Presentation 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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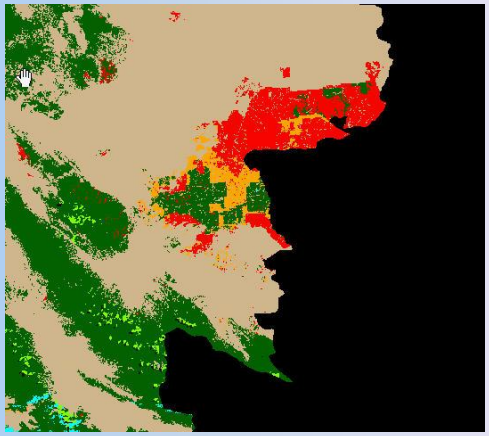
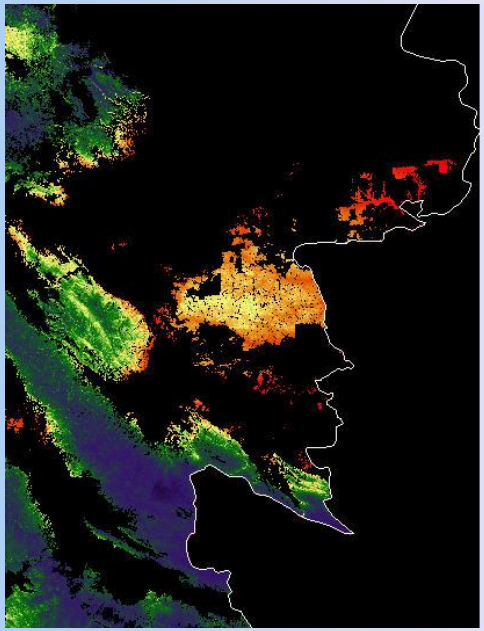
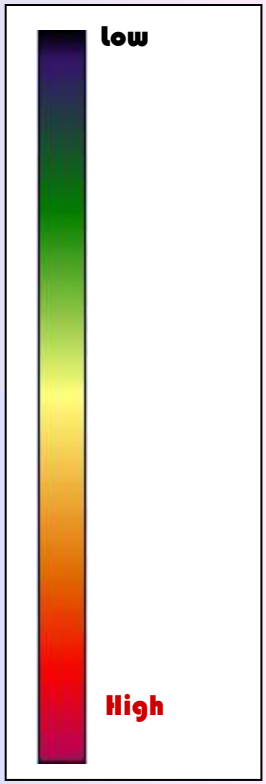
Forest Cover Monitoring and Carbon Project in Sumatra, WCS Indonesia

Bonie Dewantara
Bronx, NY Oct 28, 2010







WILDLIFE CONSERVATION SOCIETY

Forest Cover Monitoring

- Deforestation in Sumatra started in 1900. In the period of 1985 – 1997 forest lost 6.7 million ha or 29 % from the all forest cover (WCS, 2005)
- As the comparison, predicted world deforestation 15 million ha per year. In the period of 1980 – 1999 Asia had deforestation 8,2 % (Contreras-Hermosilla 2000).
- Satellite based remote sensing was used for obtaining information position, condition and the area in a periodic of time and getting more accurate data with consuming shorter time.

- WCS Indonesia Program had collaboration with Conservation International to interpret forest cover change in Sumatra in 10 years period (1990-2000), used "Stacking" method that was developed by Center for Applied Biodiversity Science (CABS), Conservation International, and further developed by WCS IP for raster editing in order to possess accuracy enhancement.
- "Change Detection Analysis" in Sumatra island wide used, Landsat TM and ETM satellite imagery with acquisition date circa 1990 and 2000.
- Interpretation result showing that Sumatera had lost forest in ten years (1990-2000) 5 million ha, or more less 500 thousands ha/year. Decreasing from 19,6 million ha to 14,6 million ha, in average 2,6% per year. Mangrove had lost from 489 thousand ha to 435 million ha.
- Accuracy assessment was done by high resolution imagery IKONOS and QuickBird defined by available image that must be closed to yang Landsat acquisition date. By using randomly 479 points, getting overall accuracy 95,8%.

