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AARES
AUSTRALIAN AGRICULTURAL & RESOURCE ECONOMICS SOCIETY

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MAPPING THE EEFFECTS OF FOREST GOVERNANCE ON LAND USE AND LAND COVER CHANGES

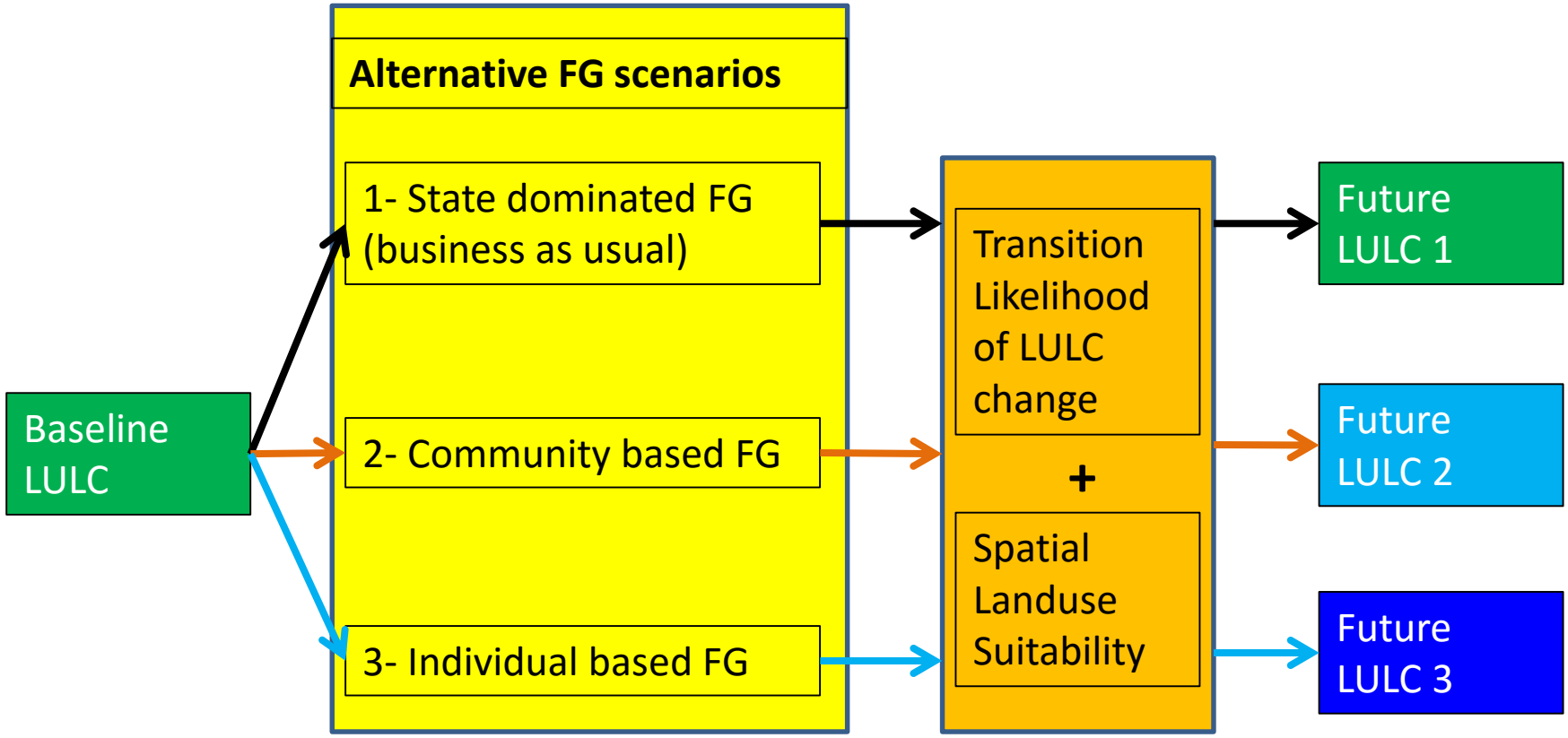
Nguyen Minh Duc
Assoc. Prof. Dr. Tihomir Ancev
Prof. Dr. Alan Randall

