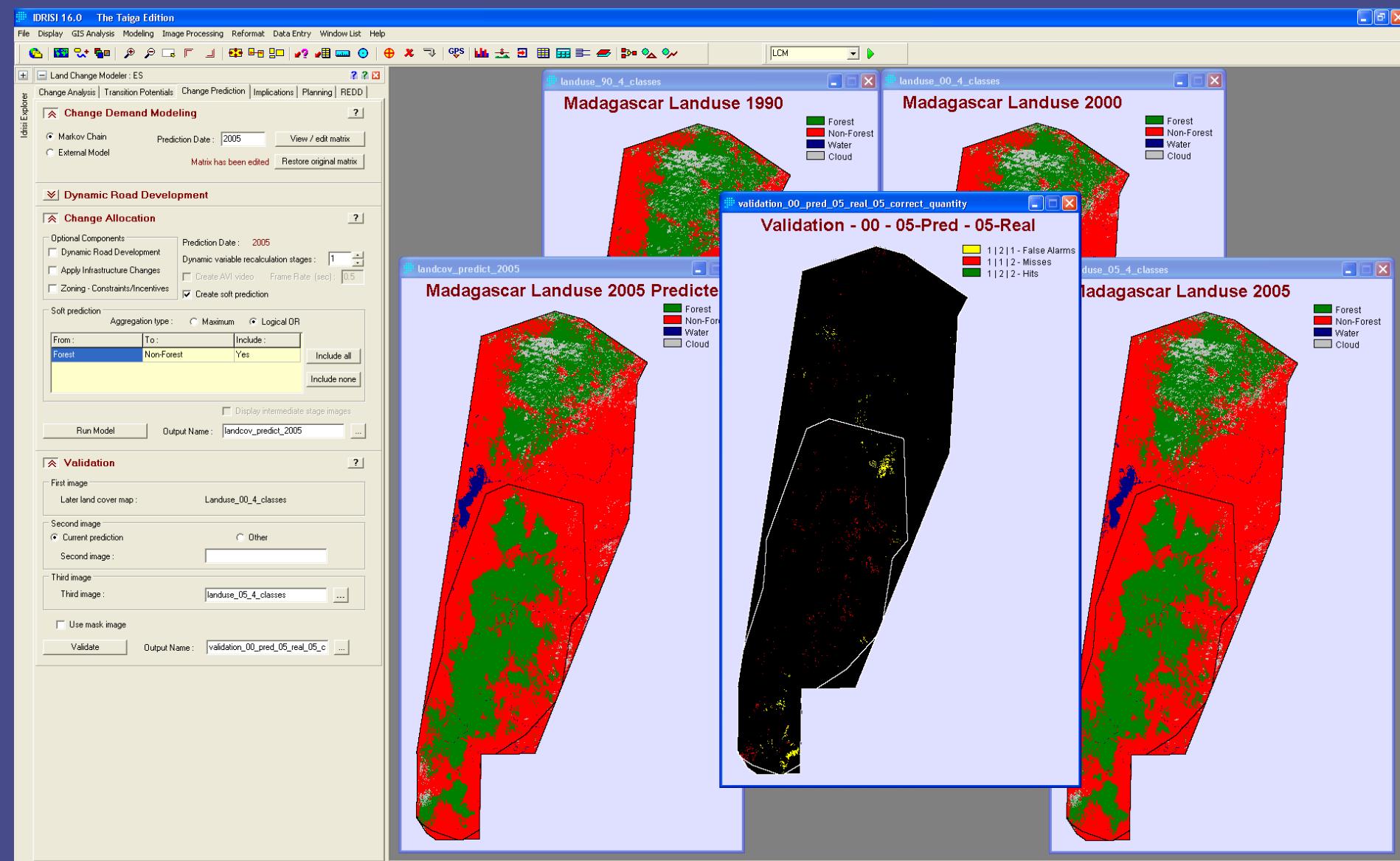
Landuse_00_4_classes

Madagascar Landuse 2000

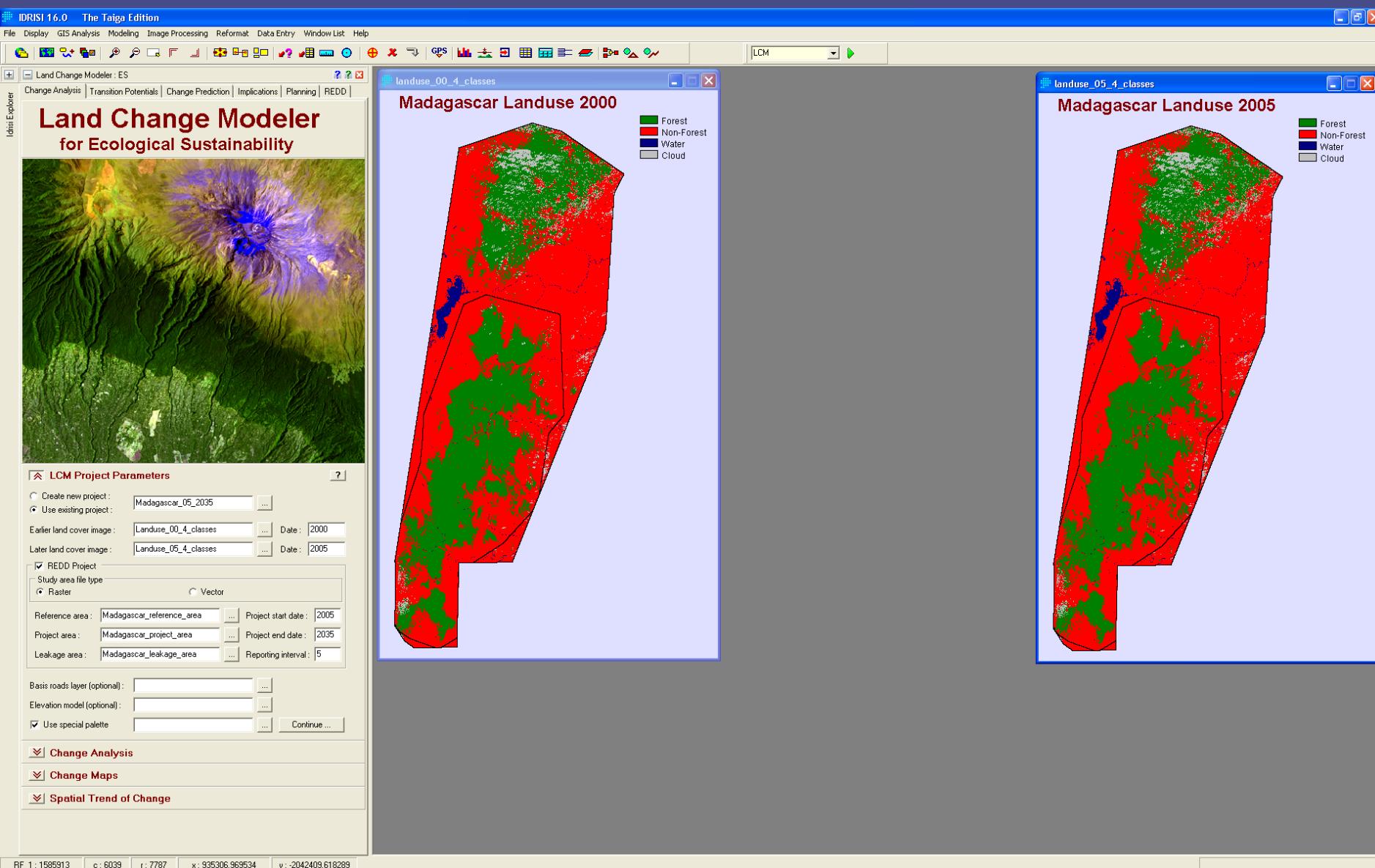
Change Analysis – Change Analysis – Validation