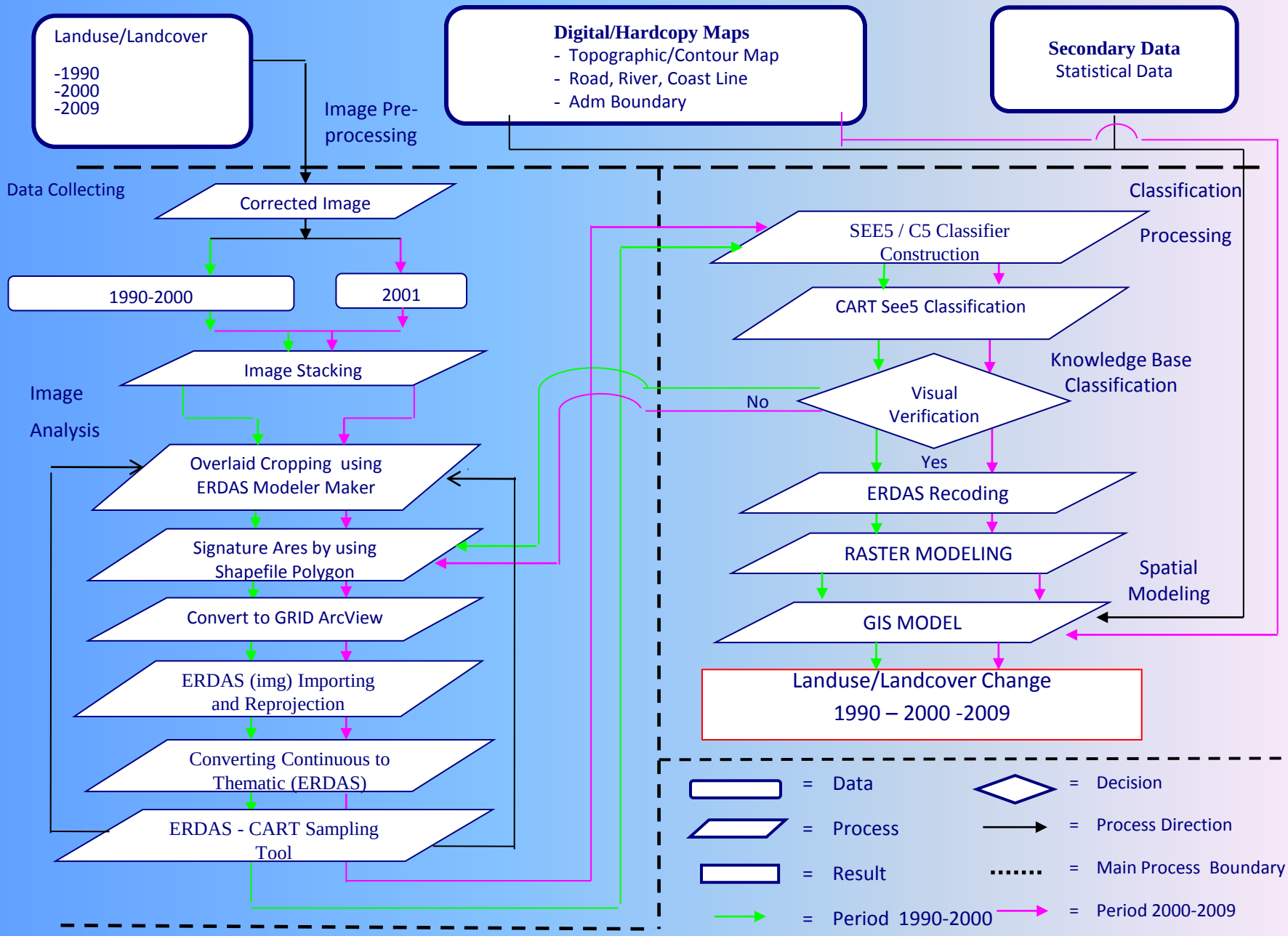
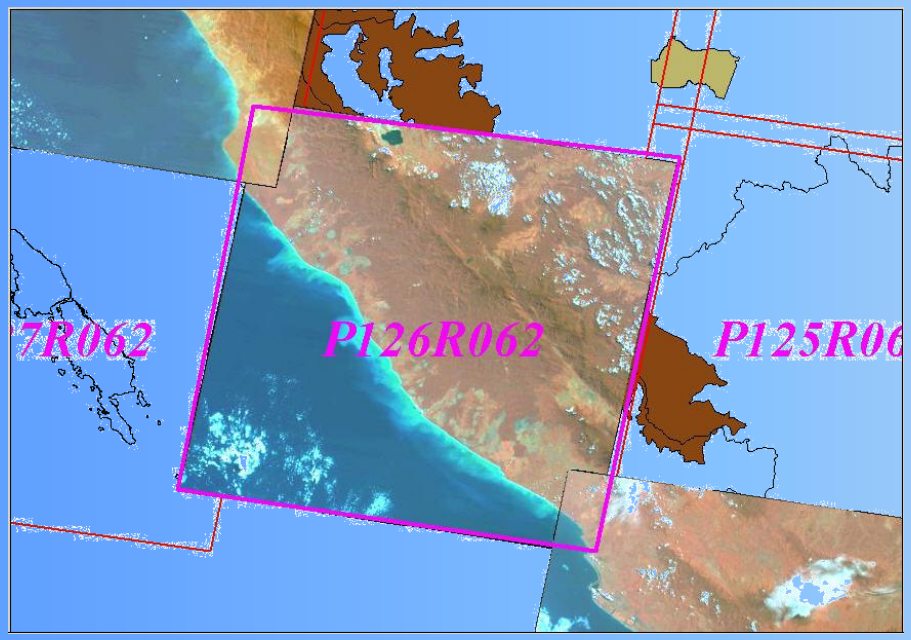
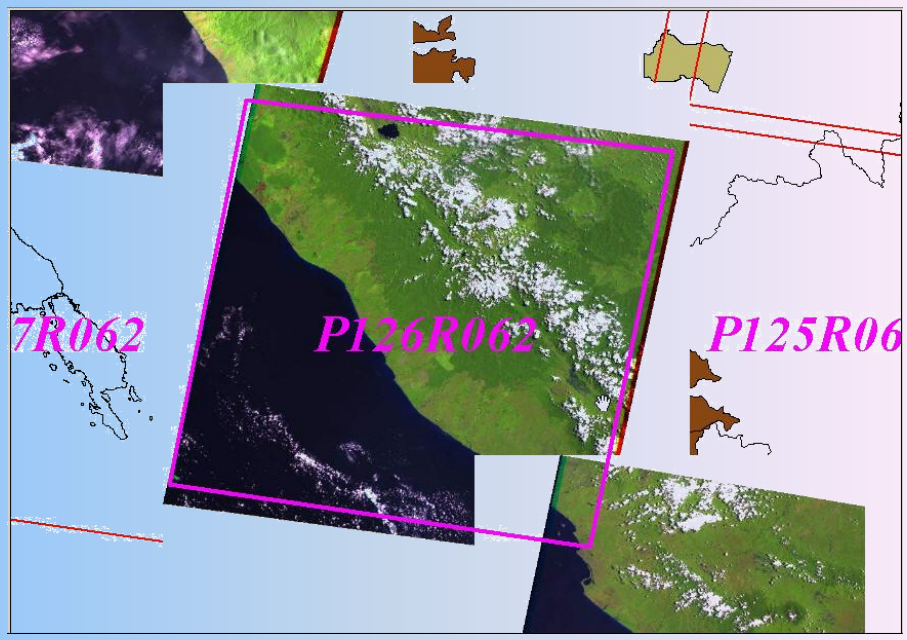


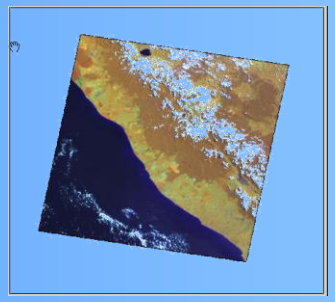
Figure . Flow chart of See5 and MLC Method