The University of Sydney

MOTIVATION

- Decision making on sustainable forestry needs to consider values of forest ecosystem services.
- Land use land cover (**LULC**) is an essential determinant of forest ecosystem services.
- Forest governance regime has a defining effect on changes in LULC.
- Therefore, studying the linkage between forest governance and provision of forest ecosystem services is necessary.

FRAMEWORK OF MAPPING THE EEFFECTS OF FOREST GOVERNANCE (FG) ON LULC CHANGES



METHODOLOGY

- **Scenario generation: Alternative forest governance regimes**
- **Expert interviews: transition likelihood of LULC changes**
- **Desk research: Spatial landuse suitability**
- **Projecting the future LULC changes:**
  - **The business as usual scenario based on the historical trend**
  - **The two alternative FG scenarios based on the experts' perception of transition likelihood of LULC changes**
- **Mapping the alternative future LULC based on estimated LULC changes and spatial land use suitability analysis**

Results

- Forest LULC changes under the Business as usual scenario (State dominated FG, based on historical trend)

	2010	**2020**	
	State dominated FG	(1) State dominated FG	
	Area (ha)	Area (ha)	Net change (ha)
Natural forest	1,429,237	1,603,637	174,400
_Old_growth forest	140,395	138,535	- 1,860
_Degraded forest	143,667	168,343	24,676
_Regrowth forest	886,493	1,038,076	151,584
_Other natural forest	258,682	258,682	0
Planted forest	126,510	192,245	65,735
Bareland/shrubland	1,221,084	956,581	- 264,503
Non-forest land	820,408	844,775	24,368

Results

- Experts' perception: Relative score of transition likelihood of net changes of LULC

	Likelihood of Net Changes of LULC			**Relative score**	
Forest LULC	State Centralised FG **(1)**	Community Based FG **(2)**	Individual Based FG **(3)**	**(2)/(1)**	**(3)/(1)**
Old growth forest	-6.706	-6.813	-8.059	**1.0159**	**1.2018**
Degraded forest	2.471	2.875	2.765	**1.1637**	**1.1190**
Regrowth forest	-3.588	-2.563	-6.824	**0.7141**	**1.9016**
Planted forest	7.706	7.688	9.588	**0.9976**	**1.2443**
Bareland/ Scrubland	2.353	1.188	5.353	**0.5047**	**2.2750**

The Transition Likelihood is measured in an ordinal scale from 1 to 10 (1 = not expected to occur at all, 10 = will absolutely occur)

Results

- Forest LULC changes under the alternative FG scenarios, 2020

LULC	Net change, 2010-2020 (ha)			Percentage of Changes (%)		
	(1) State dominated FG	(2) Community based FG	(3) Individual based FG	(1) State dominated FG	(2) Community based FG	(3) Individual based FG
Natural forest	174,400	221,741	40,289	12.2	15.5	2.8
_Old growth forest	- 1,860	- 1,890	- 2,235	- 1.3	- 1.3	- 1.6
_Degraded forest	24,676	28,716	27,614	17.2	20.0	19.2
_Regrowth forest	151,584	194,915	14,910	17.1	22.0	1.7
Planted forest	65,735	65,578	81,792	52.0	51.8	64.7
Bareland/shrubland	- 264,503	- 395,514	72,738	- 21.7	- 32.4	6.0