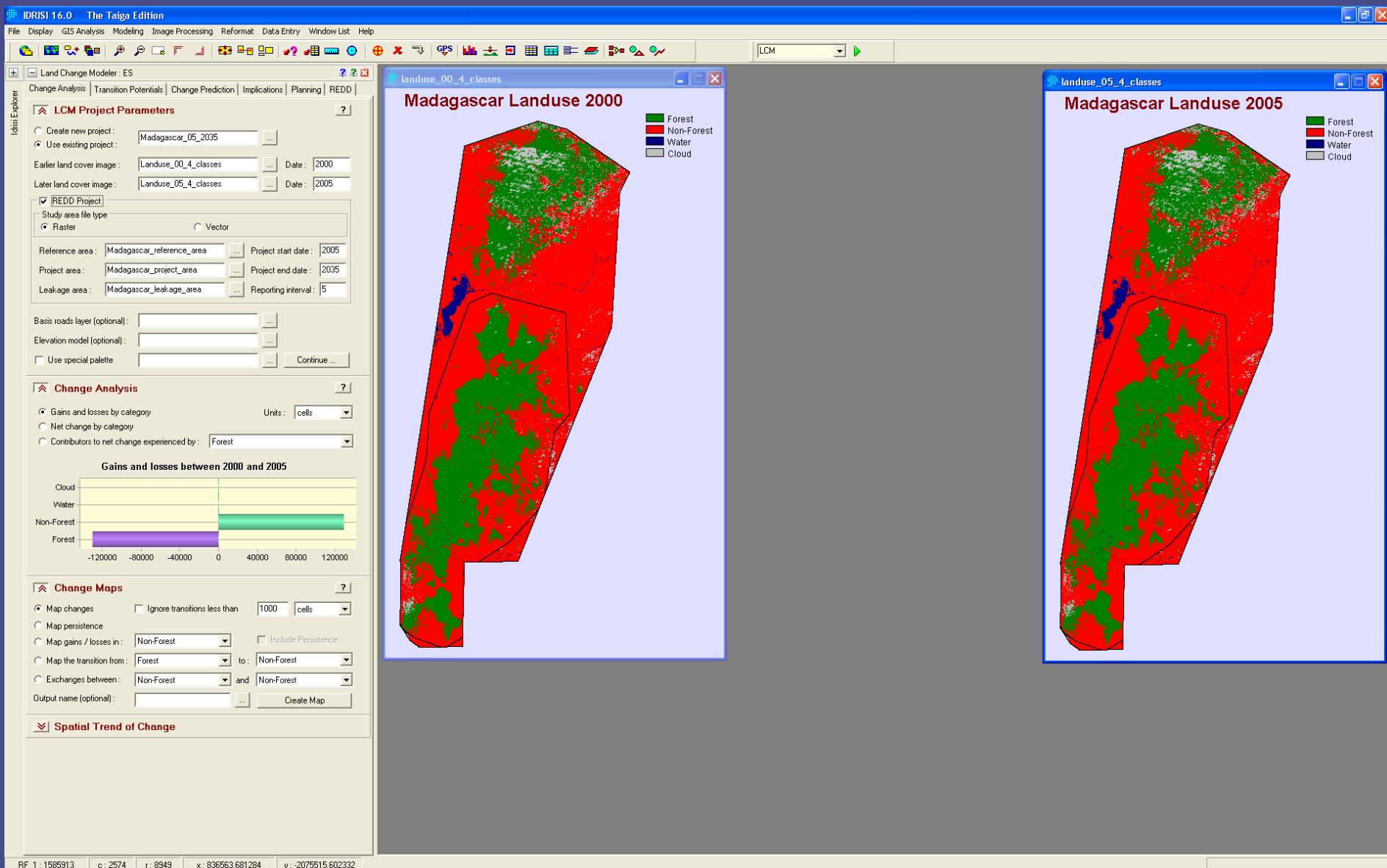
Change Prediction – Validation



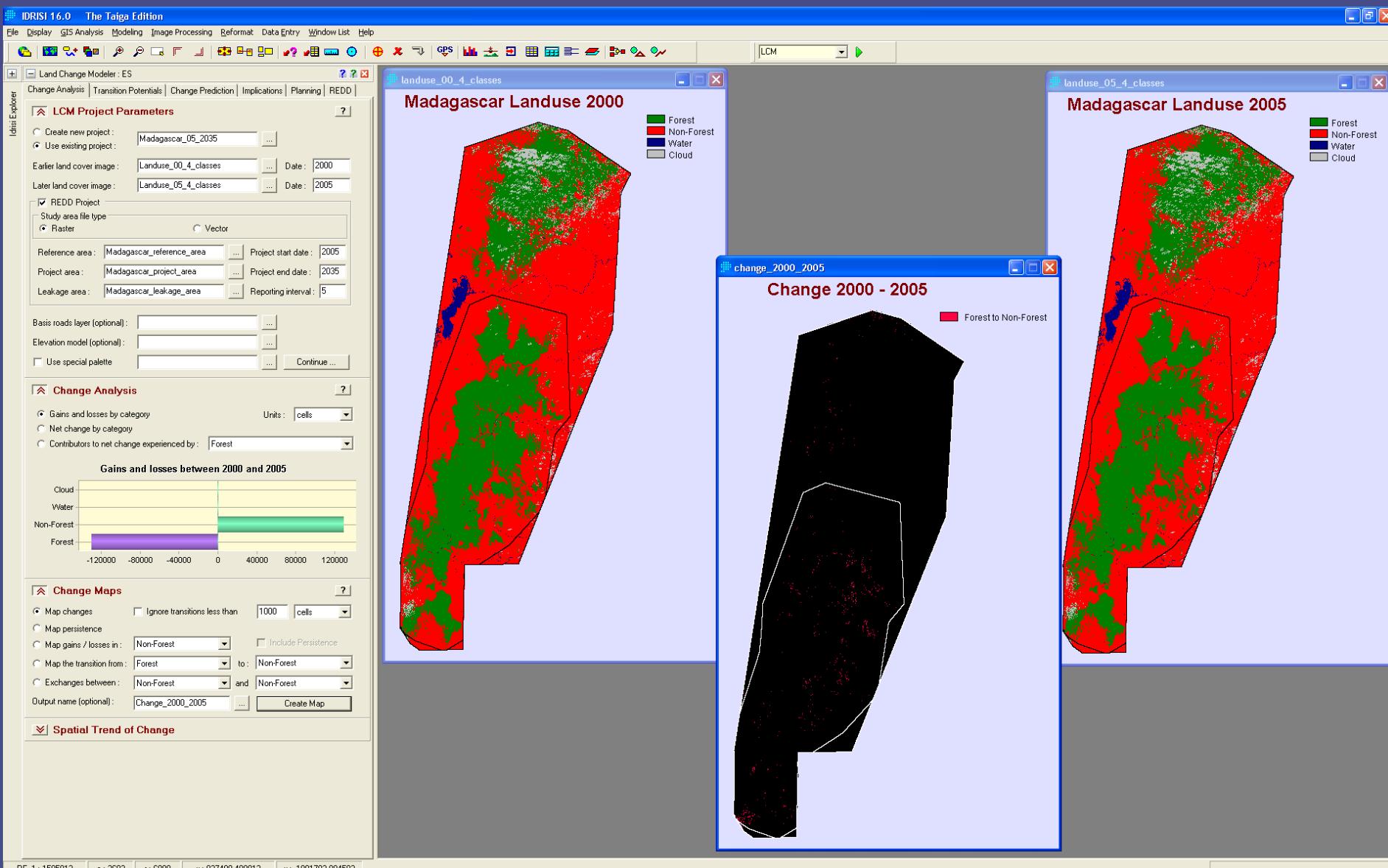
Change Analysis – Project Parameters



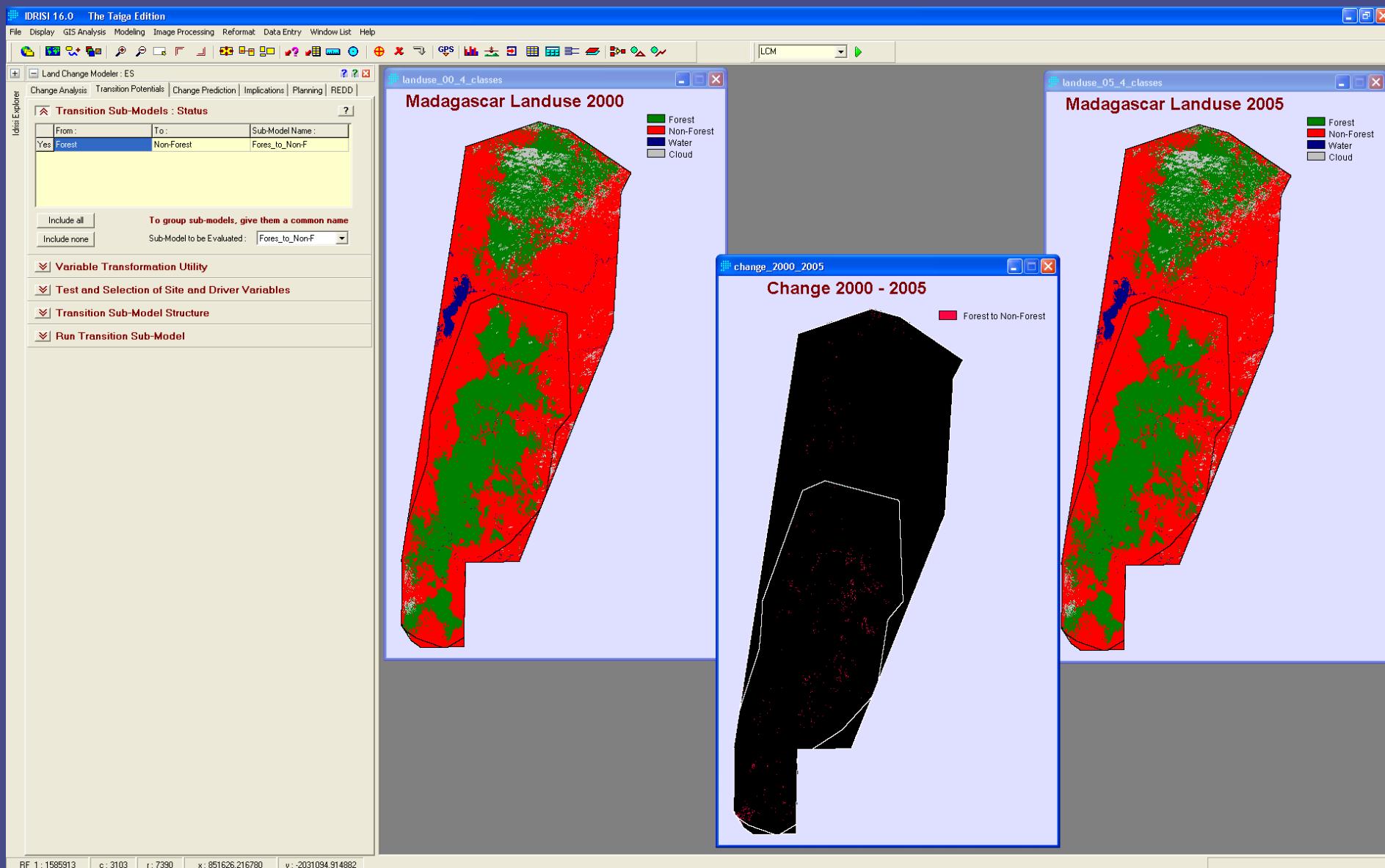
Change Analysis – Change Analysis



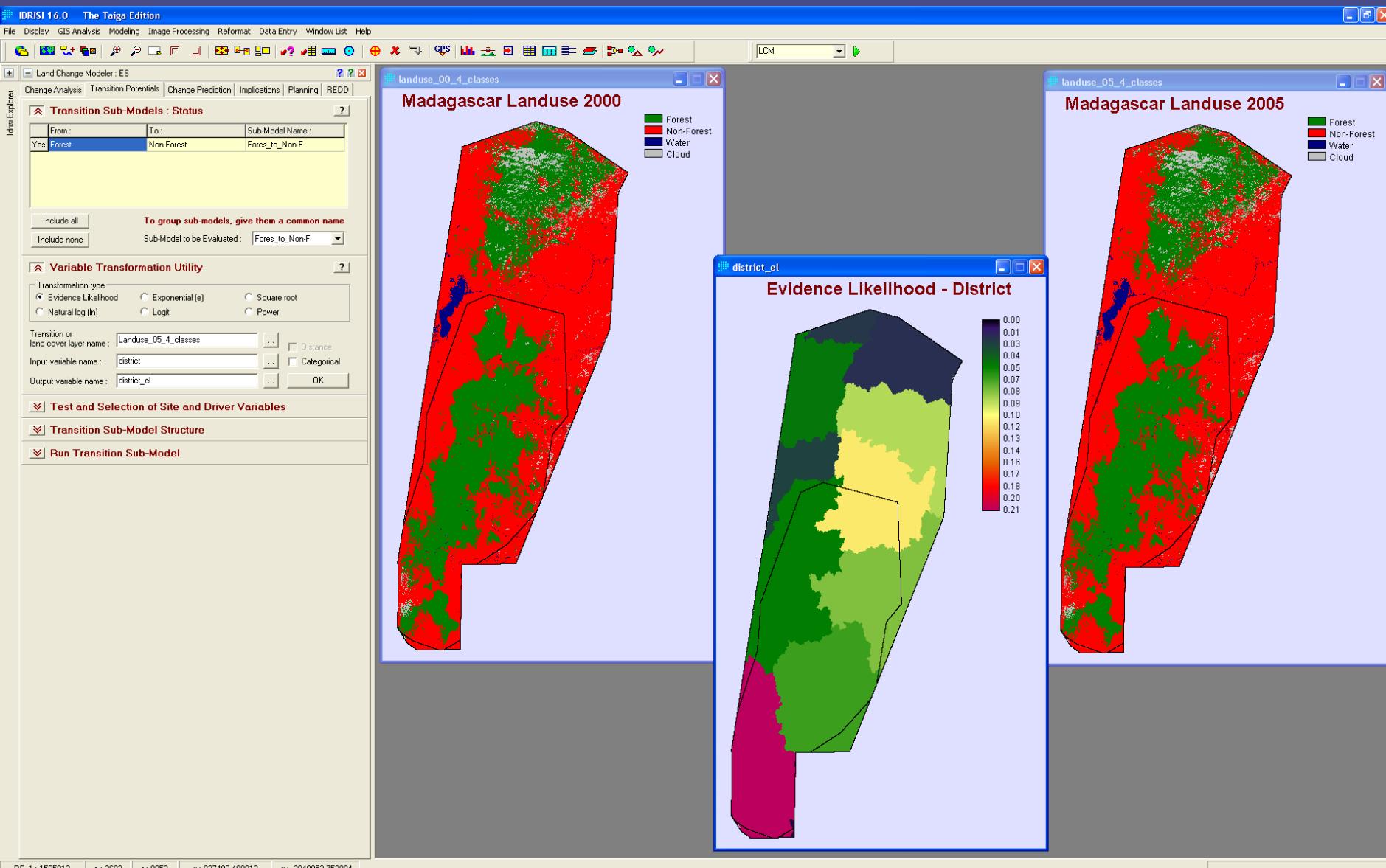
Change Analysis – Change Maps



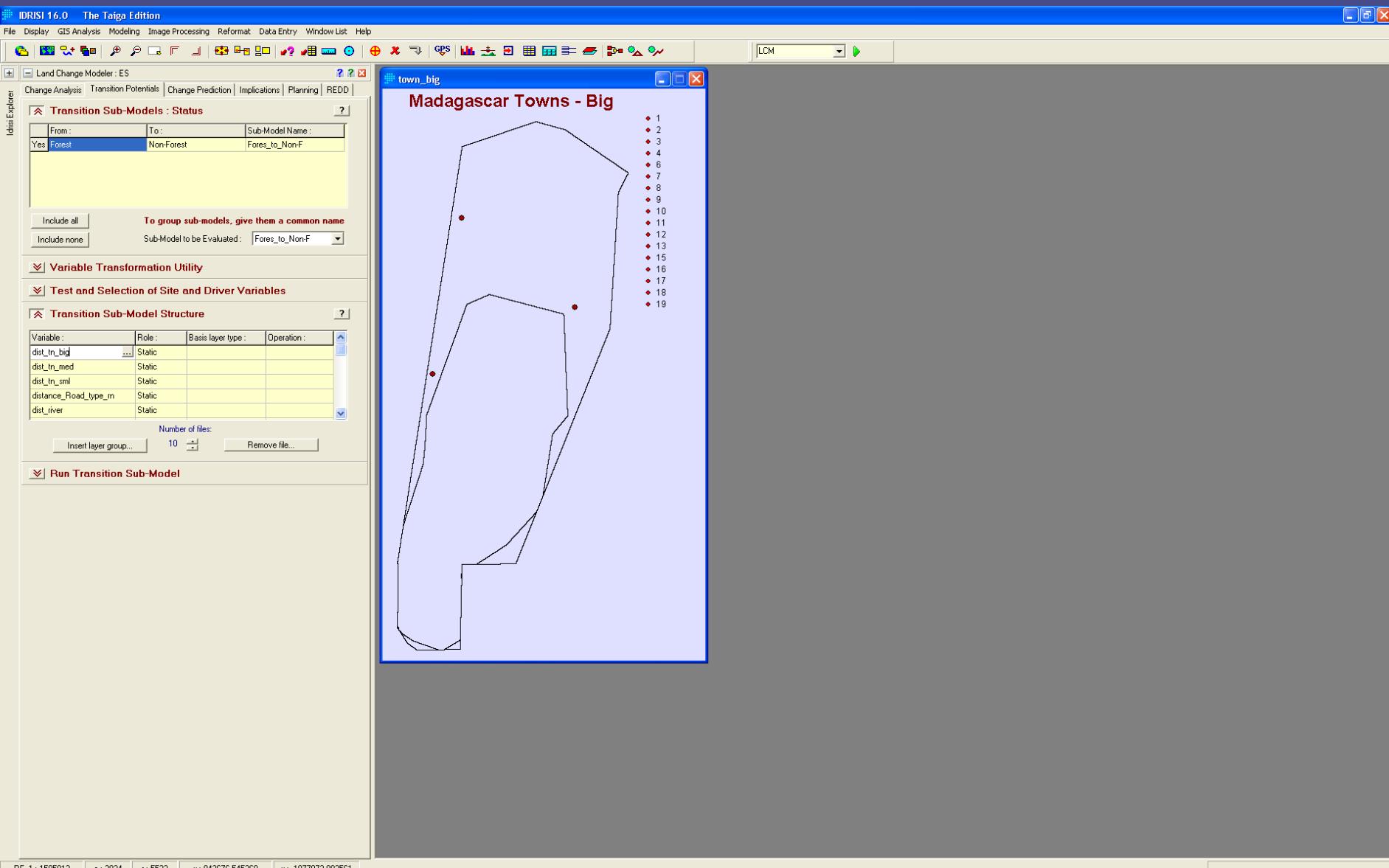
Transition Potential – Transition Sub-Models



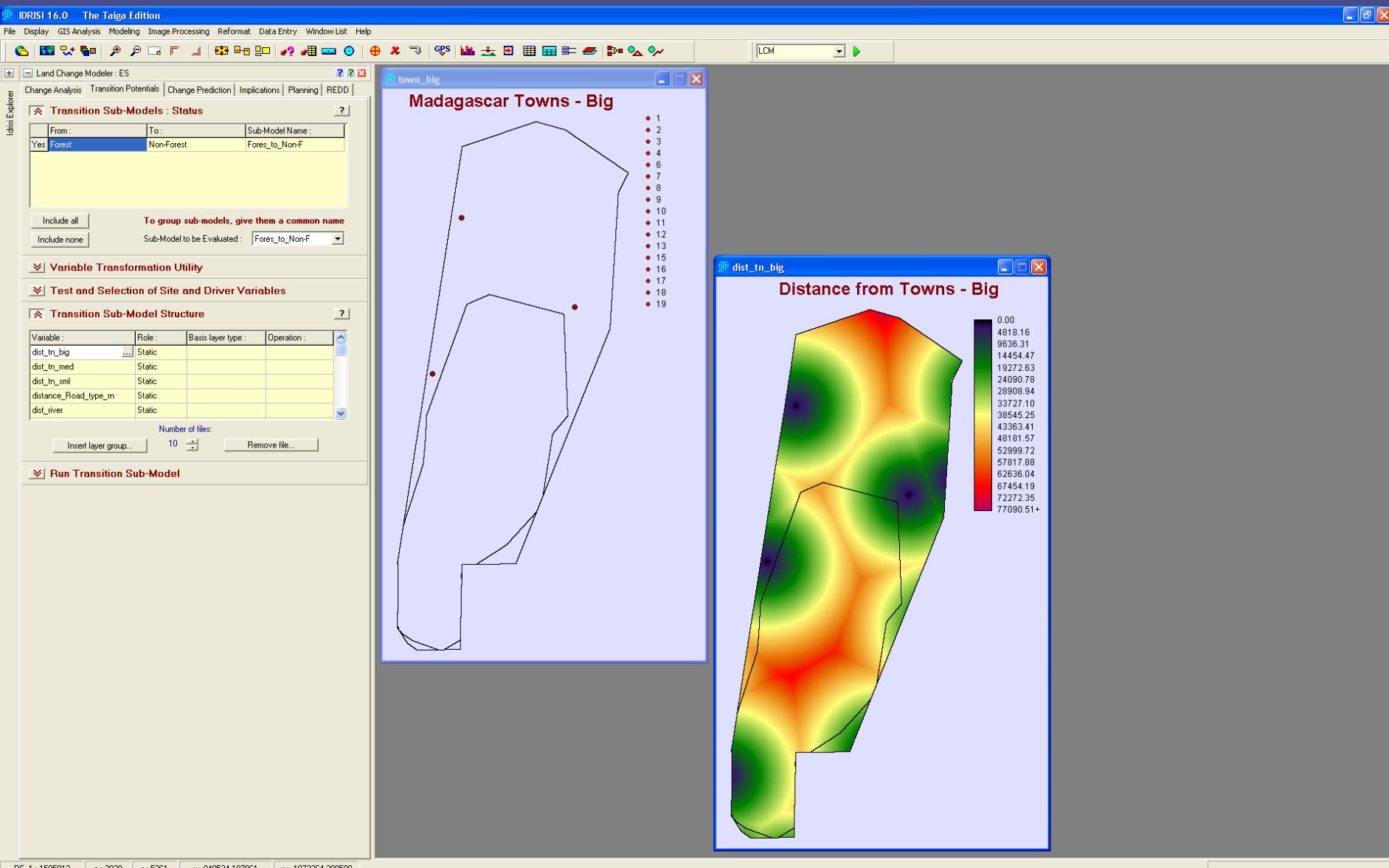
Transition Potential – Variable Transformation



Transition Potential – Variable Development

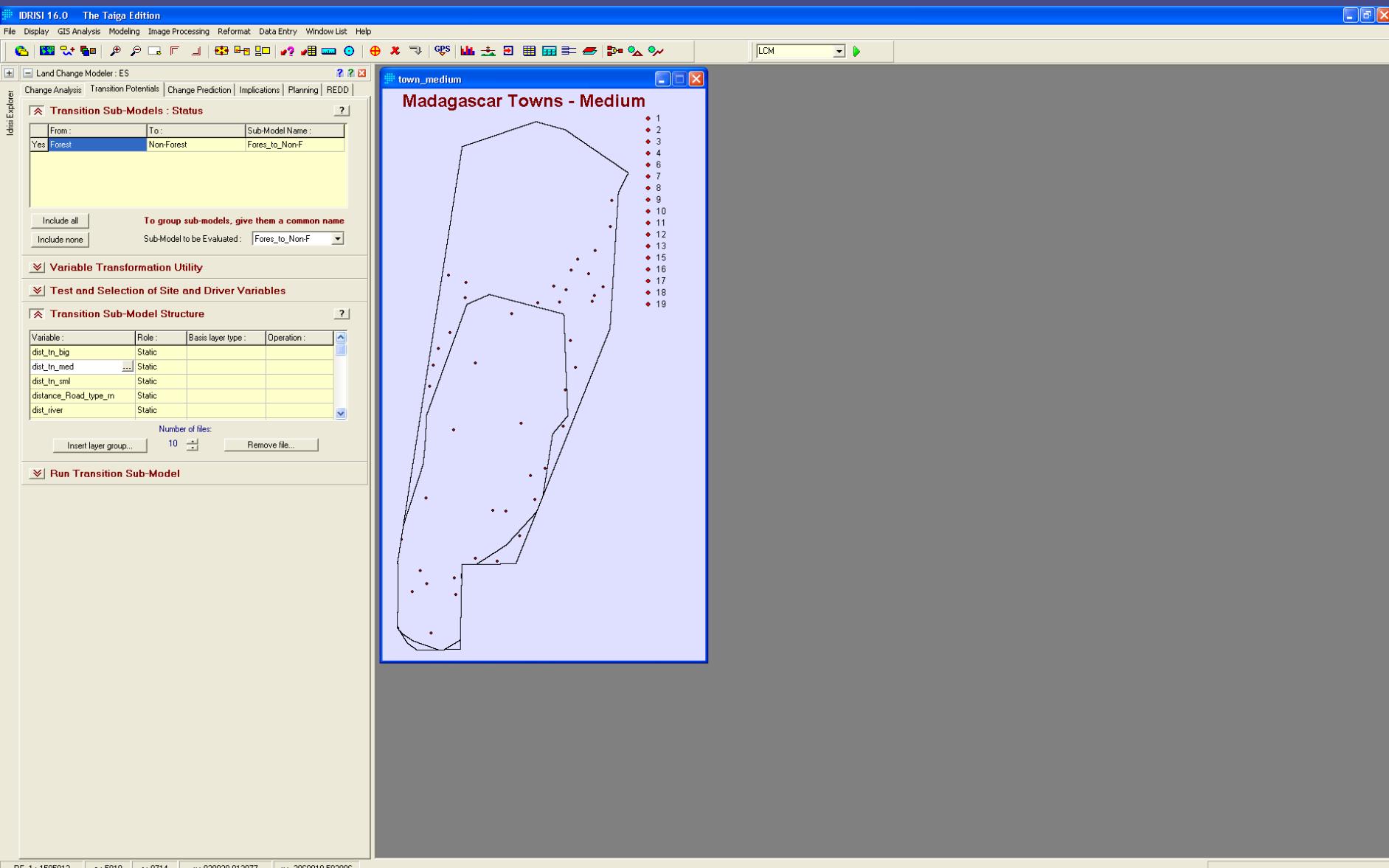


Transition Potential – Variable Development

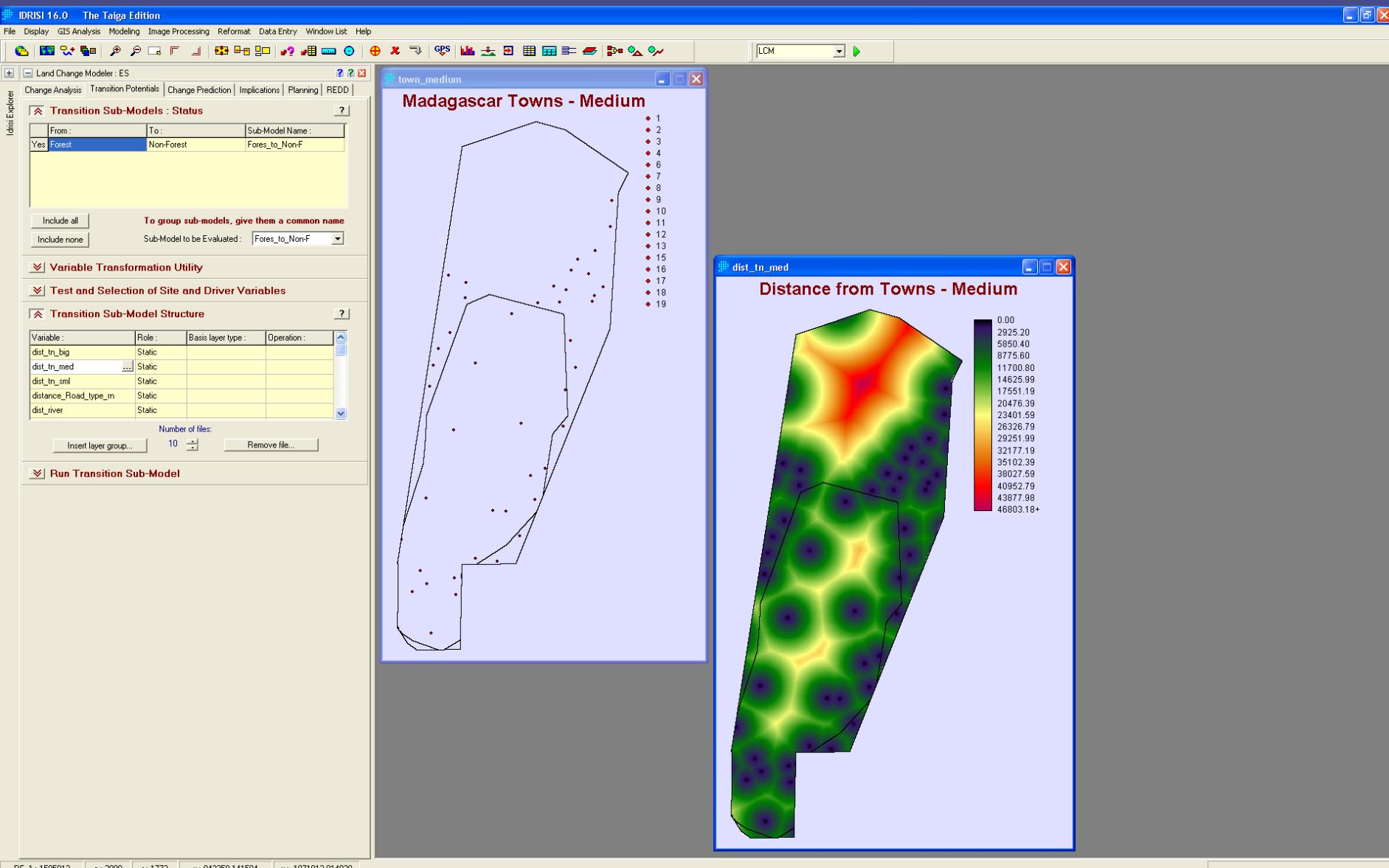


RF 1 : 1585913 c : 3029 r : 5361 x : 849534.197961 y : -1973264.208580

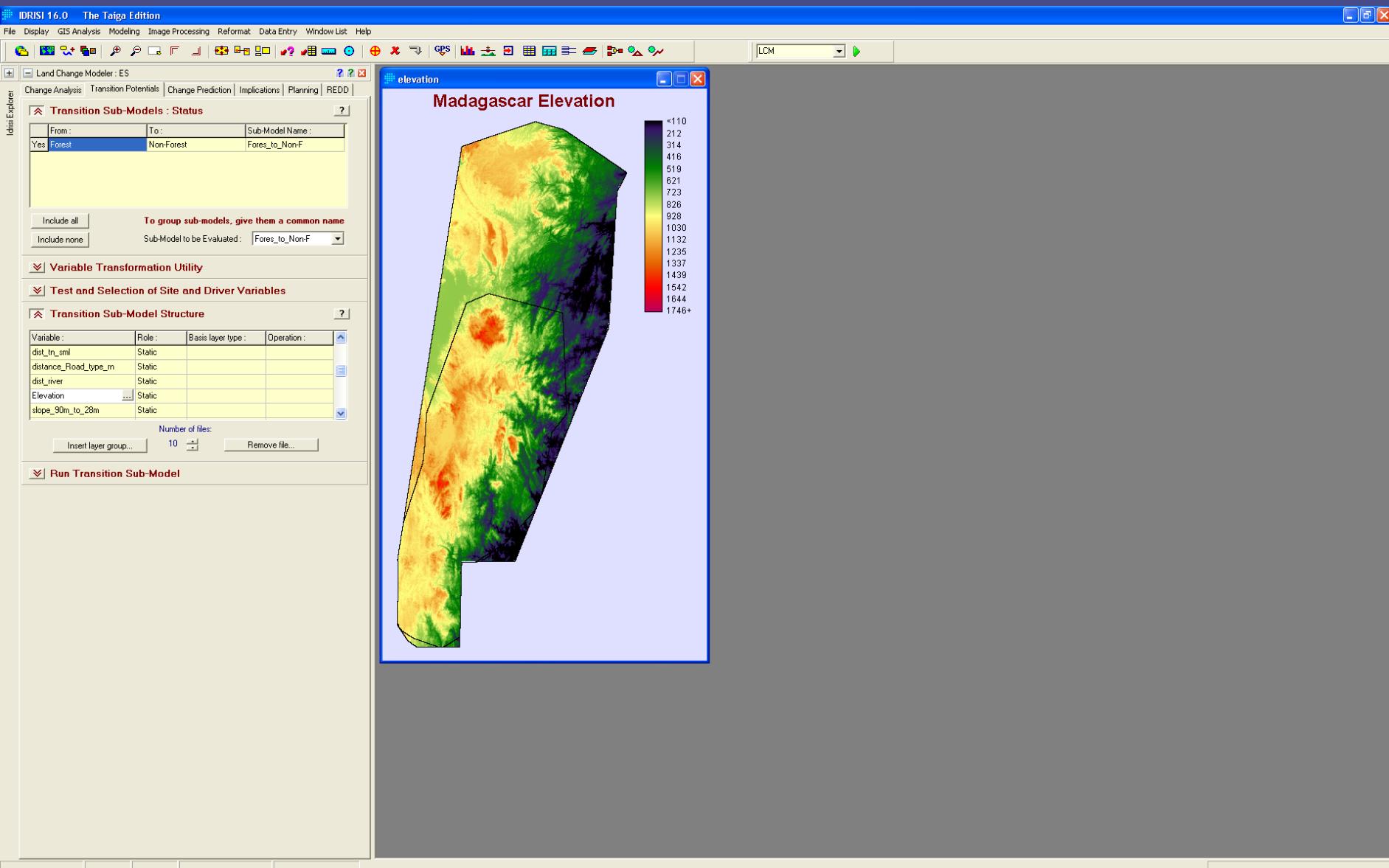
Transition Potential – Variable Development