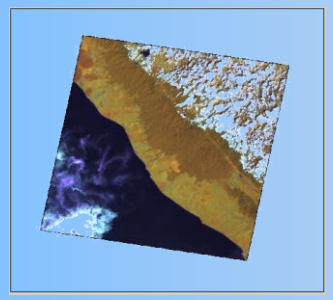
1990

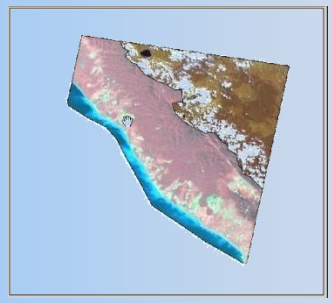
2000

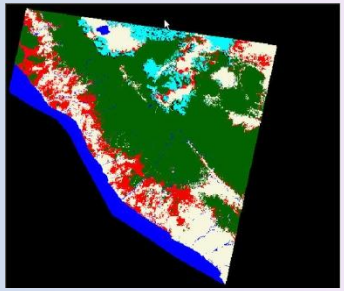








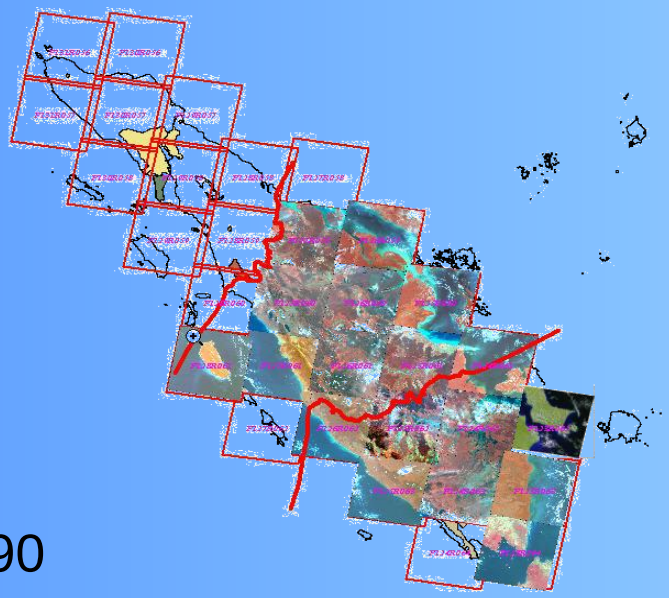




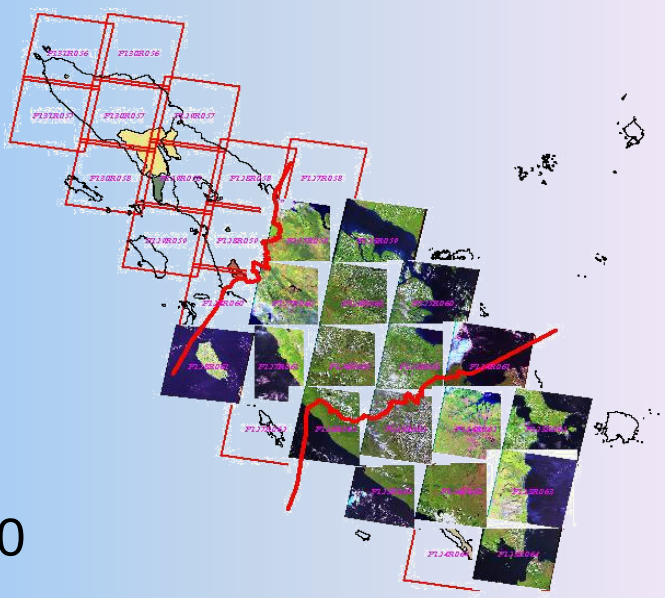
p126r062 1988

p126r062 2000