Results

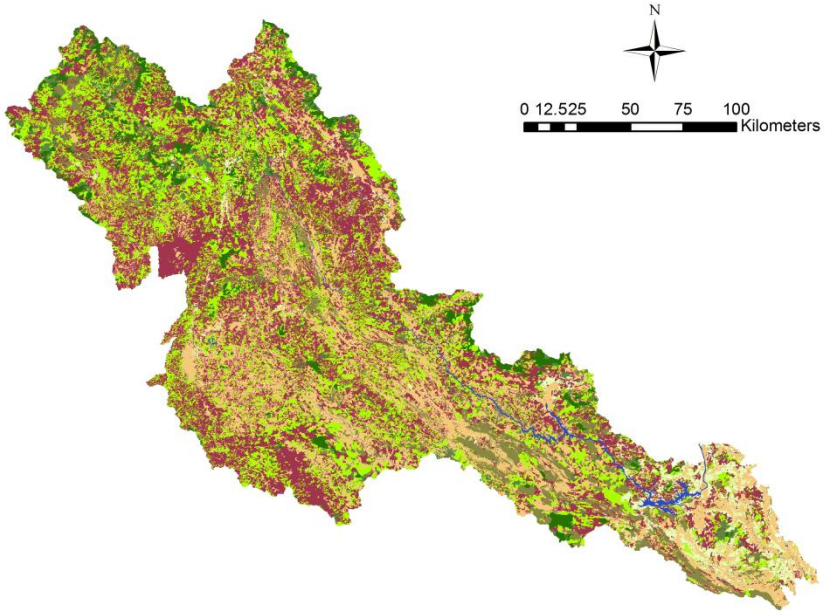
- Proportion of Forest LULC types of alternative FG scenarios, 2020

LULC	2010	2020 (1)_State dominated FG	2020 (2)_Community based FG	2020 Individual based FG
Natural forest	39.7%	44.6%	45.9%	40.9%
_Old_growth forest	3.9%	3.9%	3.9%	3.8%
_Degraded forest	4.0%	4.7%	4.8%	4.8%
_Regrowth forest	24.6%	28.9%	30.1%	25.1%
_Other natural forest	7.2%	7.2%	7.2%	7.2%
Planted forest	3.5%	5.3%	5.3%	5.8%
Bareland/shrubland	33.9%	26.6%	23.0%	36.0%
Non-forest land	22.8%	23.5%	25.8%	17.4%