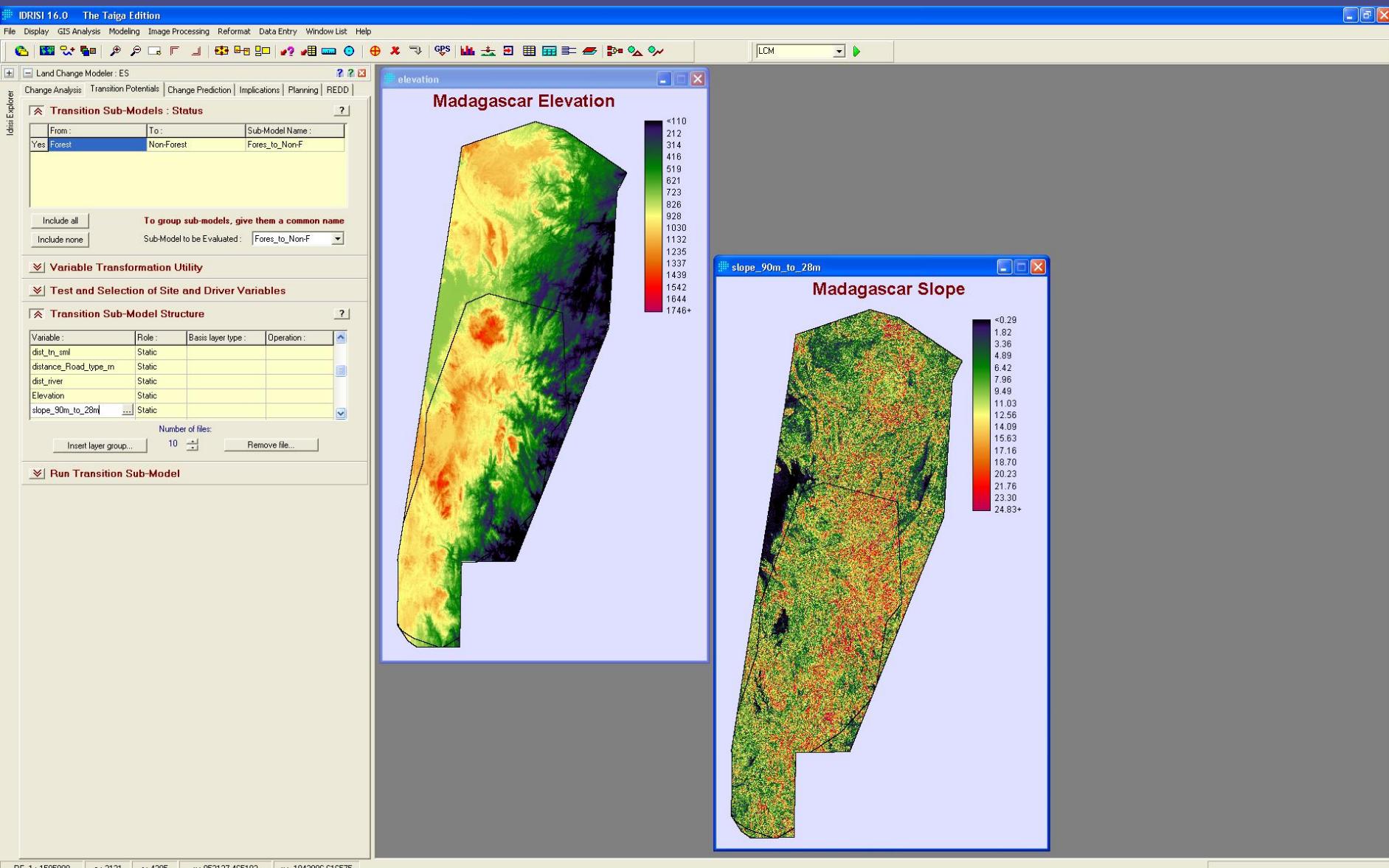
Transition Potential – Variable Development



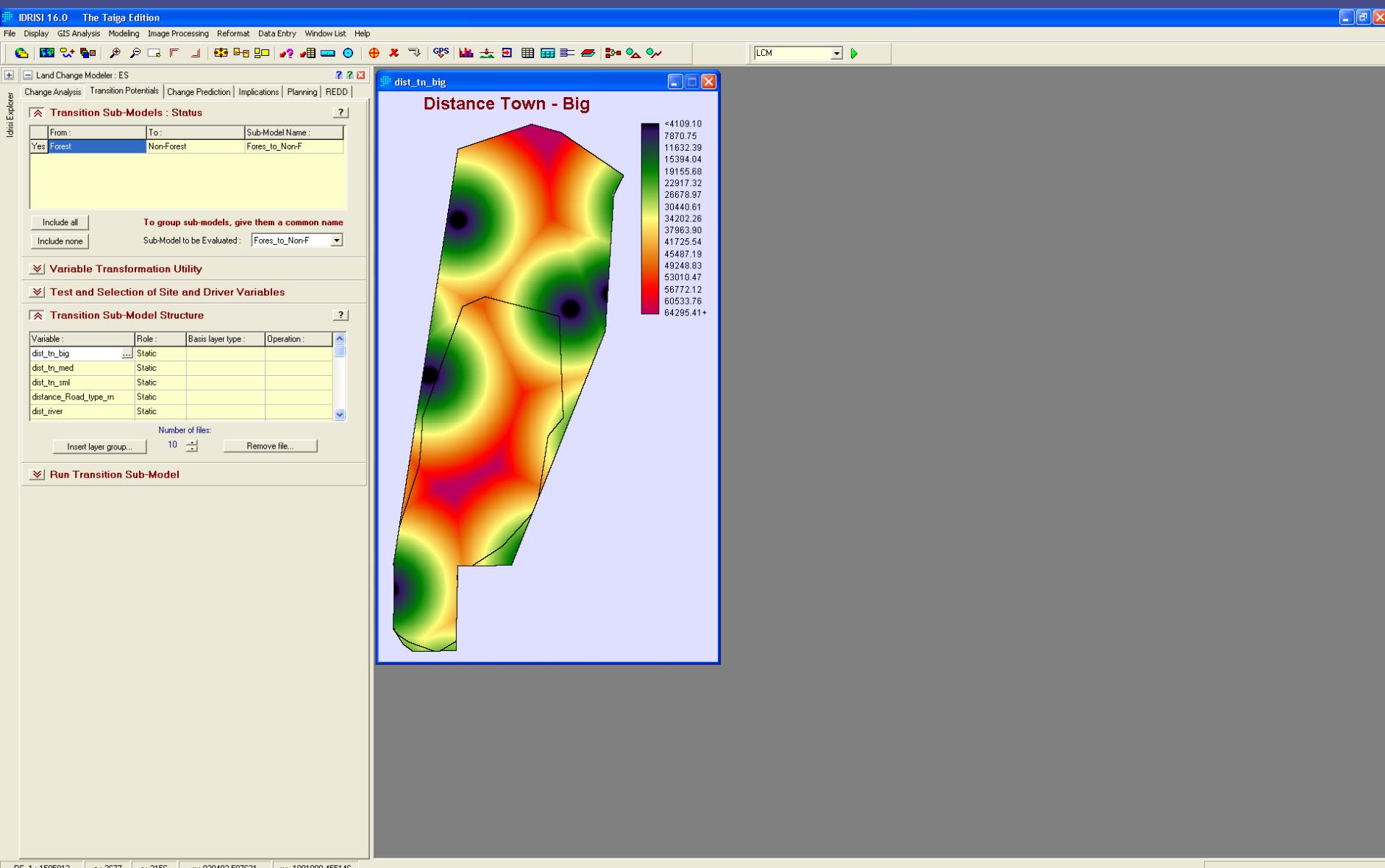
Transition Potential – Variable Development



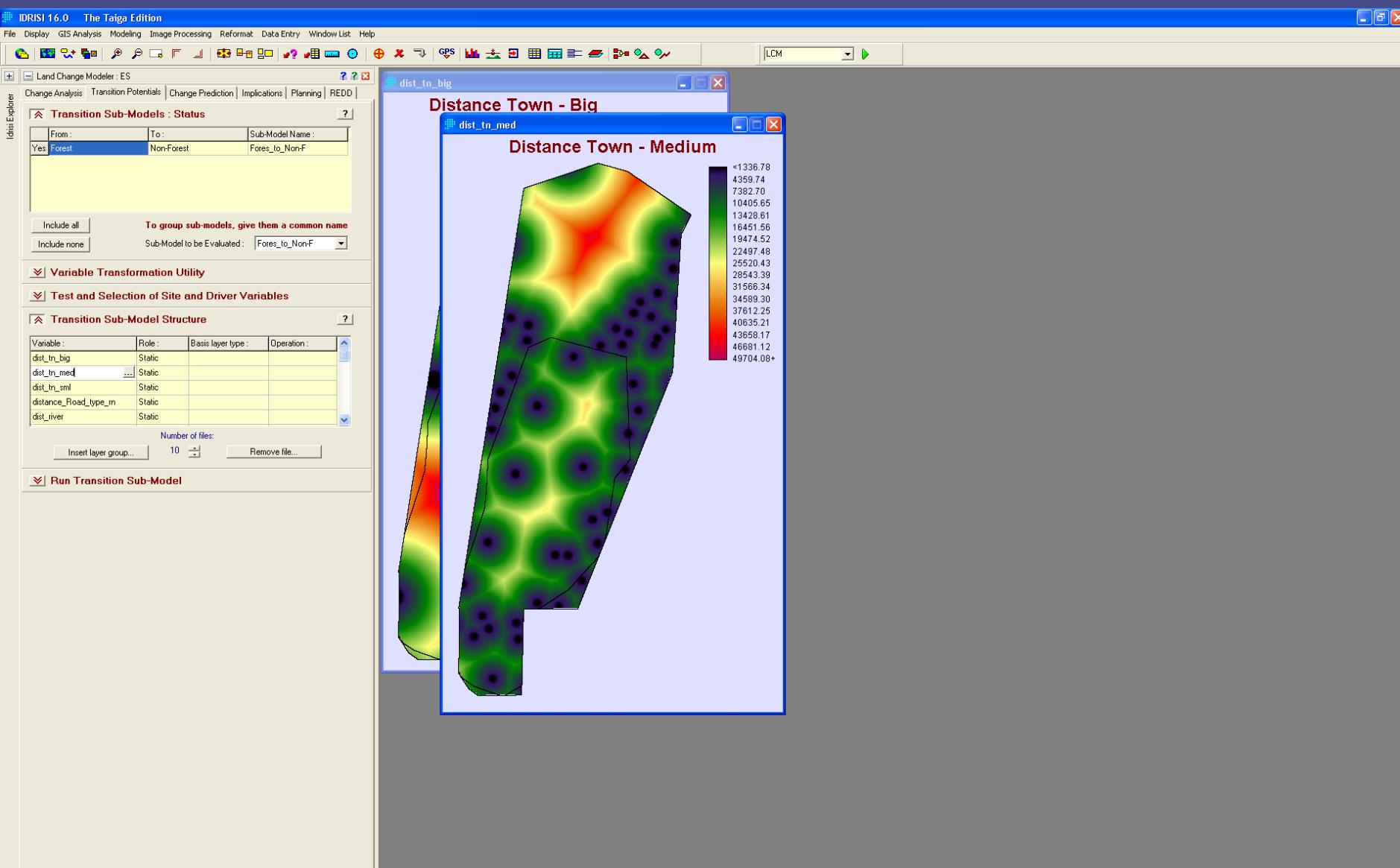
Transition Potential – Variable Development