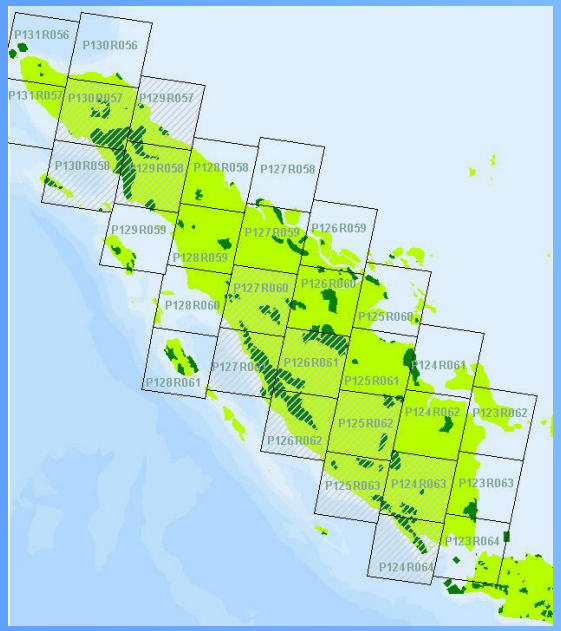
p126r062 2002



1990



2000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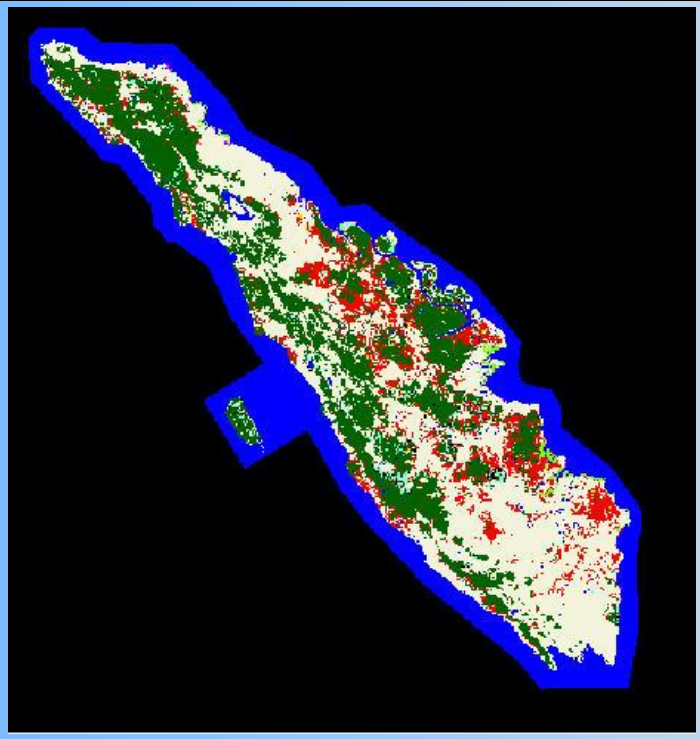
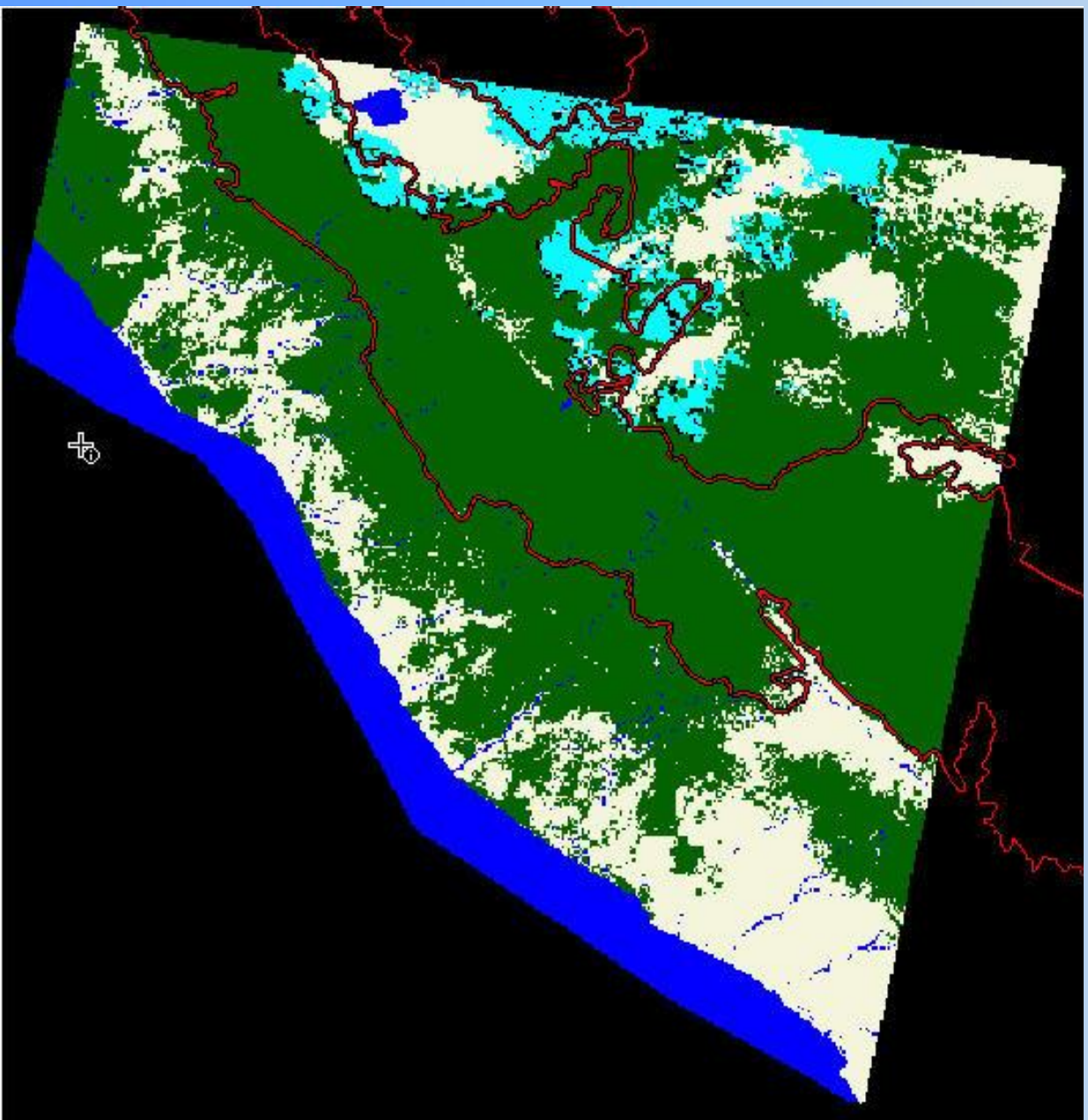
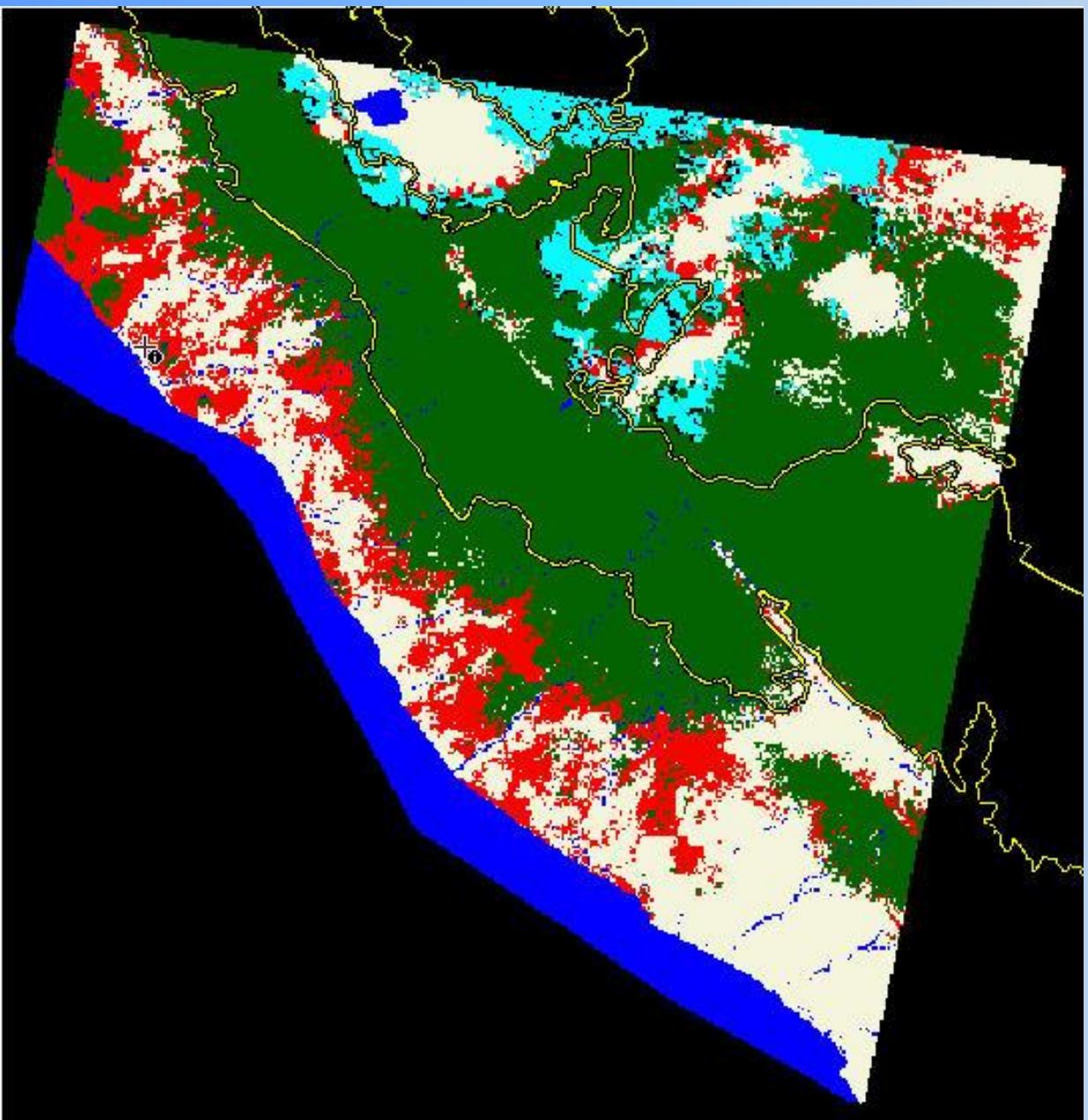