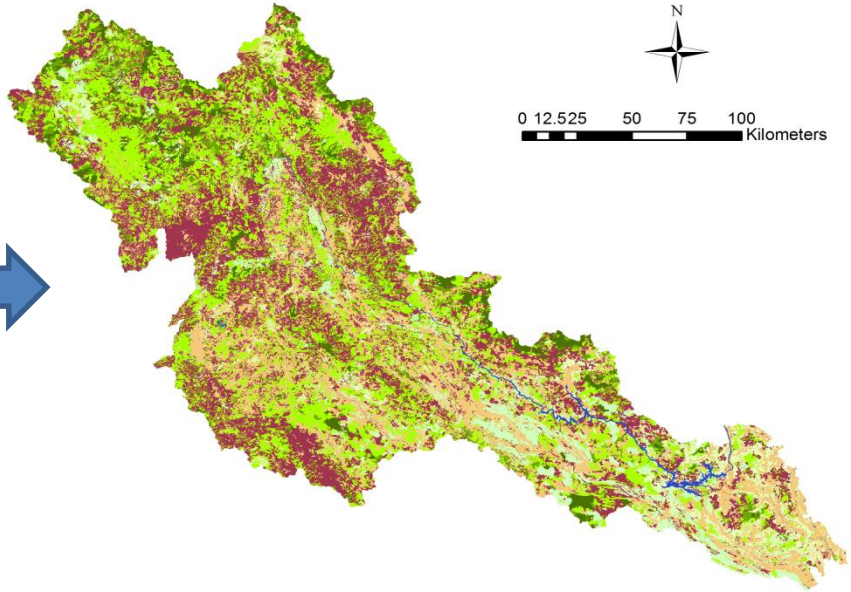
Results

- Projected maps of LULC under the alternative FG scenarios

LULC 2010



LULC 2020: State dominated FG



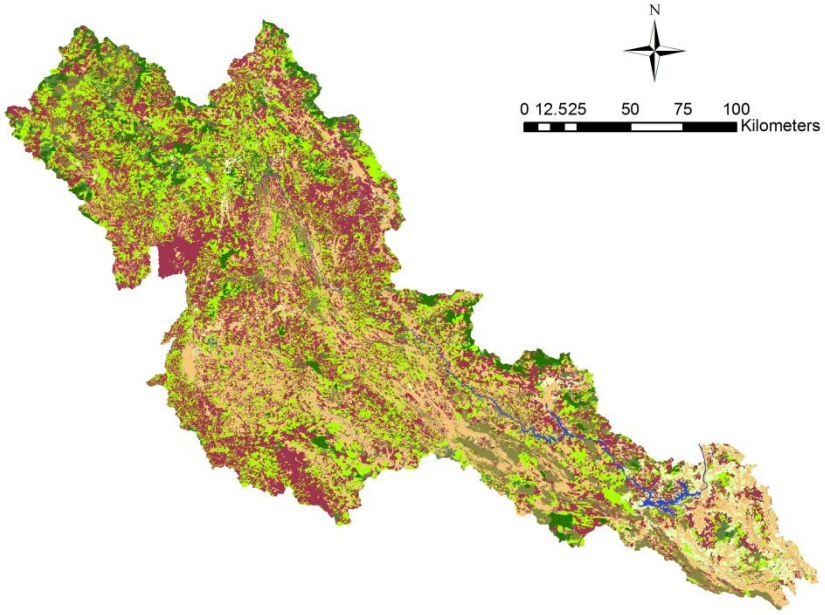
Legend

- Bareland/Shrub
- Degraded forest
- Non-forest land
- Old growth forest
- Other natural forest
- Planted forest
- Regrowth forest
- Water surface