Transition Potential – Transition Sub-Model Structure

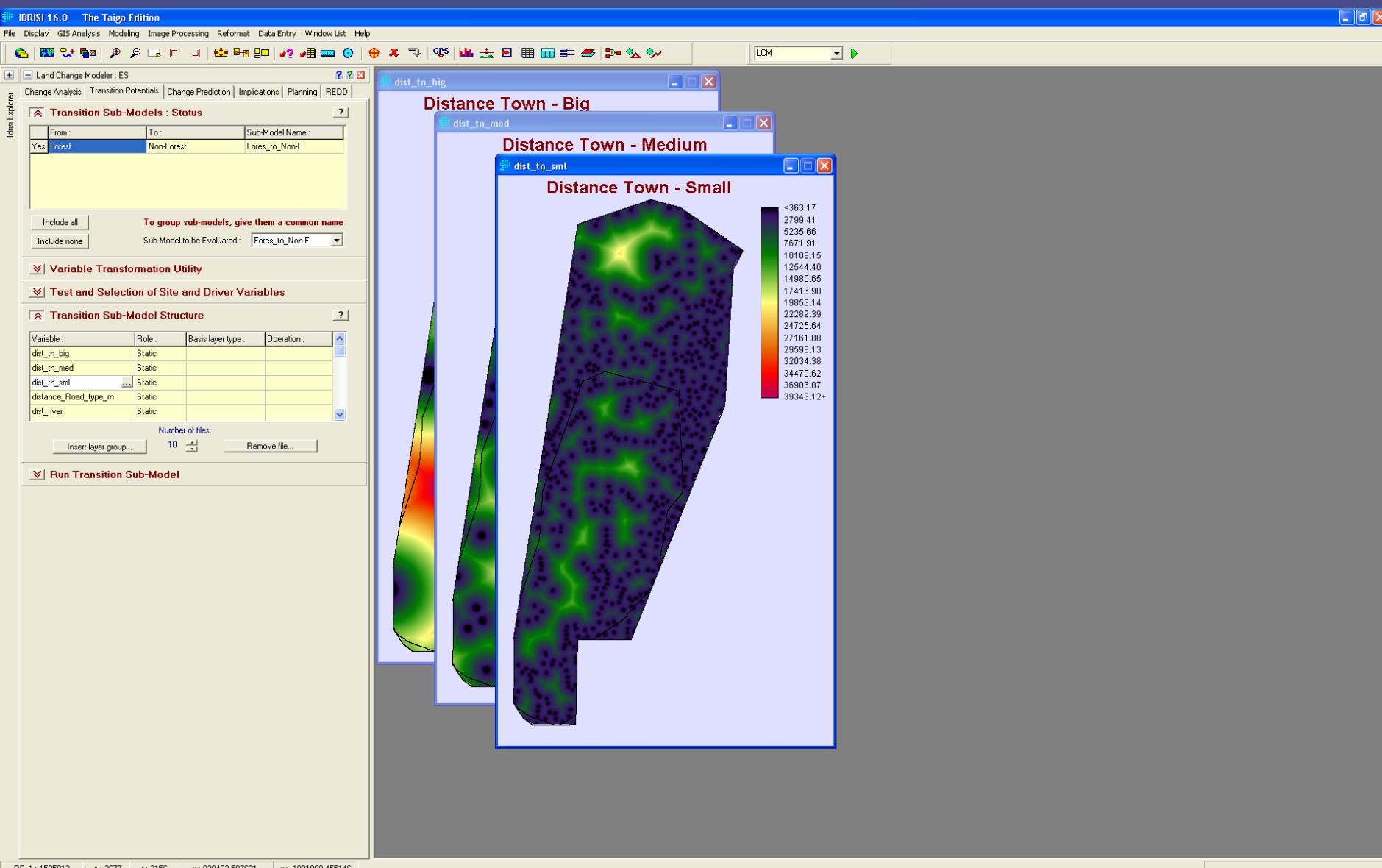


Transition Potential – Transition Sub-Model Structure

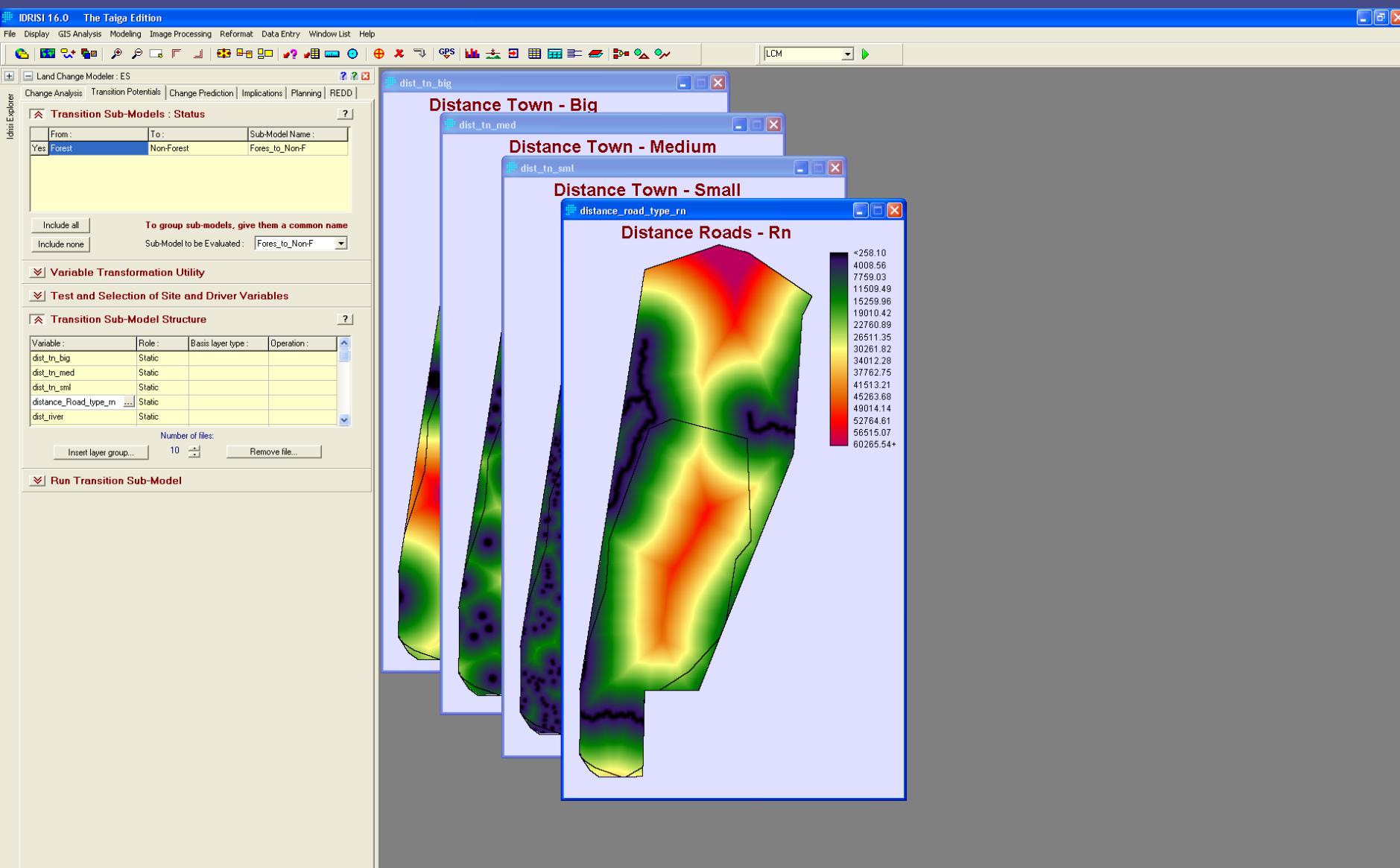


RF 1 : 1585913 c : 2677 r : 2156 x : 839432.507631 y : -1881908.455146

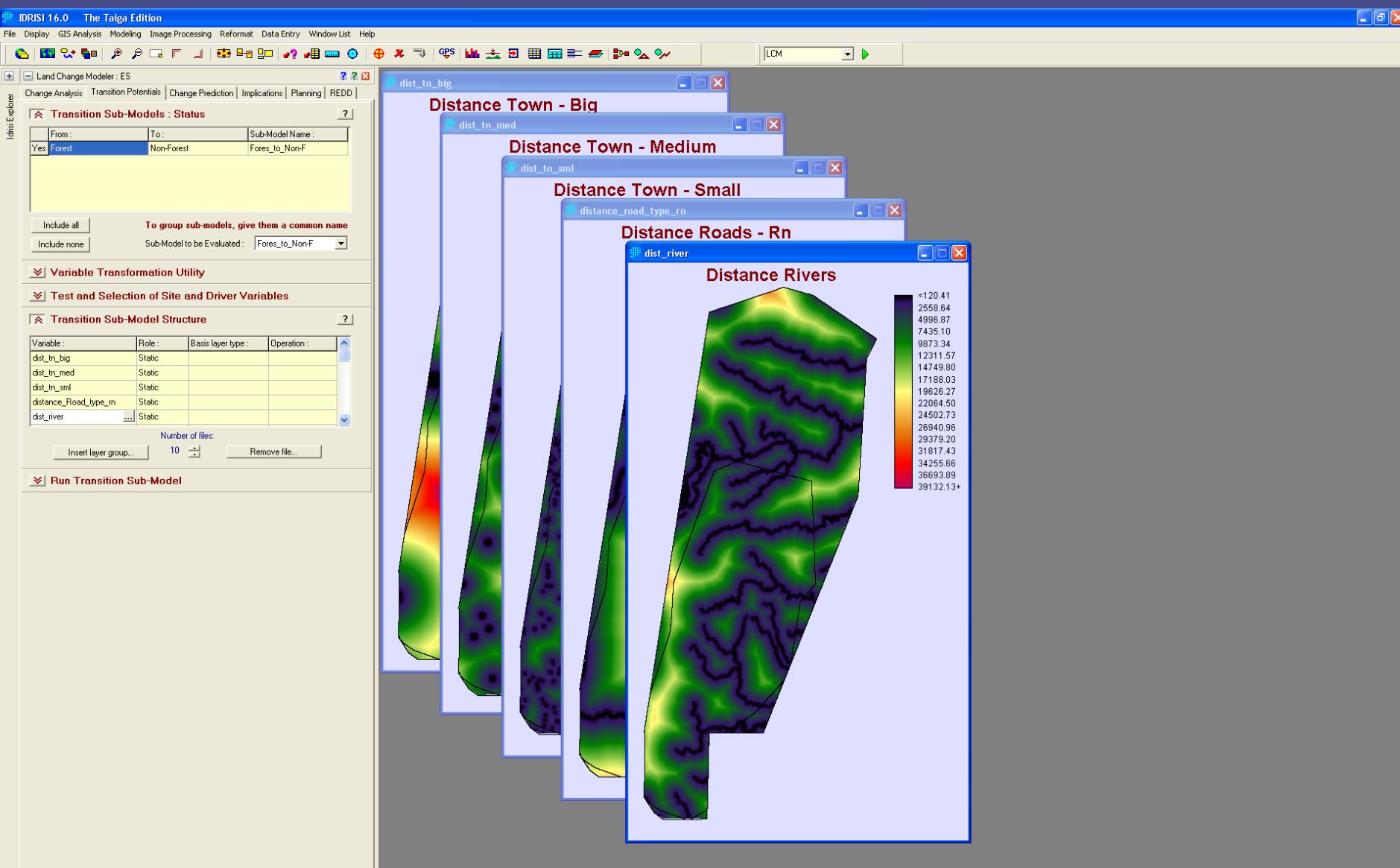
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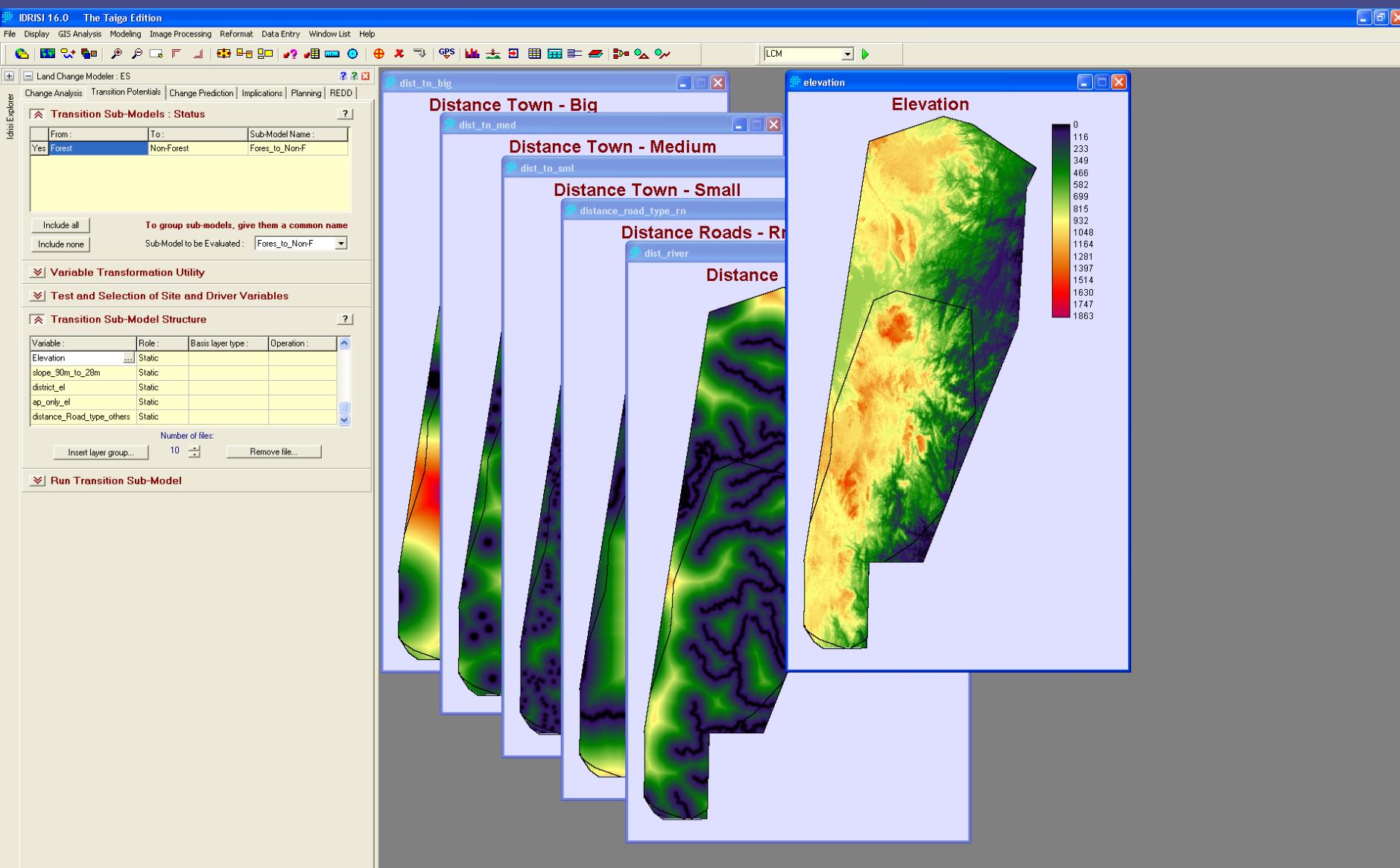


Transition Potential – Transition Sub-Model Structure

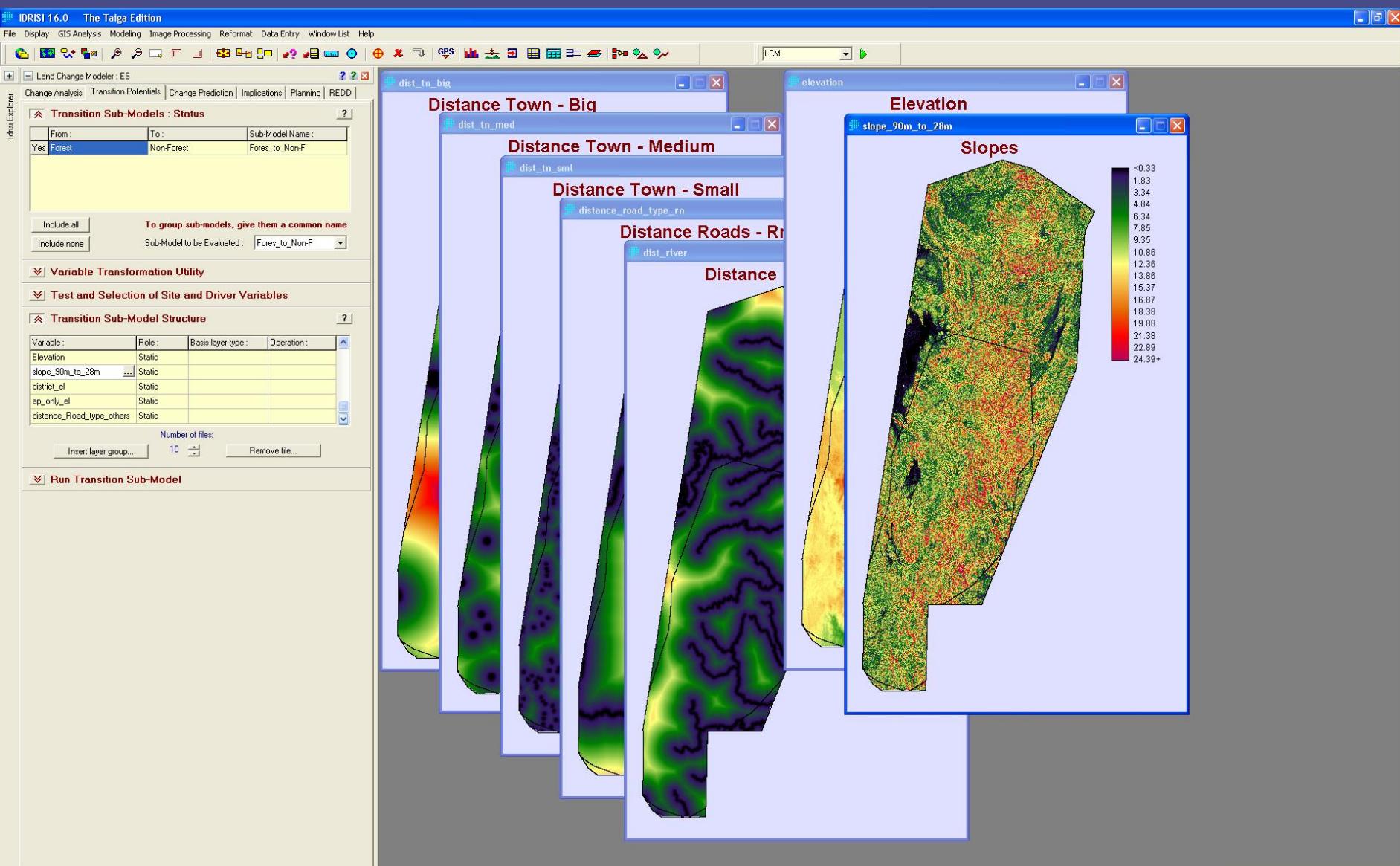


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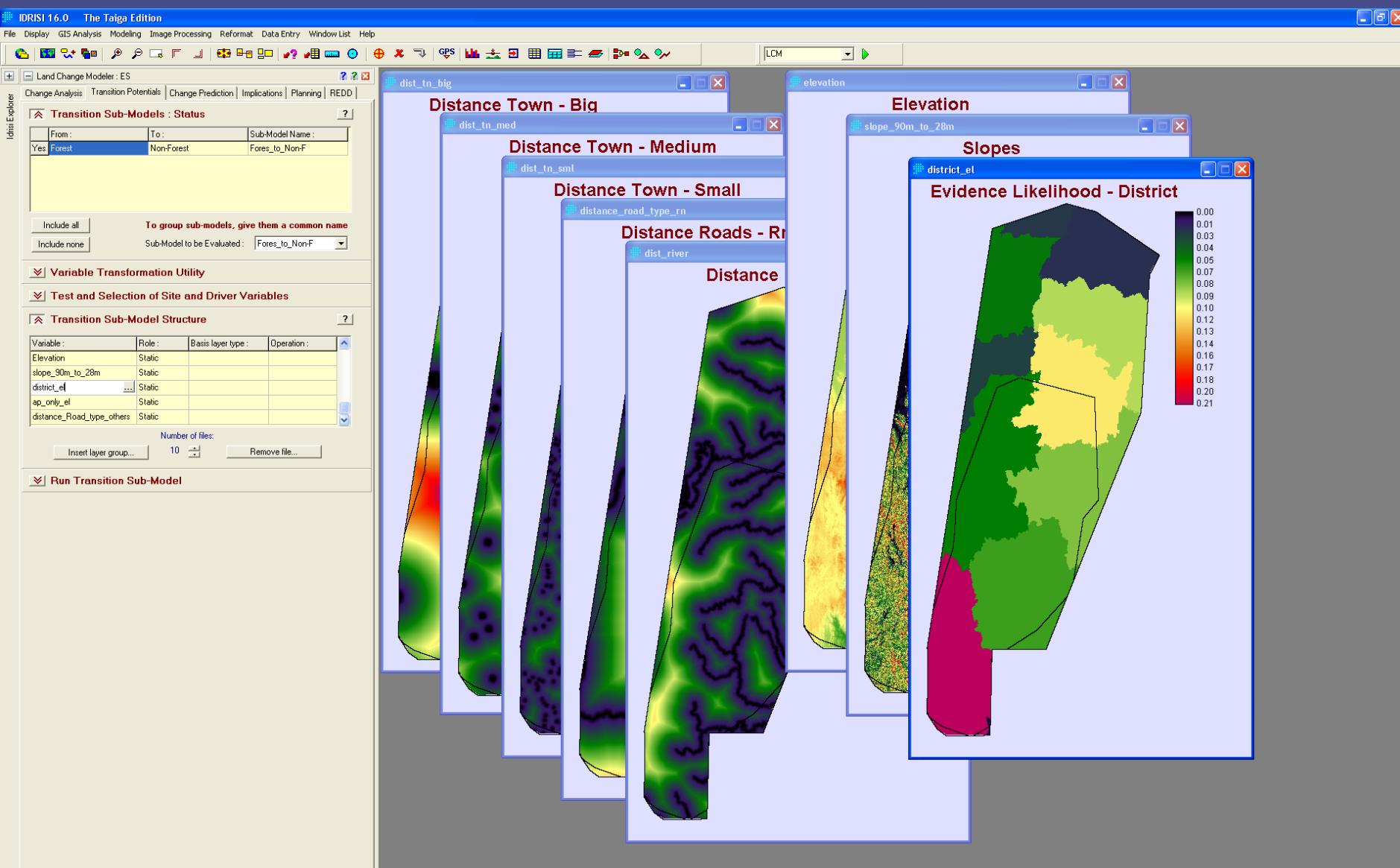


Transition Potential – Transition Sub-Model Structure



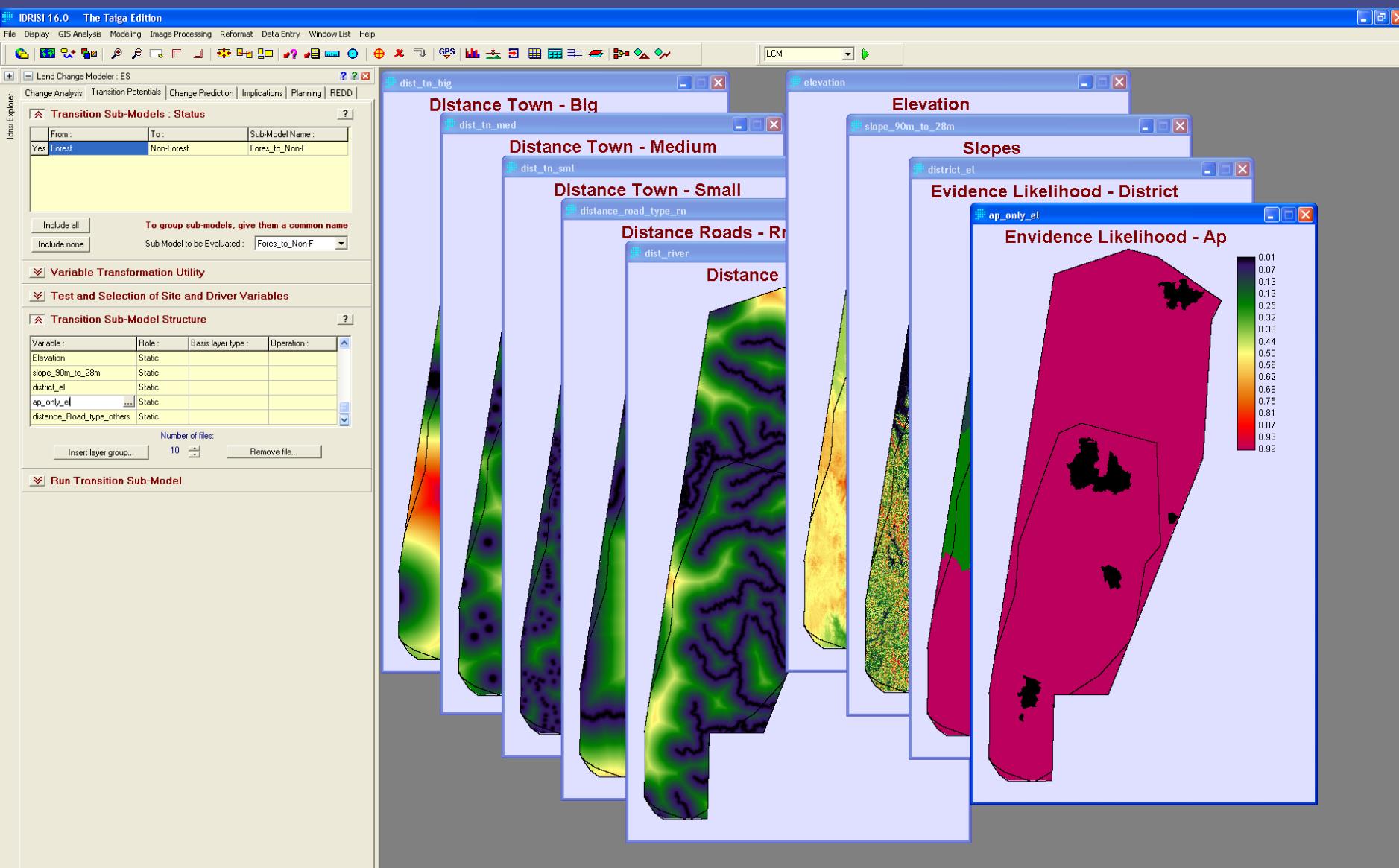
RF 1 : 1585913 c : 2794 r : 450 x : 842839.737741 y : -1833297.136805