Outcomes



1990

Outcomes

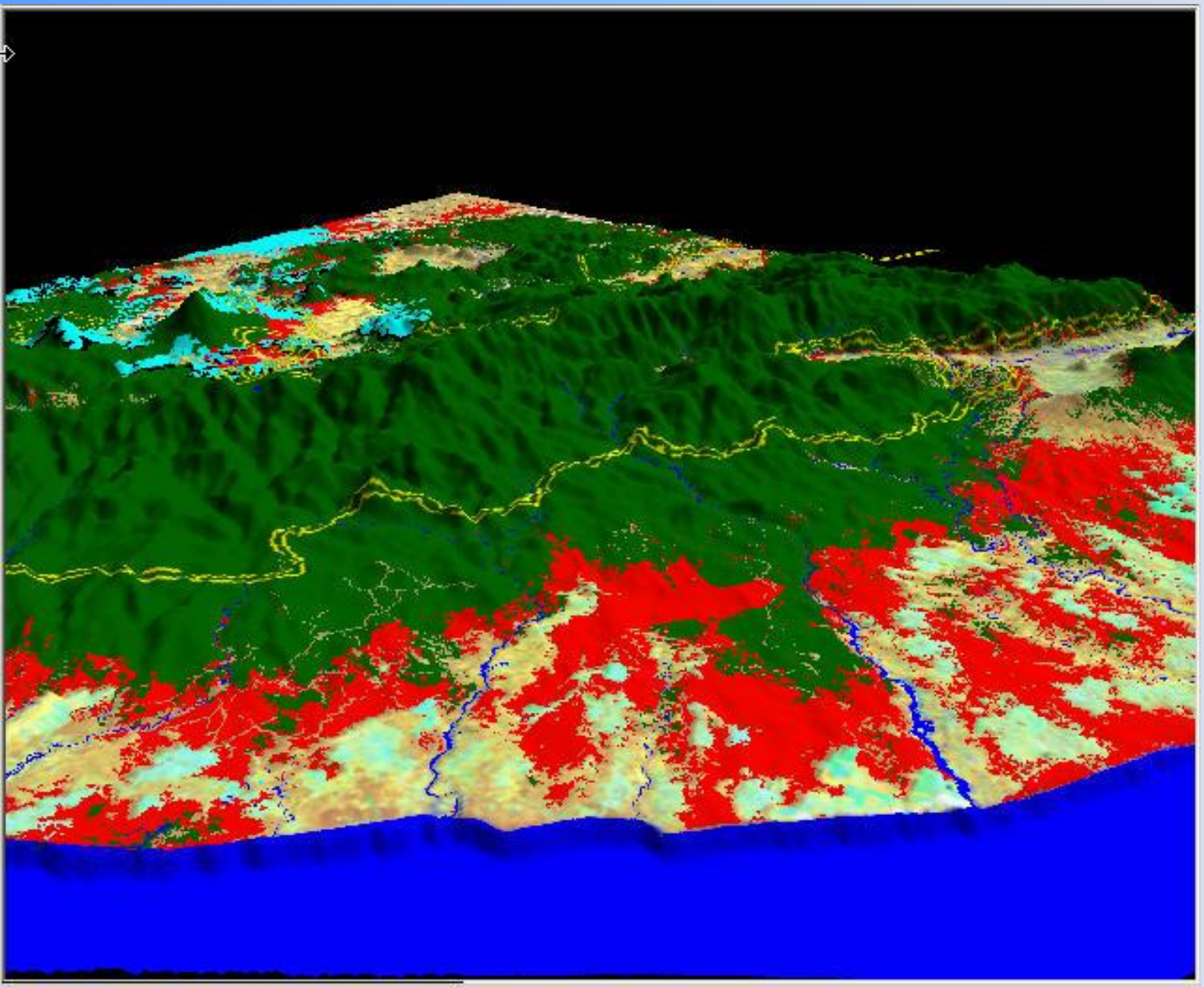


2000

Outcomes

1990

Outcomes



2000

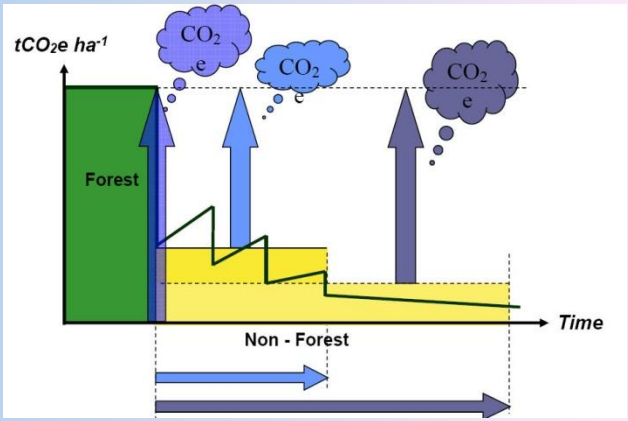
Forest Carbon Project

MENTERI KEHUTANAN
REPUBLIK INDONESIA

KEPUTUSAN MENTERI KEHUTANAN
NOMOR: SK.280/MENHUT-II/20

TENTANG

PENCADANGAN AREAL UNTUK PEMBANGUNAN HUTAN TANAMAN RAKYAT SELUAS ± 19.660 (SEMBILAN BELAS RIBU ENAM RATUS ENAM PULUH) HEKTAR DI KABUPATEN KAUR, PROVINSI BENGKULU



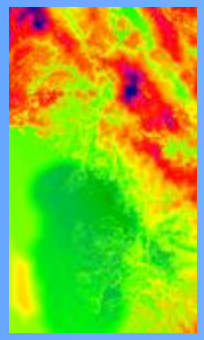
*Analytical and participatory approaches for integrating environmental and social consideration into **policies**, **plans and programs** and evaluate the inter linkages with economic and institutional considerations*

Implementing conservation goals through a sustainable landscape

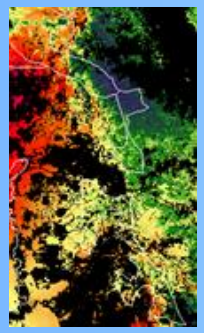
- Require integrating conservation together with land uses which deliver human wellbeing benefits
- Sustainability needs a *holistic* approach
  - Protecting species, ecosystems, and ecological processes
  - Generating sustainable livelihood options, crops land, agricultural, community forest
  - Integrating human wellbeing into regional development planning
- Finding *spatial options* for development that are consistent with allocating biodiversity, eco-settlement, agricultural, crop healthy ecosystems, e.g., REDD, etc

Assessing Tradeoffs for Decision Making

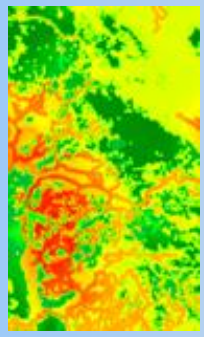
Oil Palm Suitability



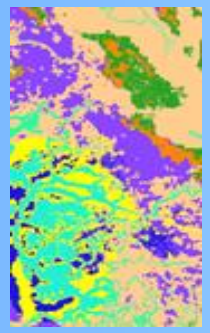
Forest Carbon Potential

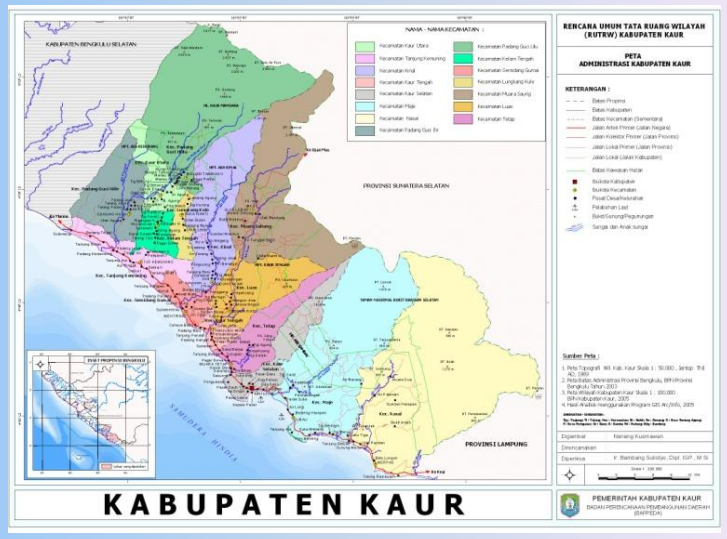


Tiger habitat suitability



Spatial Tradeoffs: Agriculture, Ecosystem Services and Conservation suitability





Spatial Planning

Agenda

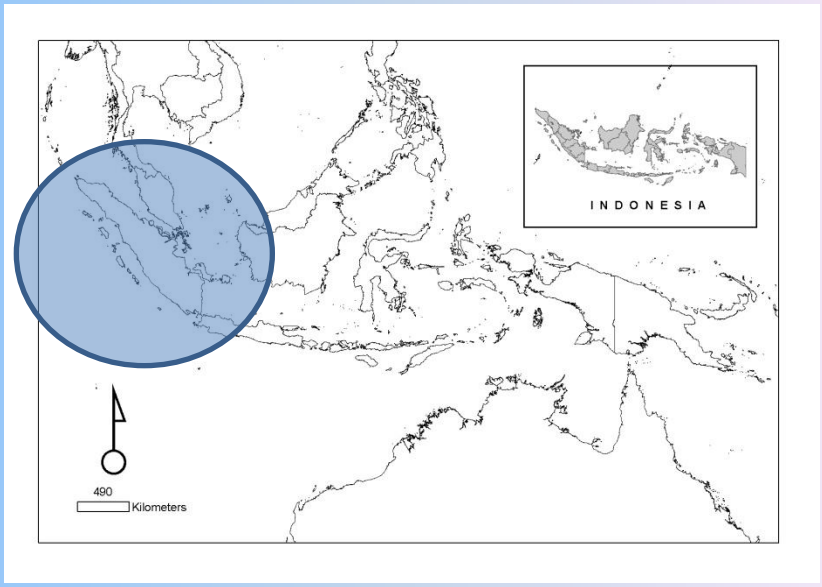
Policy Session

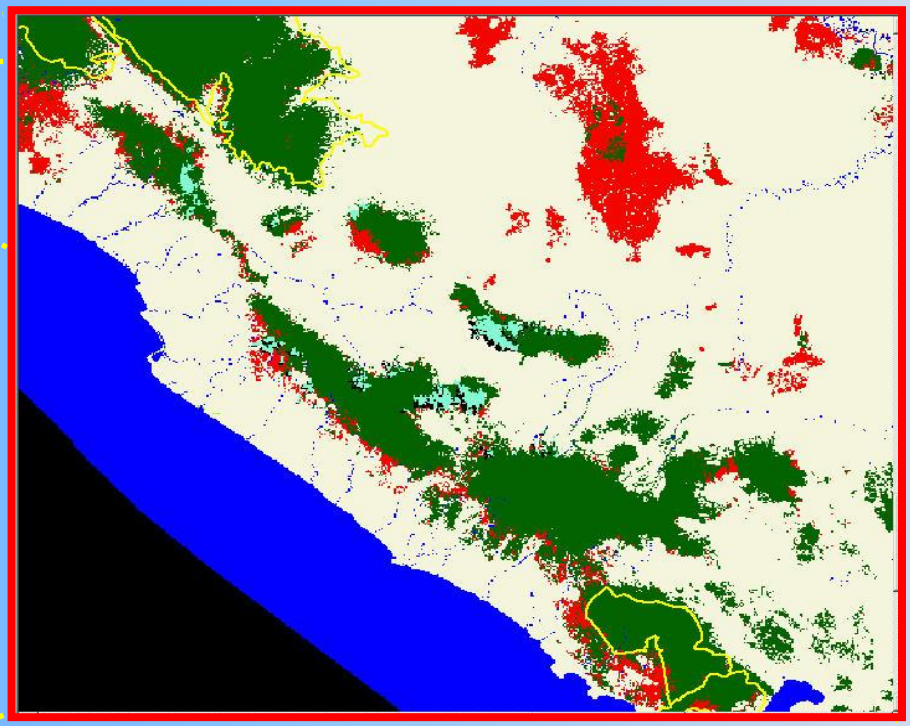
- Case-Study of REDD Demonstration Activities in scope of national level and sub-national level
- Developing institutional model for local government (*loc gov't owned company*)
- Local Regulation must be created by the act of the elected regional-parliament as a basic for LGOC for completely *controlling the mechanism*, *structure*, *rights and obligations shareholder*, and *benefit sharing*, and *other code of conducts*
- LGOC can legally be granted exclusive access to *manage forest* and *carbon market*