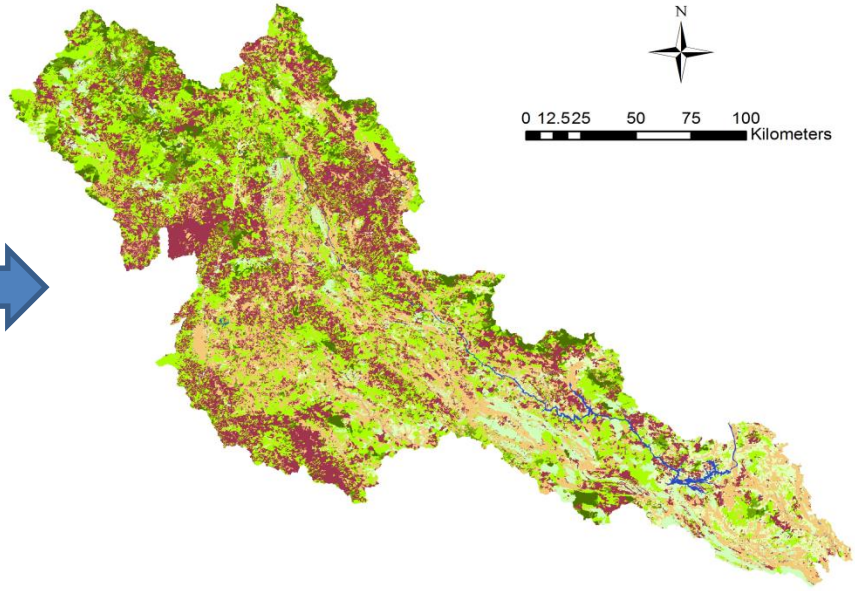
Results

- Projected maps of LULC under the alternative FG scenarios

LULC 2010



LULC 2020: Community based FG



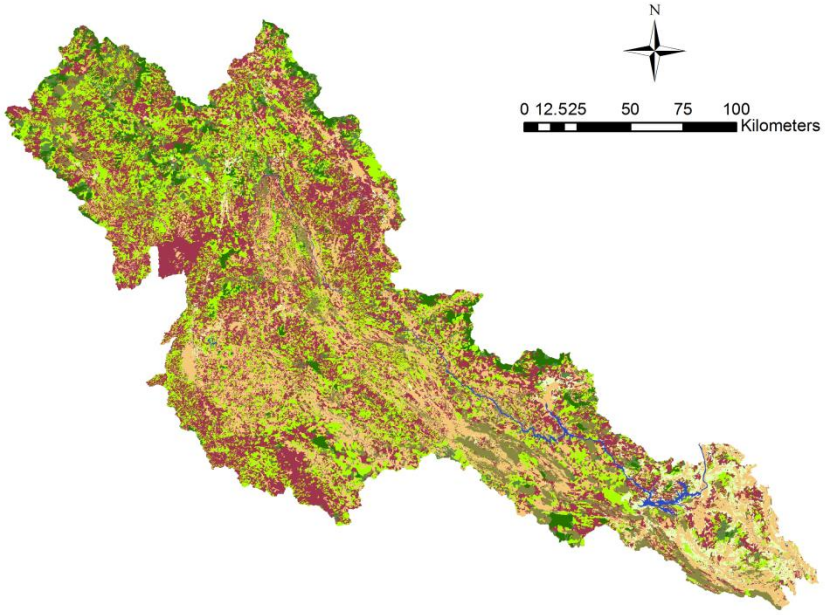
Legend

- Bareland/Shrub
- Degraded forest
- Non-forest land
- Old growth forest
- Other natural forest
- Planted forest
- Regrowth forest
- Water surface

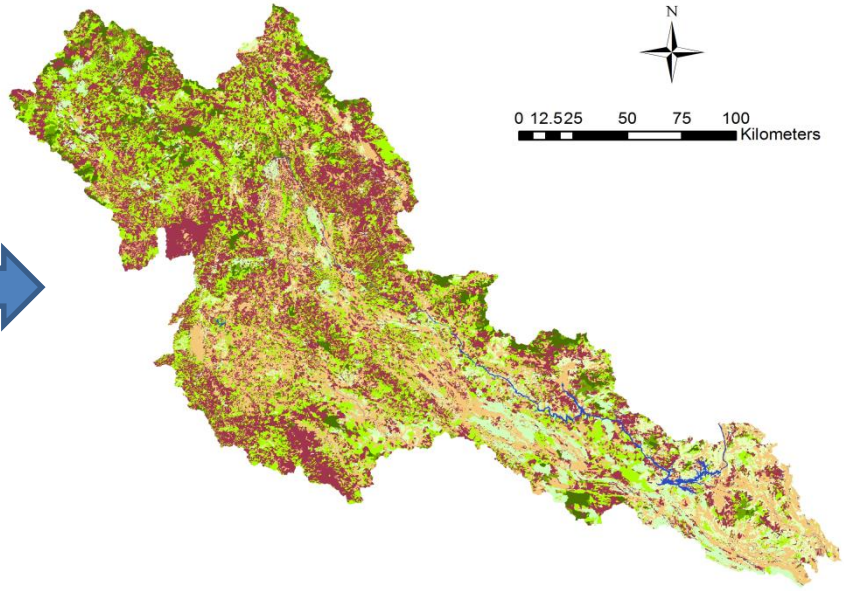
Results

- Projected maps of LULC under the alternative FG scenarios

LULC 2010



LULC 2020: Individual based FG



Legend

- Bareland/Shrub
- Degraded forest
- Non-forest land
- Old growth forest
- Other natural forest
- Planted forest
- Regrowth forest
- Water surface

Concluding Remarks

- We expected that the current State dominated FG and the Community based FG will result in increase in forest cover and forest ecosystem service provision as well.
- We are doing further research to determine the effects of these LULC changes on the provision and values forest ecosystem services.

Thank you!

Welcome questions and comments!