Transition Potential – Transition Sub-Model Structure

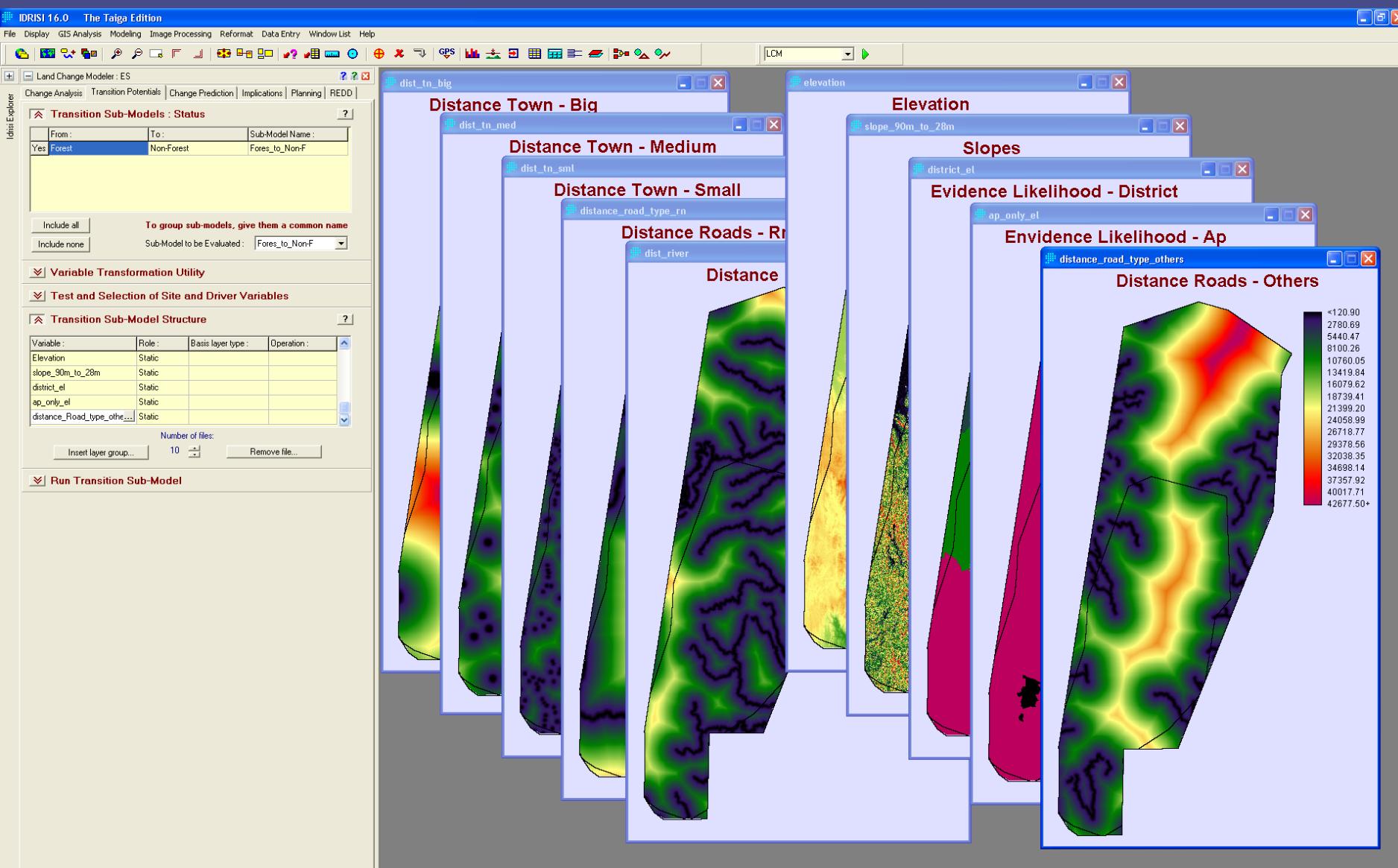


RF 1 : 1585913 c : 2794 r : 450 x : 842839.737741 y : -1833297.136805

Transition Potential – Transition Sub-Model Structure

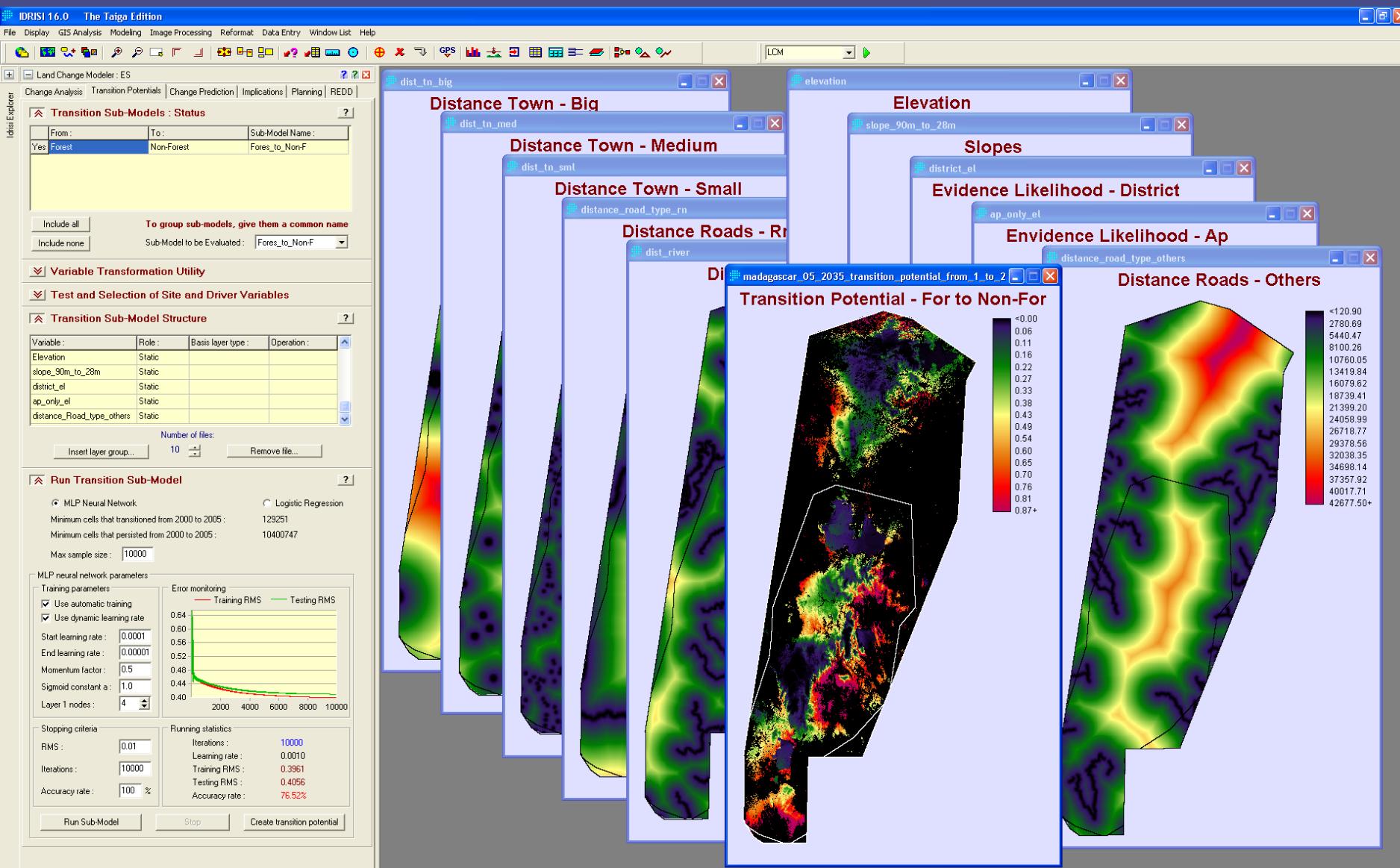


Transition Potential – Transition Sub-Model Structure

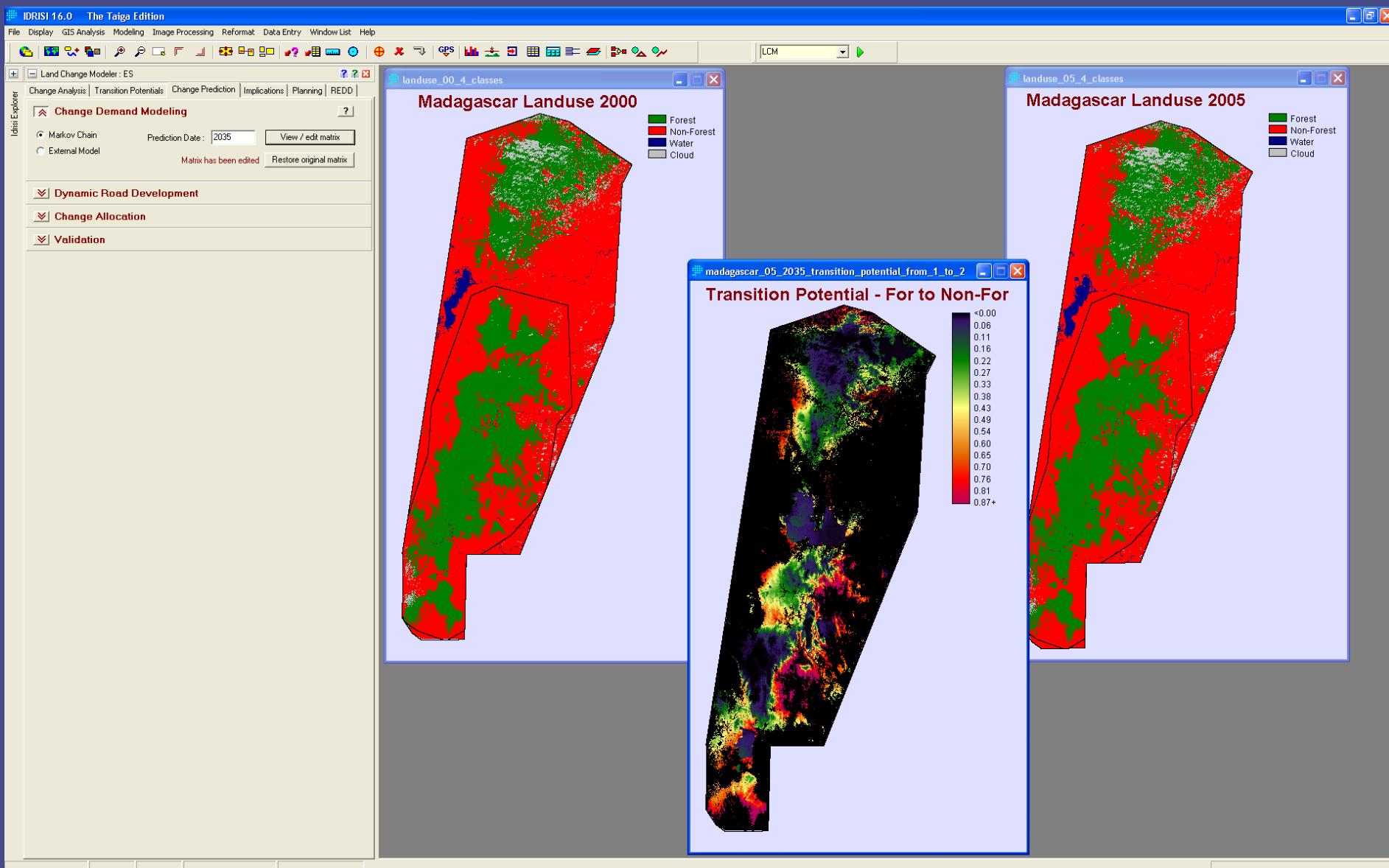


RF 1 : 1585913 c : 2794 r : 450 x : 842839.737741 y : -1833297.136805

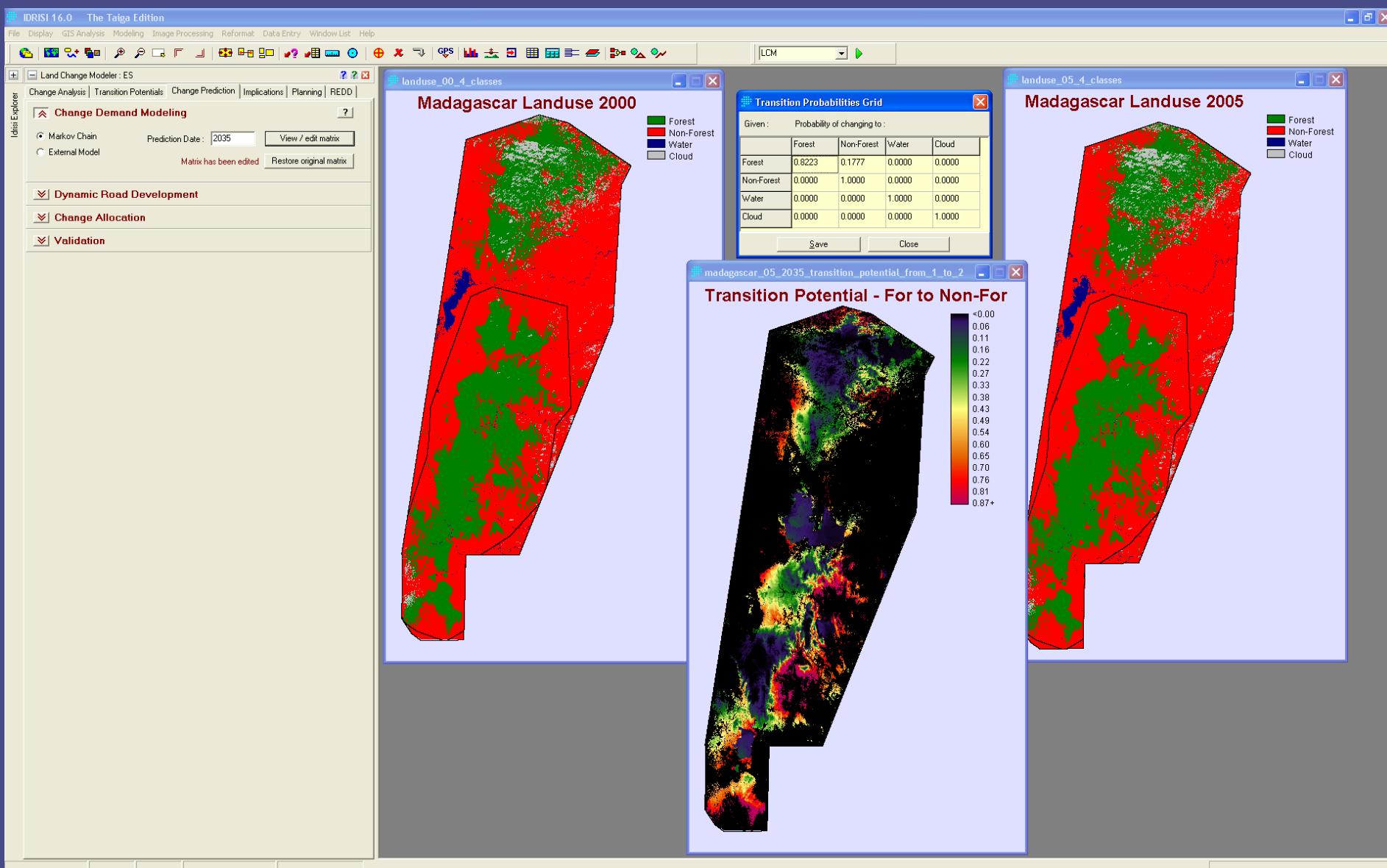
Transition Potential – Run Transition Sub-Model



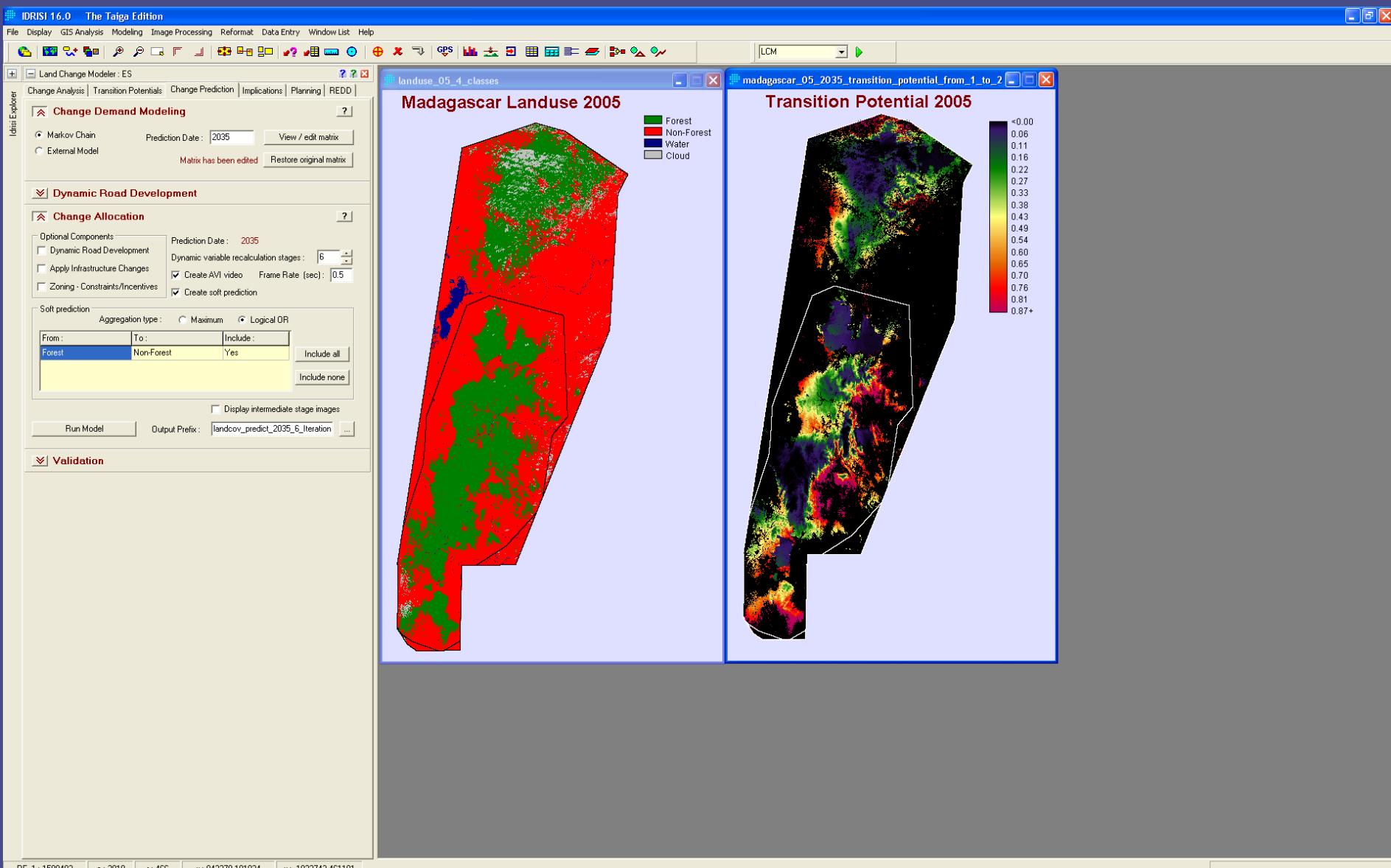
Change Prediction – Change Demand Modeling



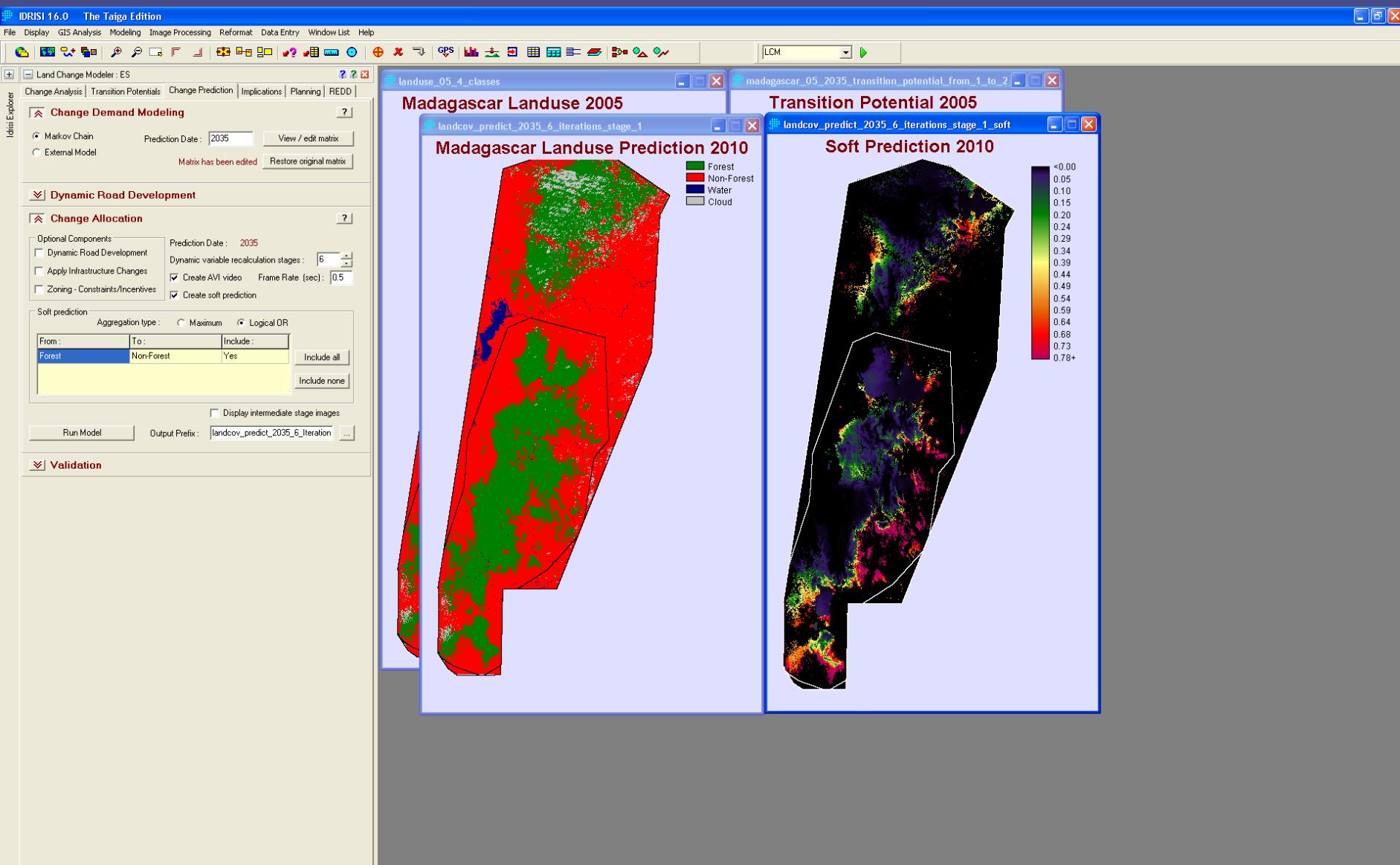
Change Prediction – Change Demand Modeling