Technical Session

- REDD planning on the ground – trade off analysis, with ecologically and economically aspect: Suitability Area for Tiger compare with Suitability Area for Palm Oil
- Landscape planning with REDD. District, sub-district level (Spatial Planning)
- Developing baseline, monitoring and modeling.
- Follow up the steps of Project Design Documents (PDD), project activities, baseline and monitoring method, environmental impact, stakeholders comment
- REDD Readiness.

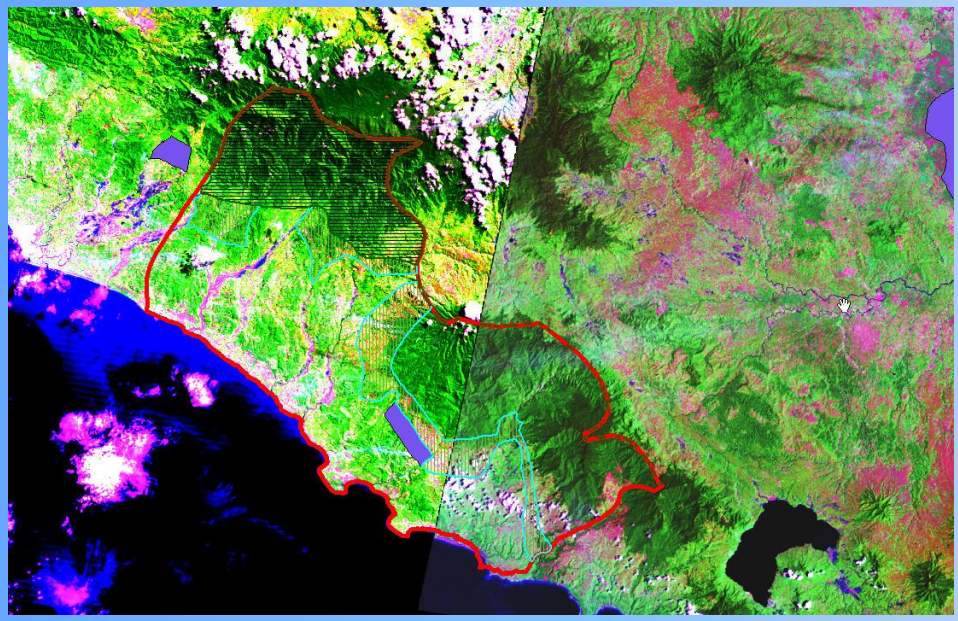
1. Develop Project Idea Note (feasibility study)
   1a. Identify drivers of deforestation & additionallity
   1b. Analysis of existing deforestation rates
   1c. Choose VCS carbon accounting methodology
   1d. Estimate potential carbon emission reductions
2. Discuss with host government
3. Seek project development funding
4. Project Design
   - Including collection of data for current and future baseline assessment
5. Creation of PDD
6. Host Country Approval
   - Including legal mechanisms for carbon ownership and disbursement of carbon funds
7. Project Validation
8. Project Registration
9. Project Implementation
10. Verification
11. Credit Issuance

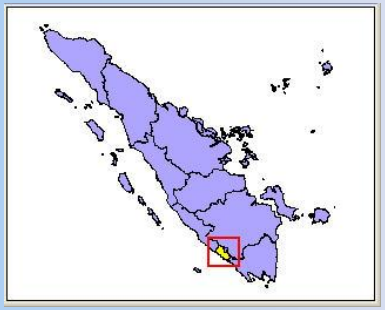

INDONESIA
490
Kilometers

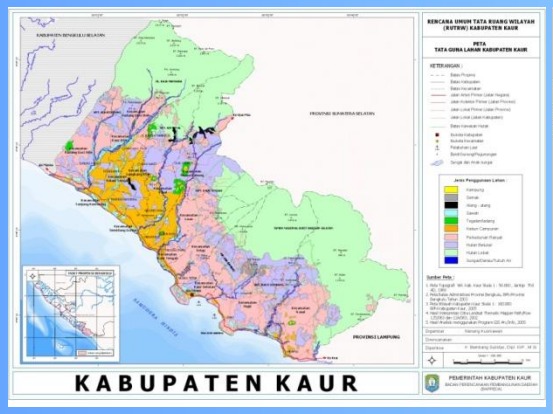


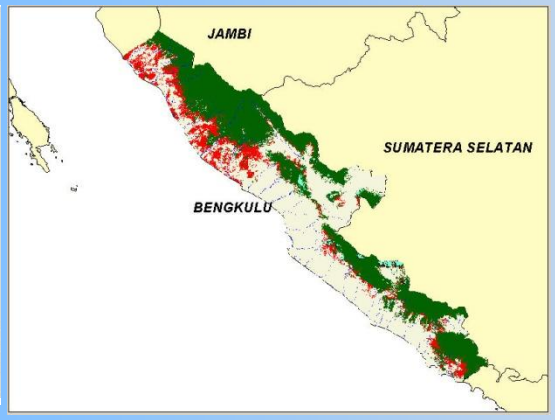
Develop Project Idea Note (feasibility study)