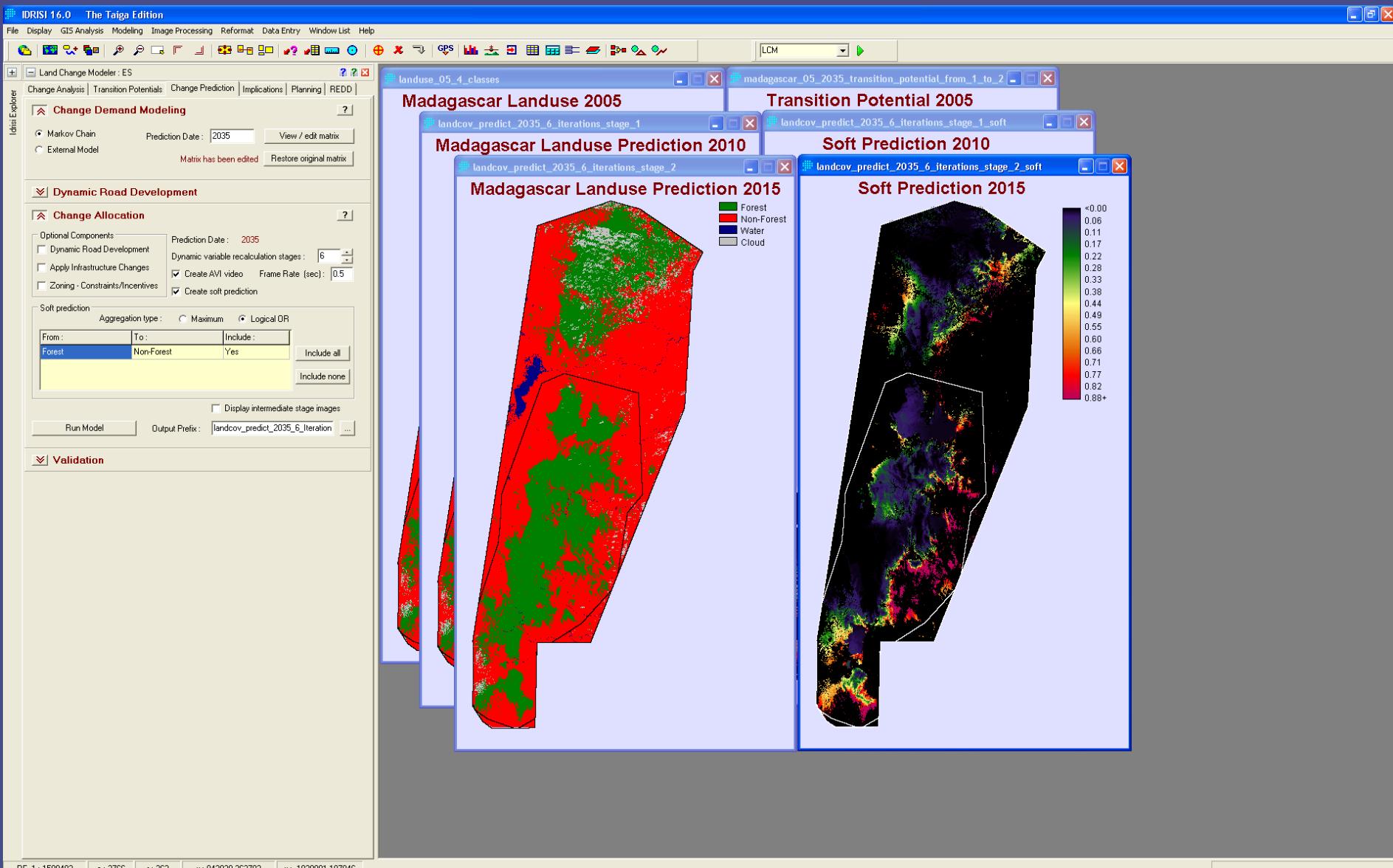
Change Prediction – Change Allocation



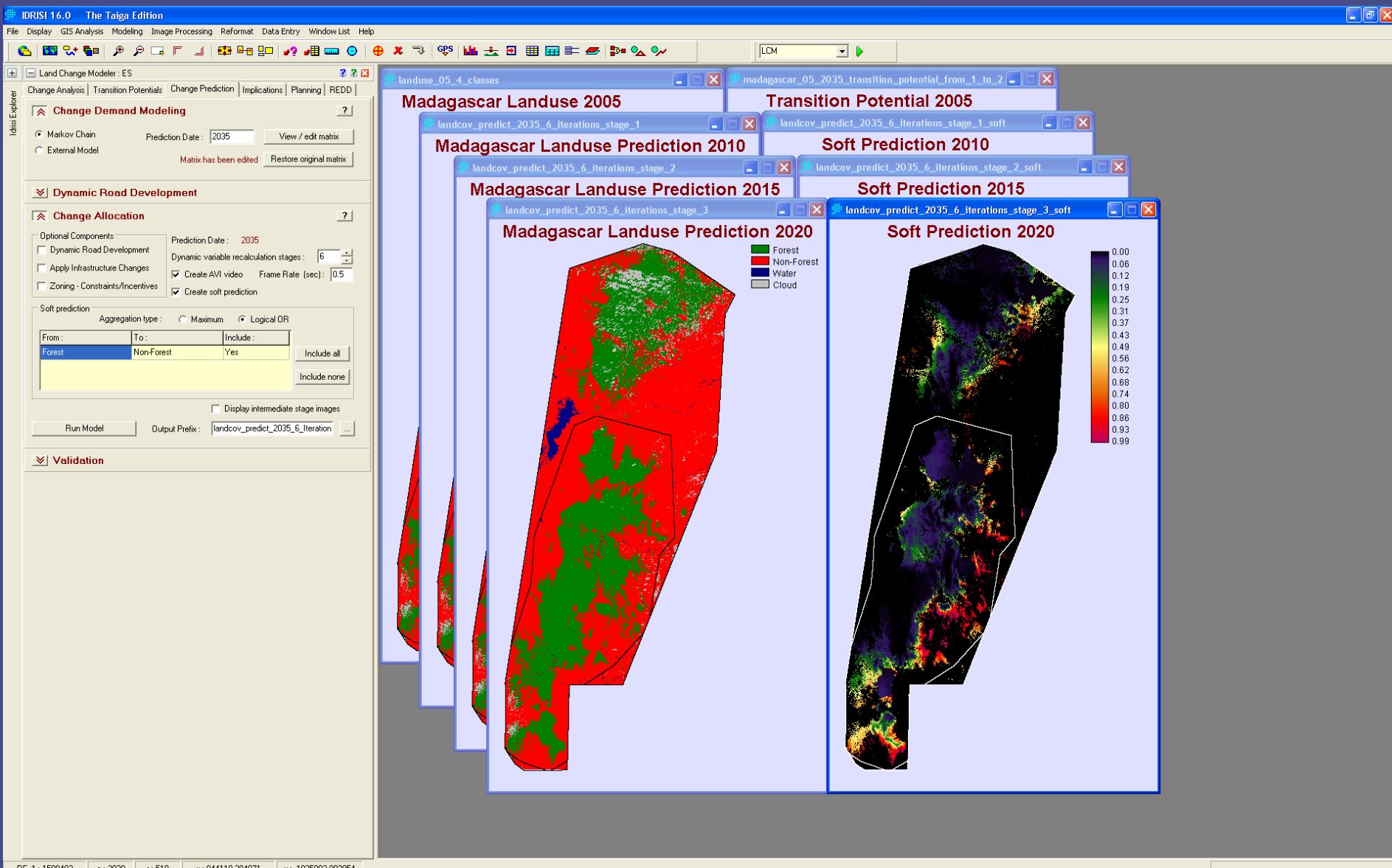
Change Prediction – Change Allocation



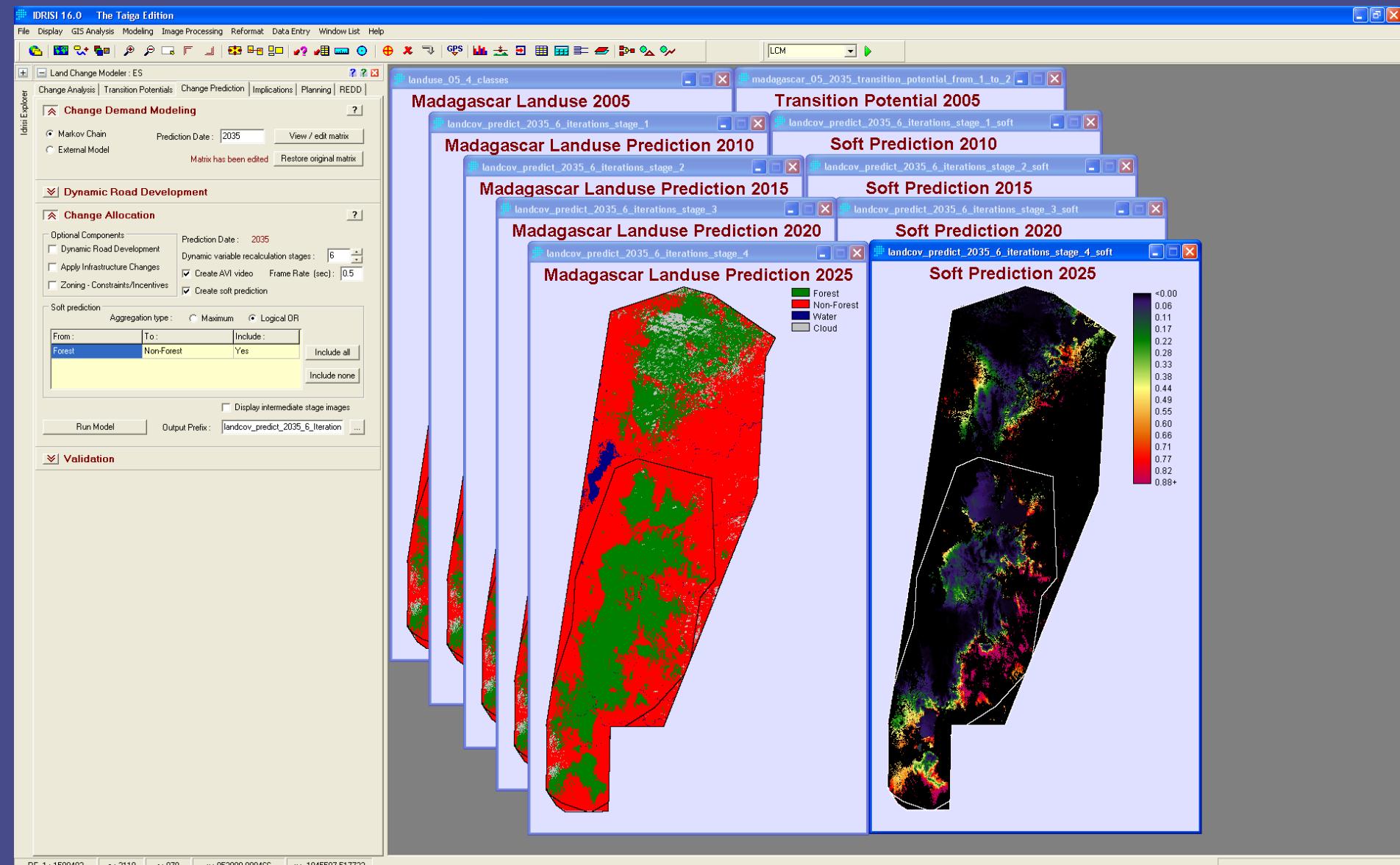
Change Prediction – Change Allocation



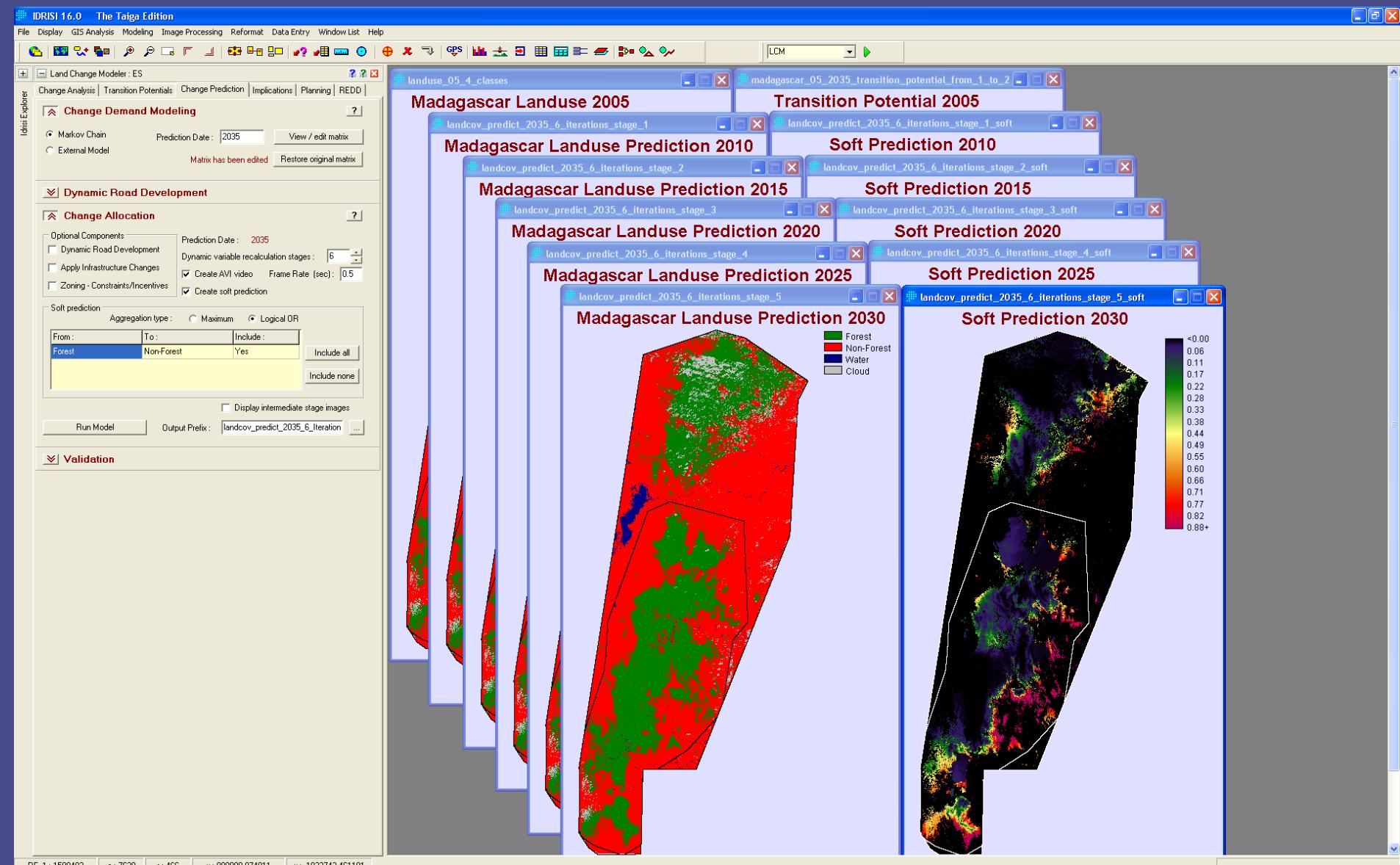
Change Prediction – Change Allocation



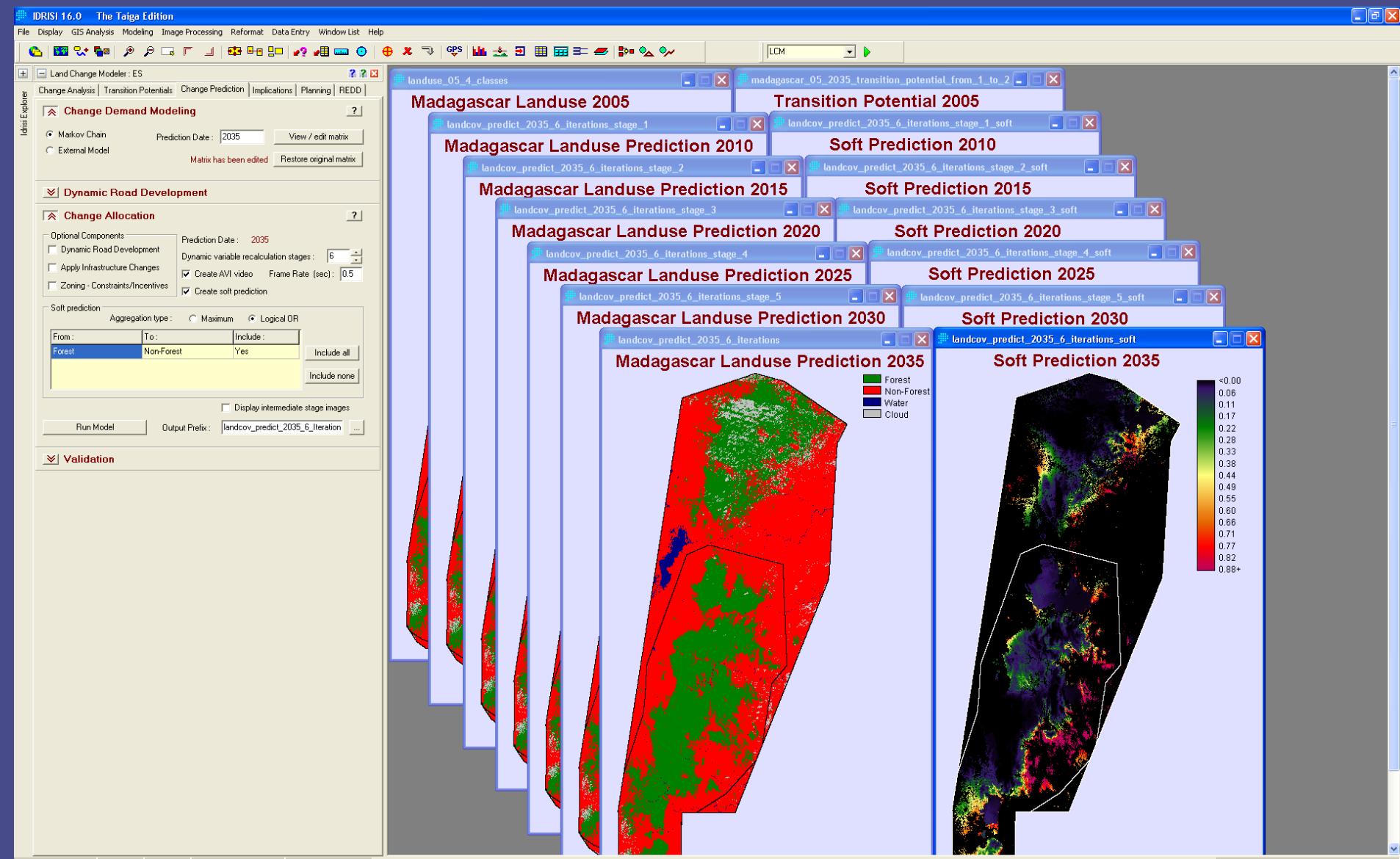
Change Prediction – Change Allocation



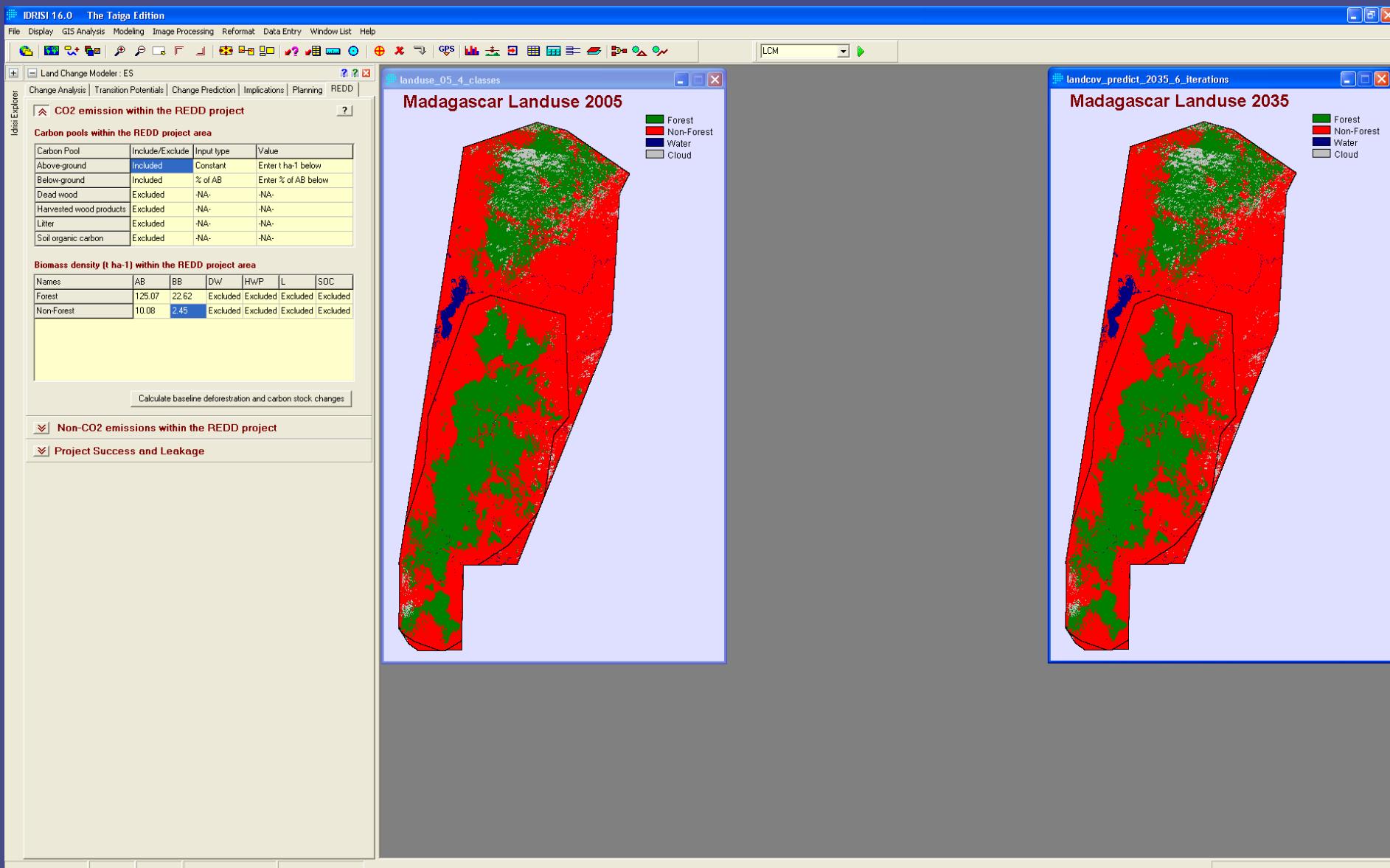
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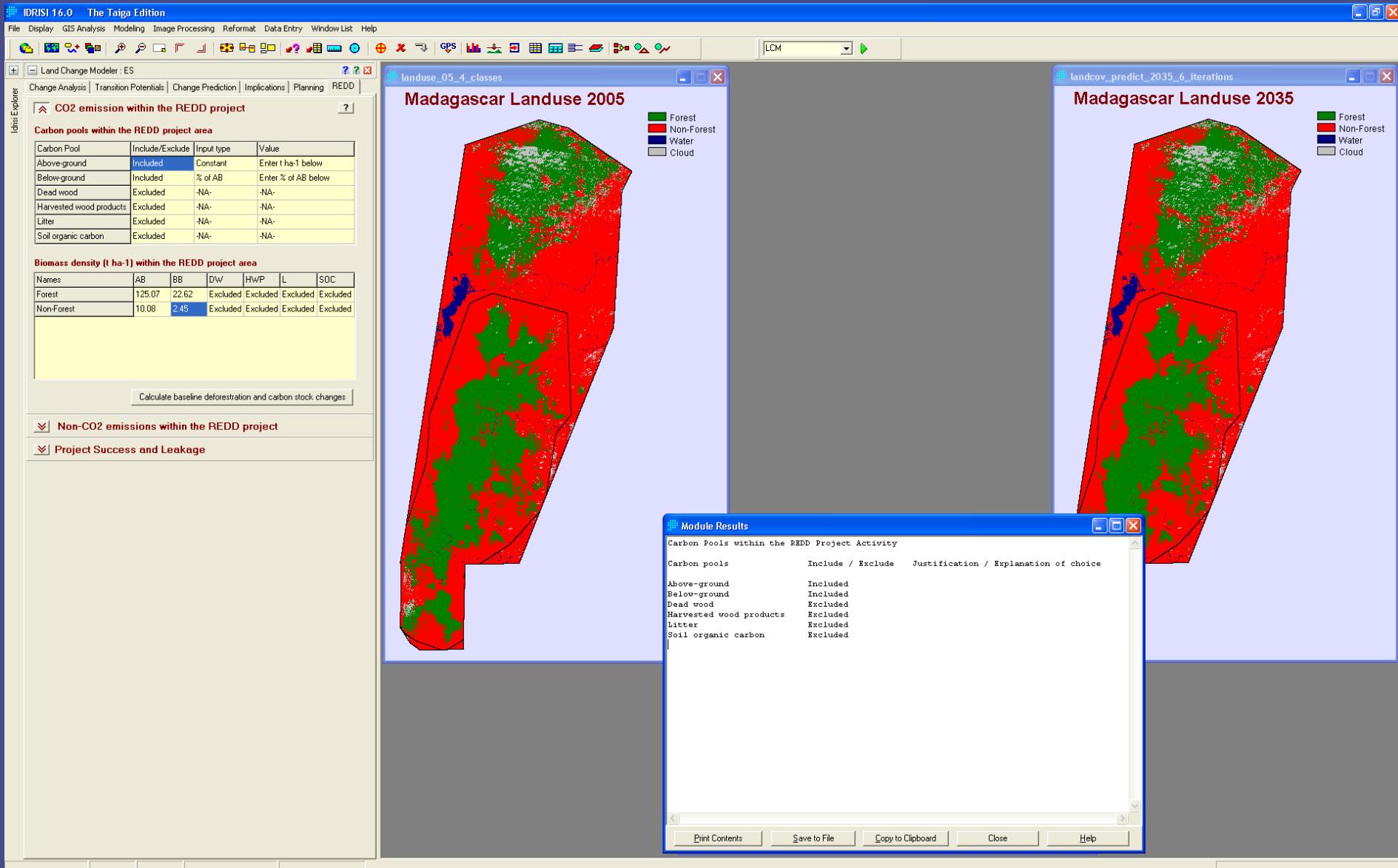
Change Prediction – Change Allocation



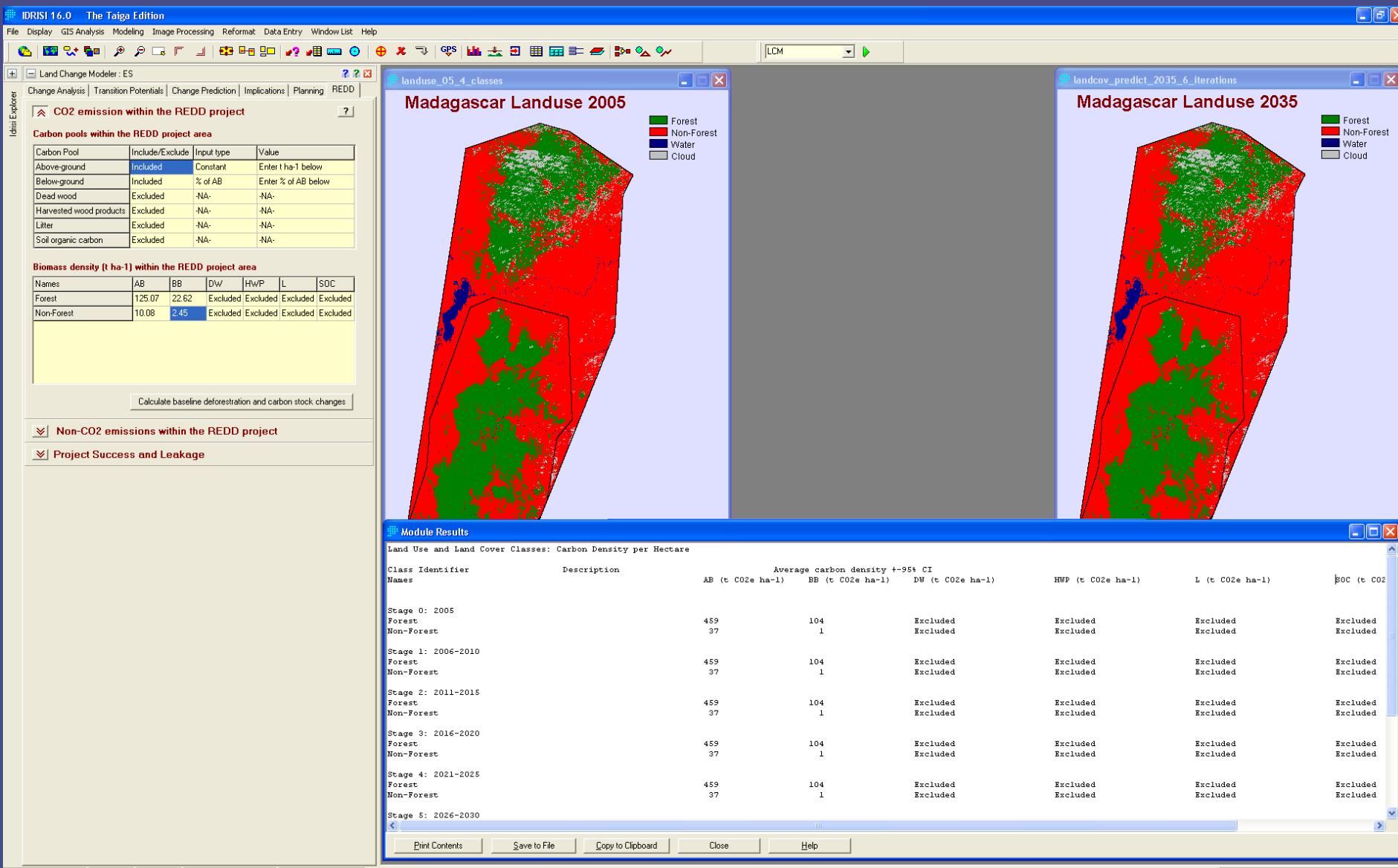
REDD – CO₂ Emission Within the REDD Project



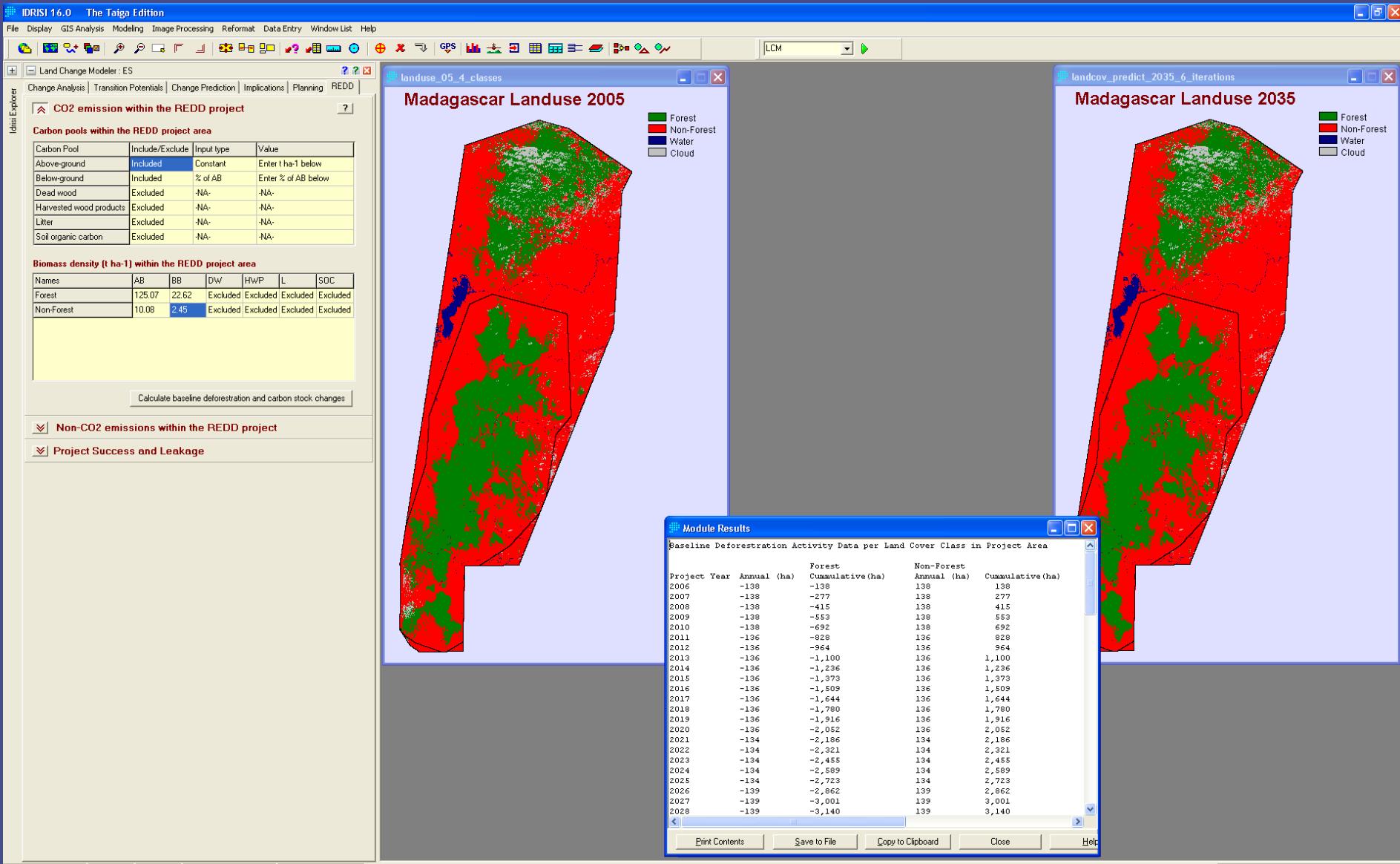
REDD – Carbon Pools within the REDD Project Activity



REDD – Carbon Density per Hectare

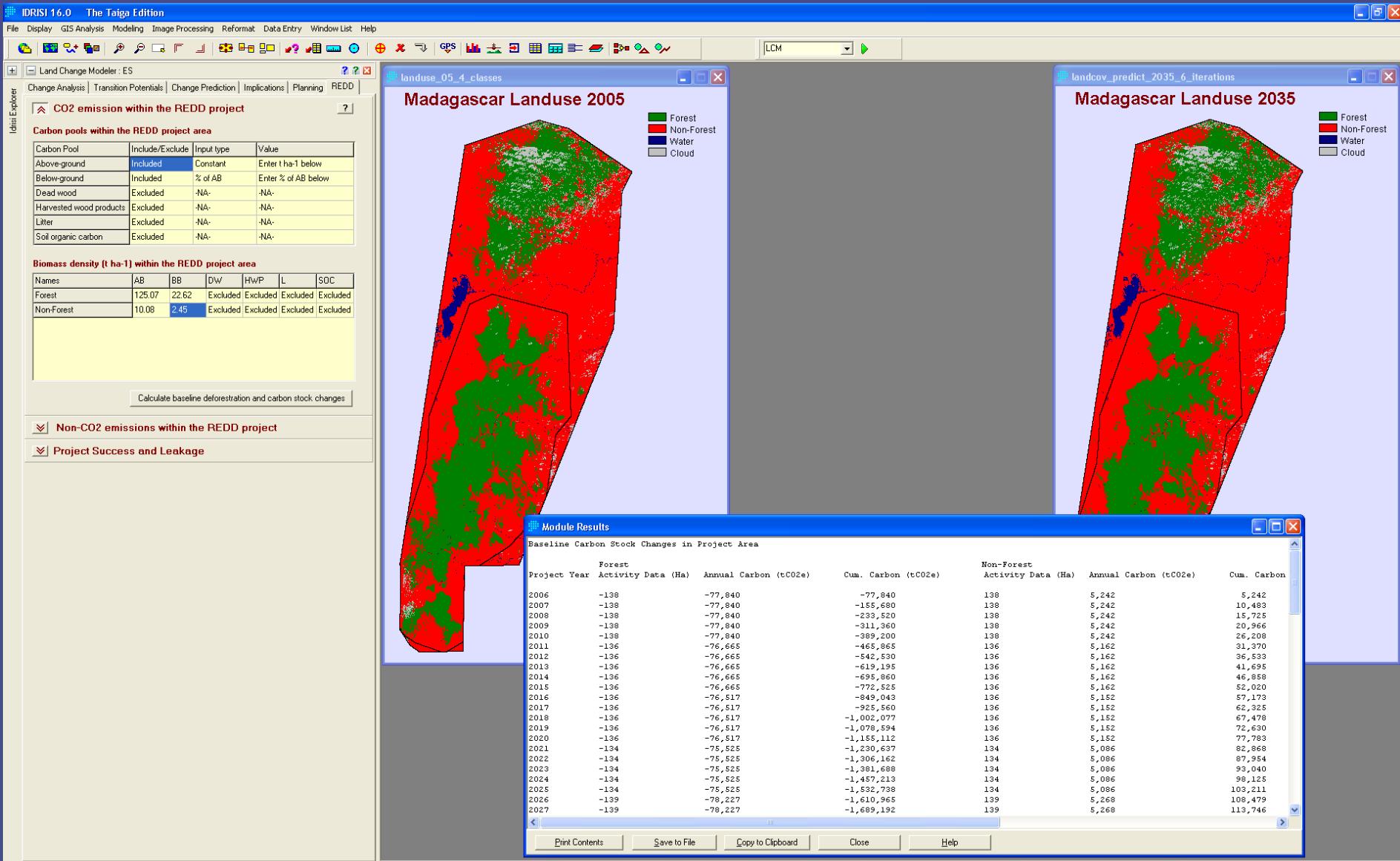


REDD – Baseline Deforestation Activity in Project Area



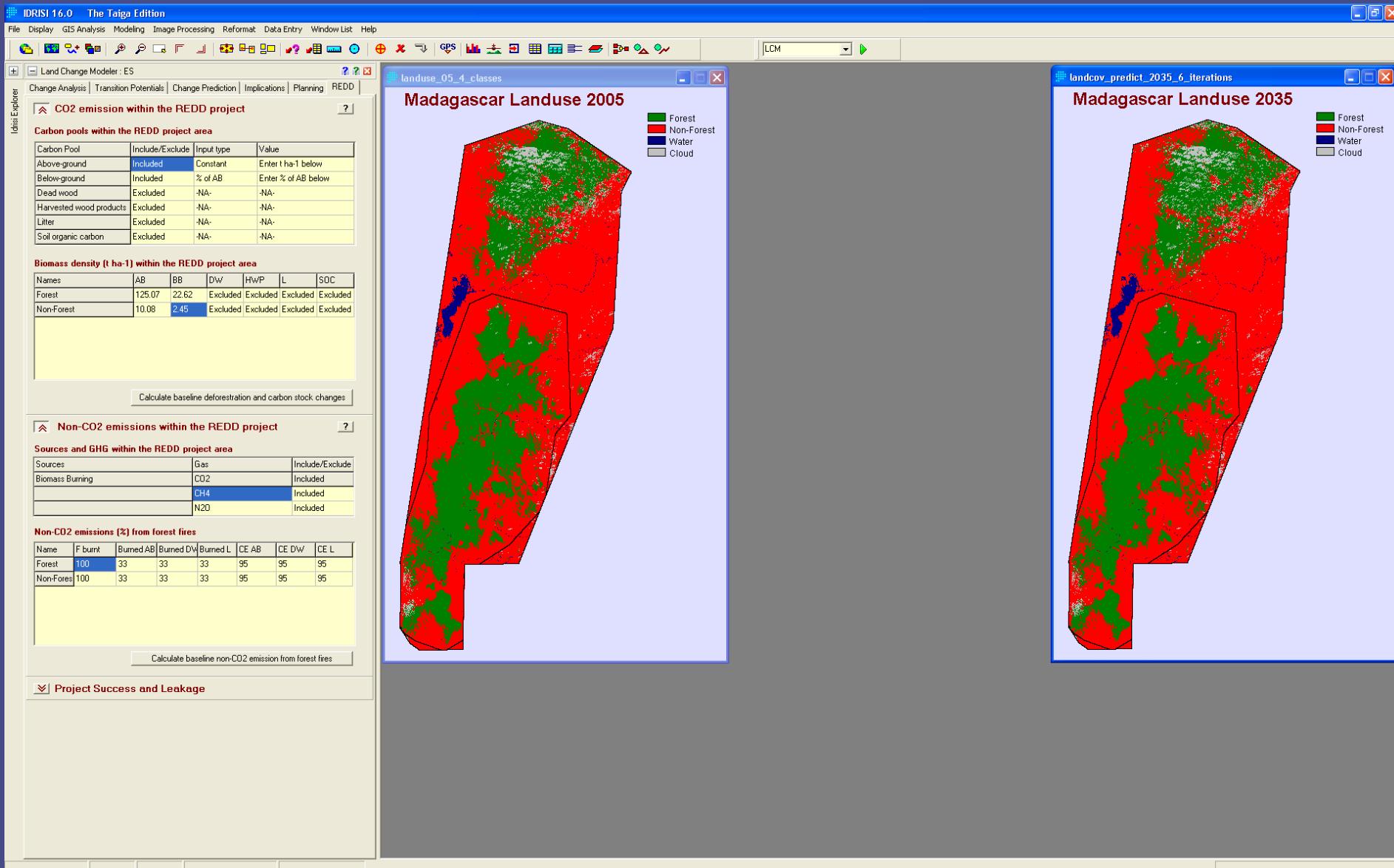
RF 1 : 1585913 c : 3470 r : 8699 x : 862086.310874 y : -2068391.592816