Project Site





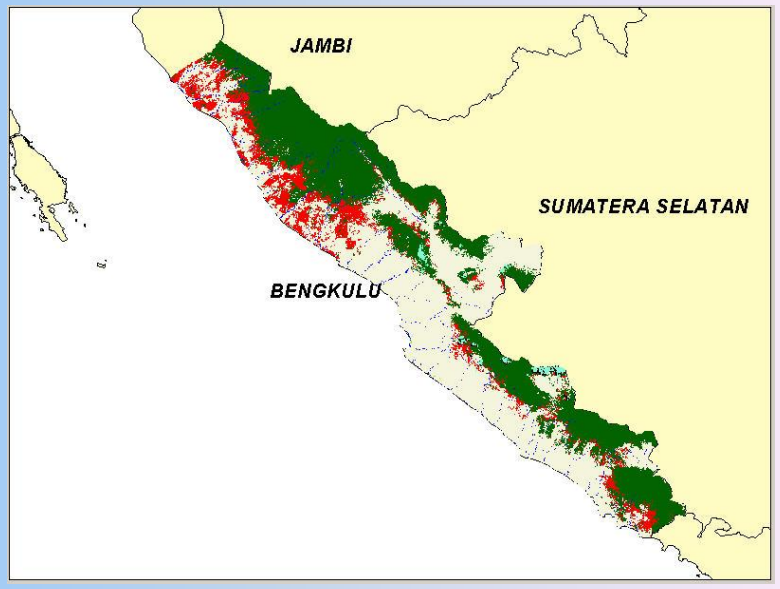


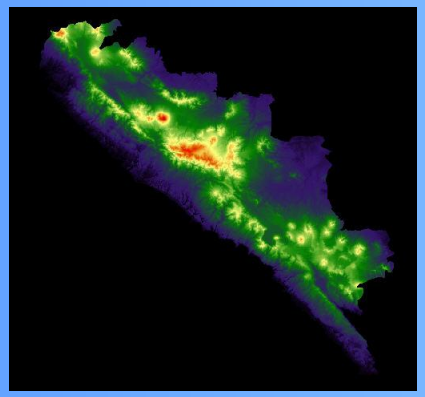


Identify drivers of deforestation & additionallity

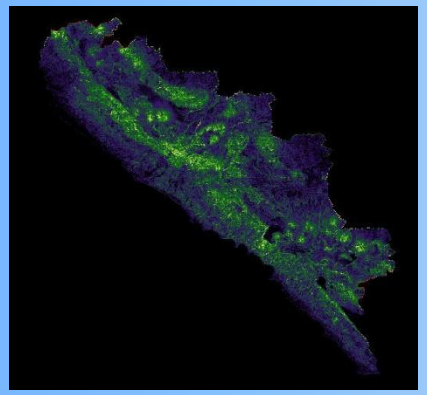
Driving Factor of Deforestation (Potential Deforestation Model)

- Elevation
- Slope
- Aspect
- Distance to cities
- Distance to Forest Concession Area
- Distance to Forest Estate Area
- Distance to Plantation Area
- Distance to River
- Distance to Main Road
- Distance to Transmigration Area