REDD – Baseline Carbon Stock Change in Project Area

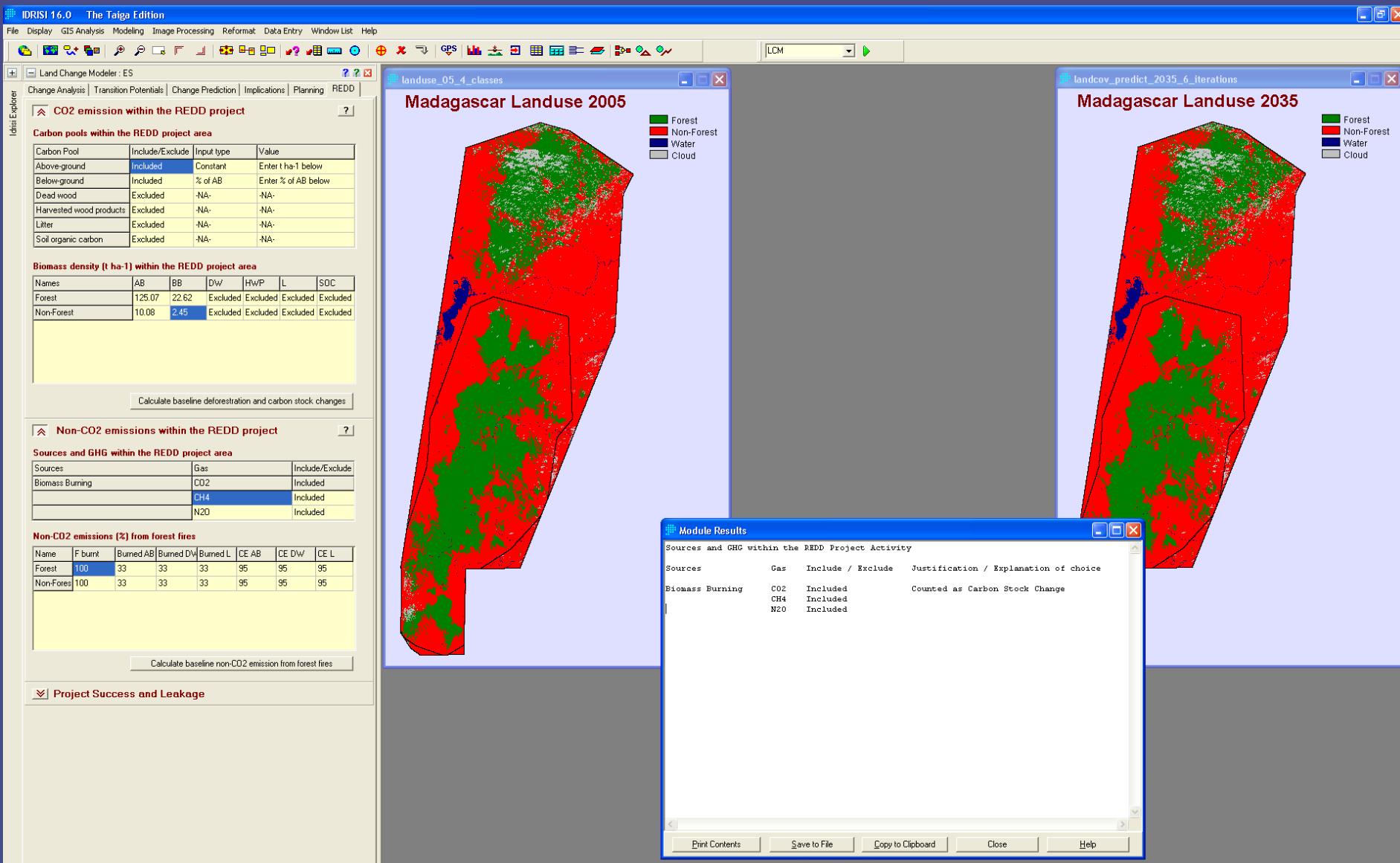


RF 1: 1585913 c : 7639 r : 8052 x : 980912.379785 y : -2049952.753894

REDD – Non-CO₂ Emissions within the REDD Project

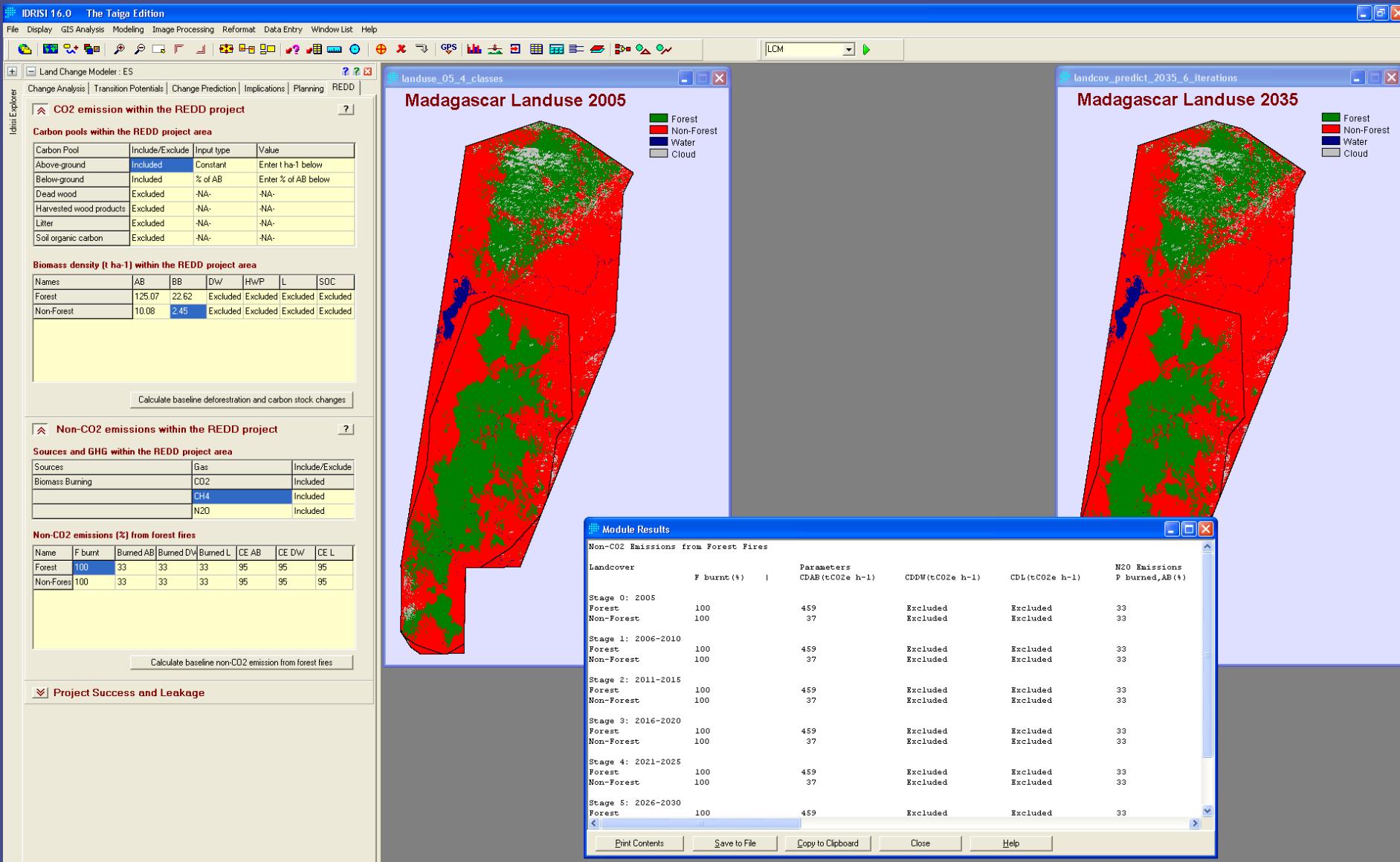


REDD – Sources of GHG within the REDD Project Activity



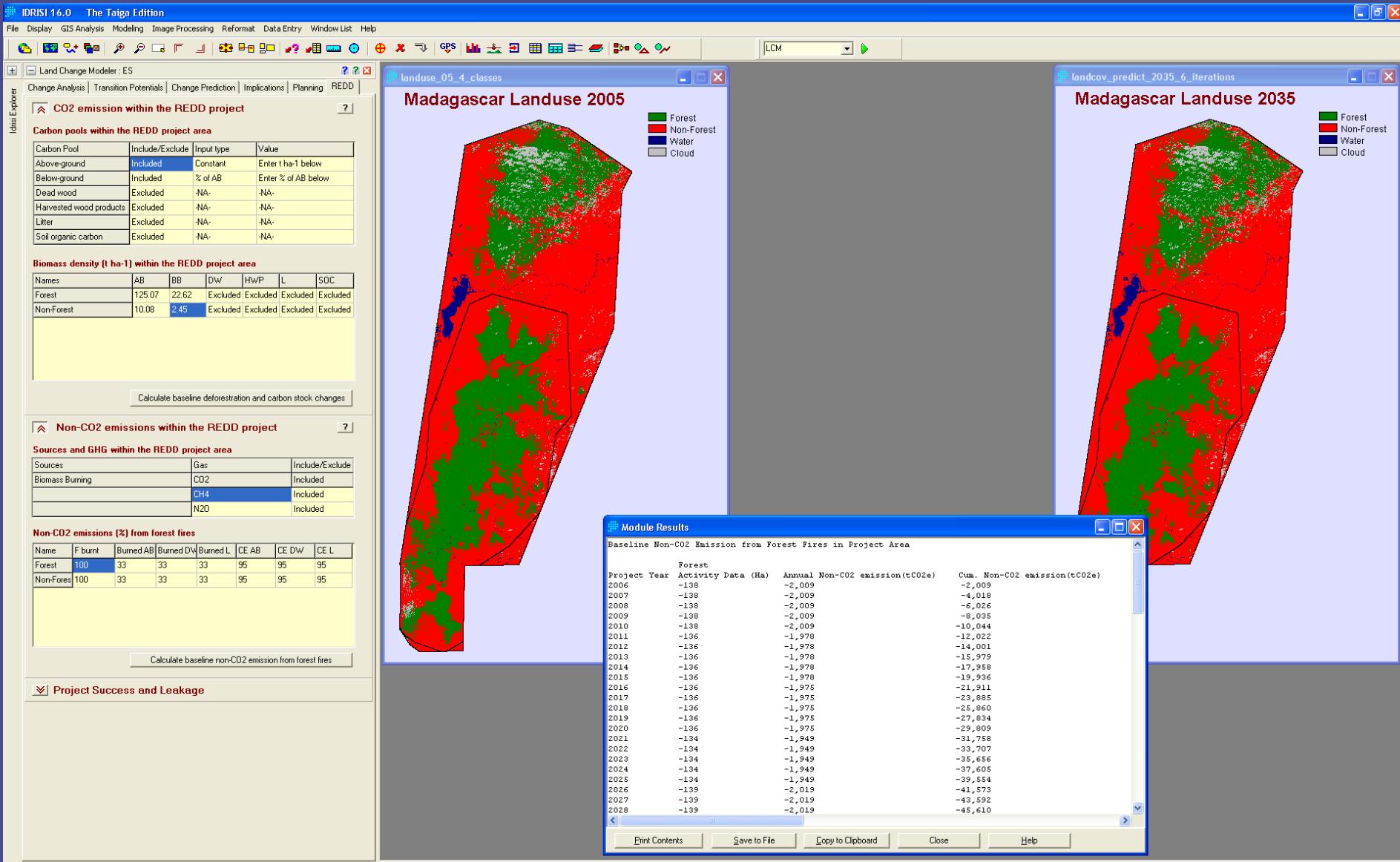
RF 1 : 1585913 c : 2750 r : 332 x : 841584.526449 y : -1829944.632092

REDD – Non-CO₂ Emissions from Forest Fires



RF 1 : 1585913 c : 7228 r : 8199 x : 969197.674399 y : -2054143.384785

REDD – Baseline Non-CO₂ Emission from Forest Fires



REDD – Project Success and Leakage

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CO2 emission within the REDD project

Carbon pools within the REDD project area

Carbon Pool	Include/Exclude	Input type	Value
Above-ground	Included	Constant	Enter t ha-1 below
Below-ground	Included	% of AB	Enter % of AB below
Dead wood	Excluded	-NA-	-NA-
Harvested wood products	Excluded	-NA-	-NA-
Litter	Excluded	-NA-	-NA-
Soil organic carbon	Excluded	-NA-	-NA-

Biomass density (t ha-1) within the REDD project area

Names	AB	BB	DW	HwP	L	SOC
Forest	125.07	22.62		Excluded	Excluded	Excluded
Non-Forest	10.08	2.45		Excluded	Excluded	Excluded

Calculate baseline deforestation and carbon stock changes

Non-CO2 emissions within the REDD project

Sources and GHG within the REDD project area

Sources	Gas	Include/Exclude
Biomass Burning	CO2	Included
	CH4	Included
	N2O	Included

Non-CO2 emissions (%) from forest fires

Name	F burnt	Burned AB	Burned DW	Burned L	CE AB	CE DW	CE L
Forest	100	33	33	33	95	95	95
Non-Fores	100	33	33	33	95	95	95

Calculate baseline non-CO2 emission from forest fires

Project Success and Leakage

Reporting Interval	Leakage Rate(%)	Success Rate(%)	Effective(%)
Stage 01: 2006-2010	20	55	35
Stage 02: 2011-2015	20	80	60
Stage 03: 2016-2020	10	90	80

Calculate ex ante net GHG emission reductions

landuse_05_4_classes

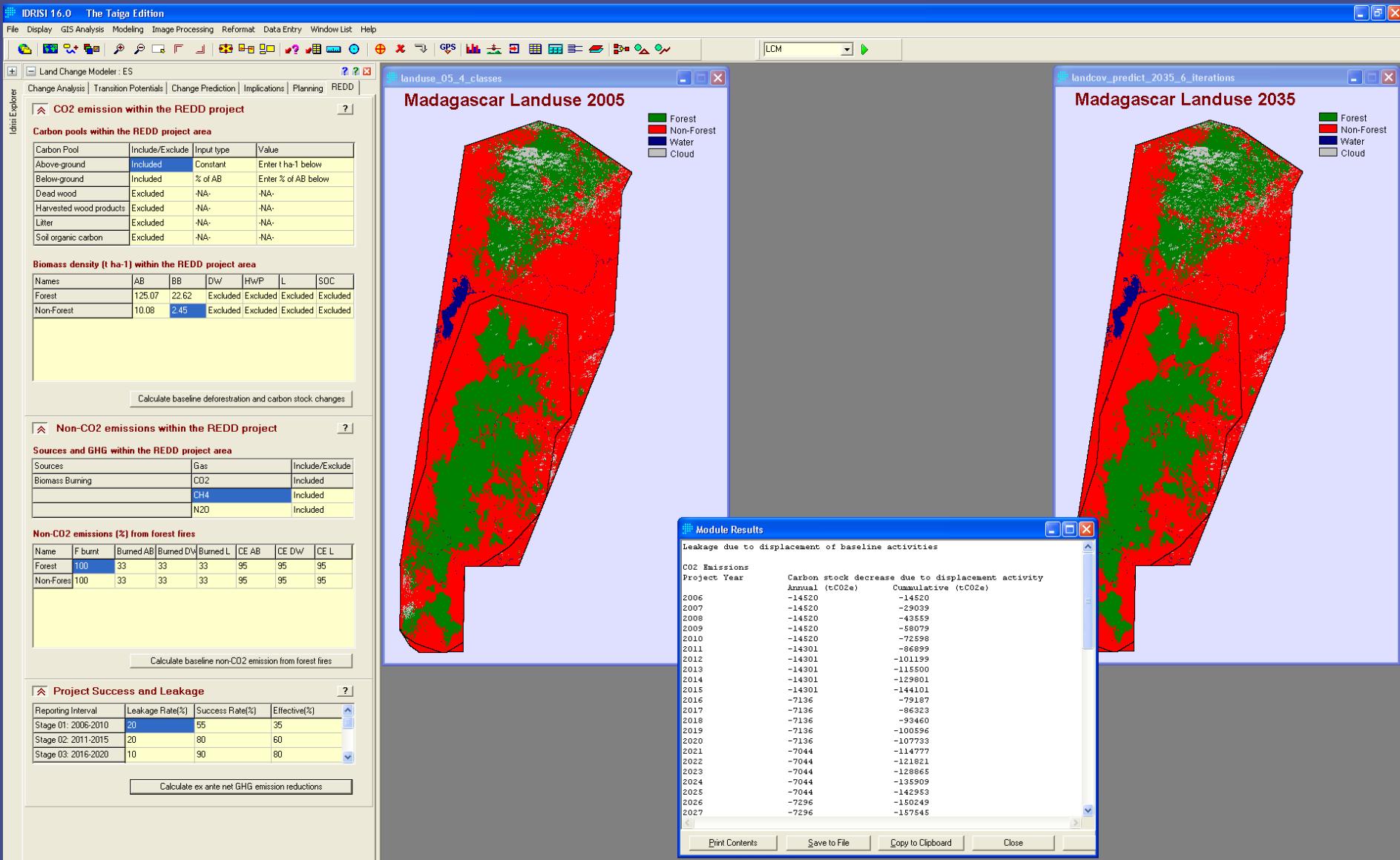
Madagascar Landuse 2005

Forest
Non-Forest
Water
Cloud

landcov_predict_2035_6_iterations

Madagascar Landuse 2035

REDD – Leakage due to Displacement Activities



RF 1: 1585913 c : 7654 r : 6376 x : 981331.383549 y : -2002179.561731

REDD – Ex Ante net GHG Emission Reductions

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Calculate ex ante net GHG emission reductions

landuse_05_4_classes Madagascar Landuse 2005

landcov_predict_2035_6_iterations Madagascar Landuse 2035

Module Results

Ex ante net anthropogenic GHG emission reductions

Project	Year	C-Baseline Carbon Stocks Annual (tCO2e)	Cumulative (tCO2e)	non-CO2 GHG Annual (tCO2e)	Cumulative (tCO2e)	C-Actual Carbon Stocks Annual (tCO2e)	Cumulative (tCO2e)	non-CO2 GHG Annual (tCO2e)	Cumulative (tCO2e)
2006	-72,598	-72,598	-1,847	-1,847	-32,669	-32,669	-831	-831	
2007	-72,598	-145,197	-1,847	-3,694	-32,669	-65,339	-831	-1,662	
2008	-72,598	-217,795	-1,847	-5,541	-32,669	-98,086	-831	-2,493	
2009	-72,598	-290,394	-1,847	-7,397	-32,669	-130,677	-831	-3,324	
2010	-72,598	-362,992	-1,847	-9,234	-32,669	-163,346	-831	-4,155	
2011	-71,503	-434,495	-1,819	-11,053	-14,301	-86,899	-364	-4,211	
2012	-71,503	-505,997	-1,819	-12,872	-14,301	-101,199	-364	-5,574	
2013	-71,503	-577,500	-1,819	-14,691	-14,301	-115,500	-364	-6,938	
2014	-71,503	-649,003	-1,819	-16,510	-14,301	-129,801	-364	-8,302	
2015	-71,503	-720,505	-1,819	-18,329	-14,301	-144,101	-364	-9,666	
2016	-71,365	-791,870	-1,815	-20,145	-7,136	-79,187	-182	-10,014	
2017	-71,365	-863,235	-1,815	-21,960	-7,136	-86,323	-182	-10,196	
2018	-71,365	-934,600	-1,815	-23,776	-7,136	-93,460	-182	-10,378	
2019	-71,365	-1,005,964	-1,815	-25,591	-7,136	-100,596	-182	-10,559	
2020	-71,365	-1,077,329	-1,815	-27,407	-7,136	-107,733	-182	-10,741	
2021	-70,440	-1,147,769	-1,792	-29,199	-7,044	-114,777	-179	-10,920	
2022	-70,440	-1,218,209	-1,792	-30,990	-7,044	-121,821	-179	-10,909	
2023	-70,440	-1,288,648	-1,792	-32,782	-7,044	-128,865	-179	-10,278	
2024	-70,440	-1,359,088	-1,792	-34,574	-7,044	-135,909	-179	-10,457	
2025	-70,440	-1,429,527	-1,792	-36,366	-7,044	-142,953	-179	-10,637	
2026	-72,959	-1,502,487	-1,856	-38,222	-7,296	-150,249	-186	-10,822	
2027	-72,959	-1,575,446	-1,856	-40,078	-7,296	-157,545	-186	-10,008	

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