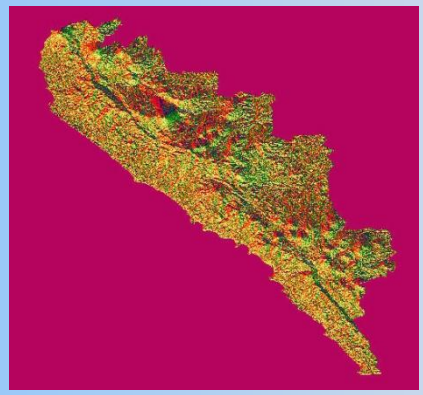




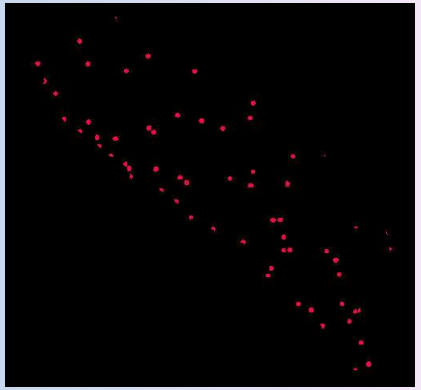
Elevation



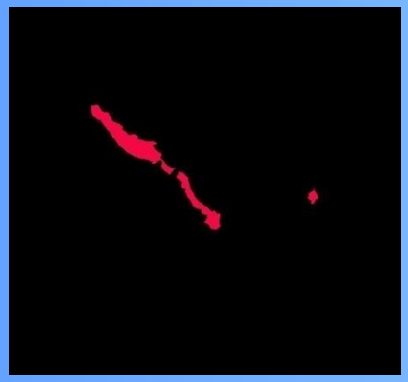
Slope



Aspect

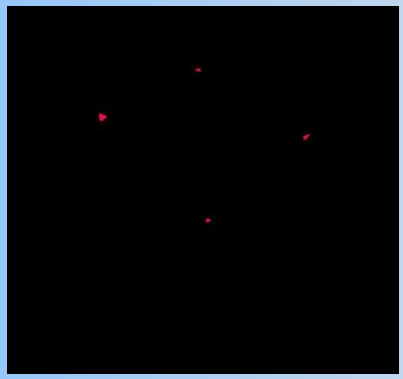


Dist to City



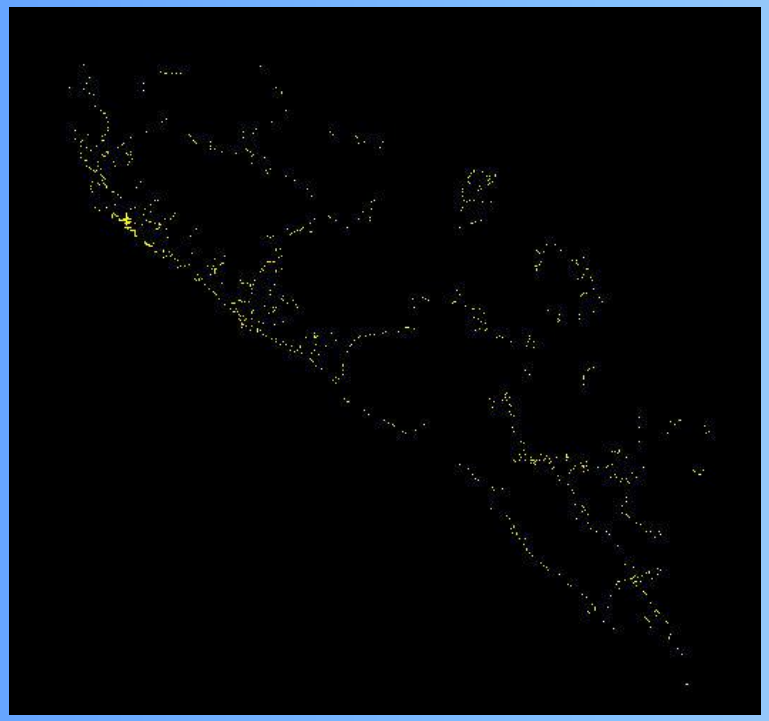
Forest Concession

Forest Estate

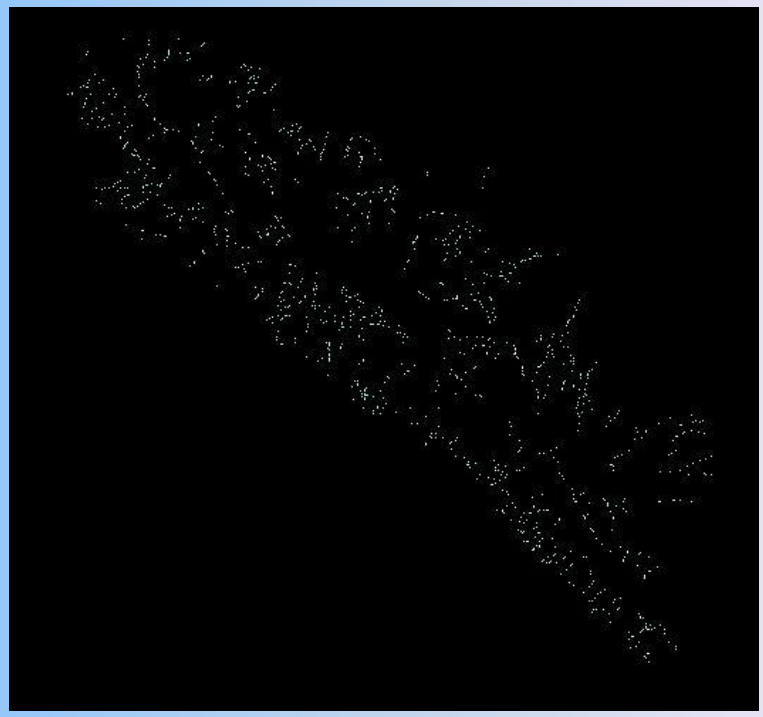


Plantation

Transmigration



Road



River

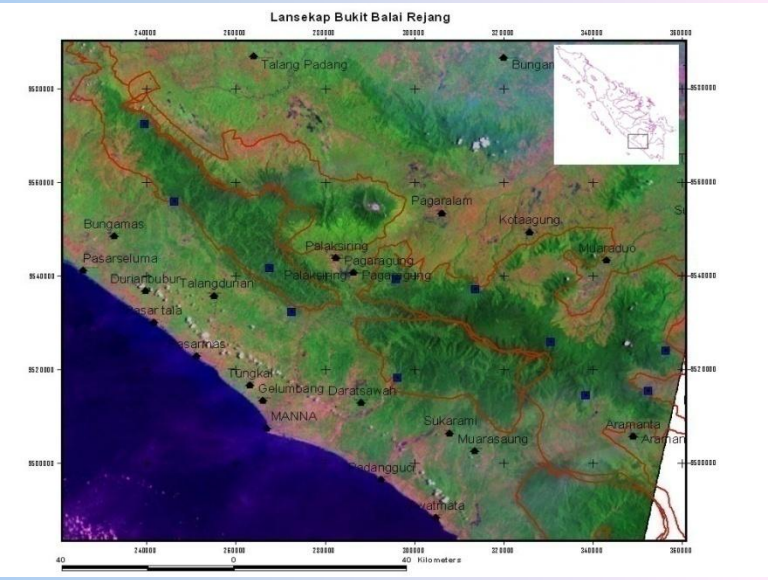
Method & Survey Design

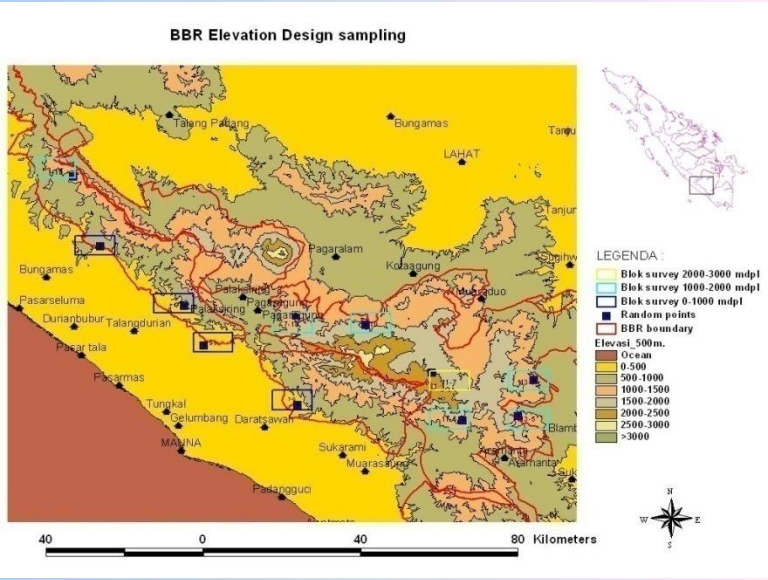
Method :

- Voluntary Carbon Standard (VCS)

Survey :

- GIS Analysis : Survey Area (Forest Cover), Stratification (altitude)
- Sampling Design
- Field Survey Data
- Survey Equipment





DBH meter

Ultrasonic range finder

Laser Hypsometer

Compass

GPS

Meter Tape

Plot Design / Field Data Collecting

- Small Plot

  Radius: 5.64 m = 0.01 ha

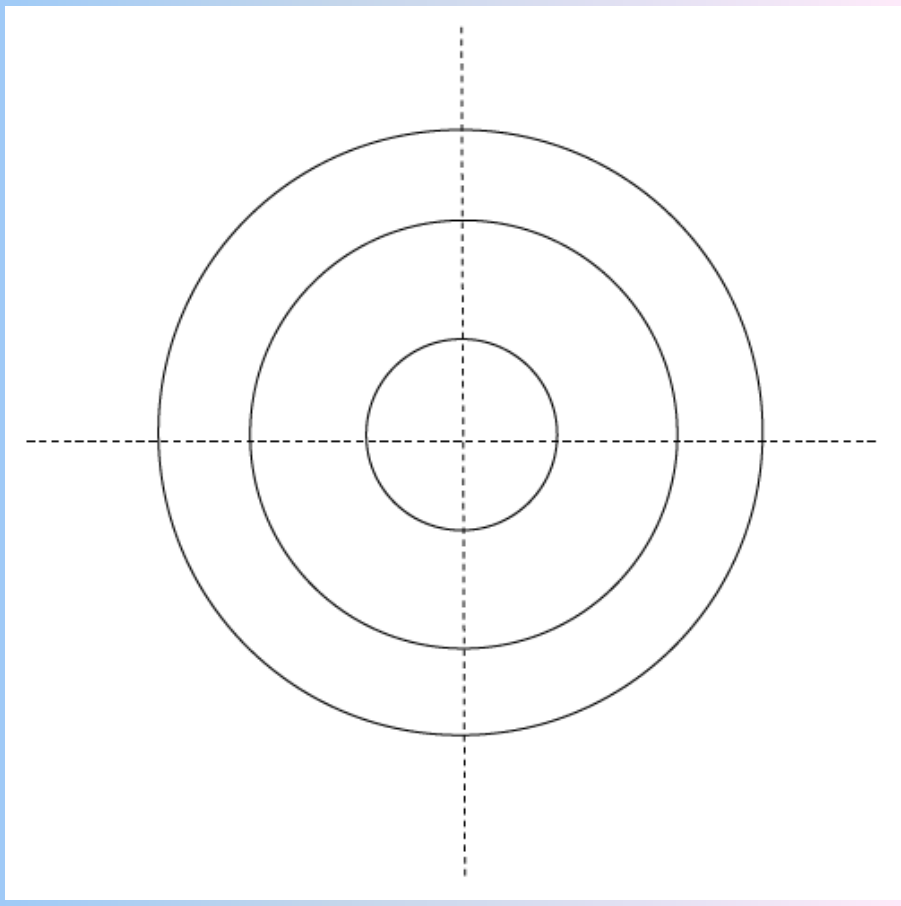
  Tree: 5 – 20 cm DBH
- Medium Plot

  Radius: 12.62 m = 0.05 ha

  Tree: 20-50 cm DBH
- Big Plot

  Radius: 17.84 m = 0.10 ha

  Tree: > 50 cm



Ground Survey Result

- Biodiversity Index (Shannon index) 4.5, dominated by family *Euphorbiaceae* and *Lauraceae*
- Carbon stock per altitude

  0-1000 = 200-300 ton/ha

  1000-2000 = 250-350 ton/ha

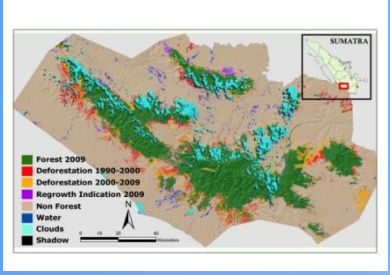
  > 2000 = 350-500 ton/ha
- Average Carbon stock 300 ton/ha

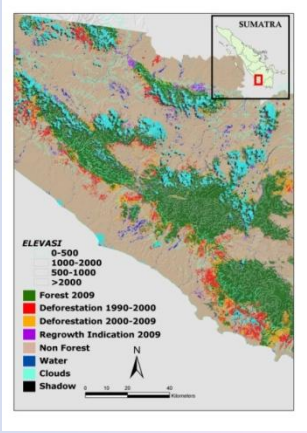
Note : unincluded dead wood and wood density

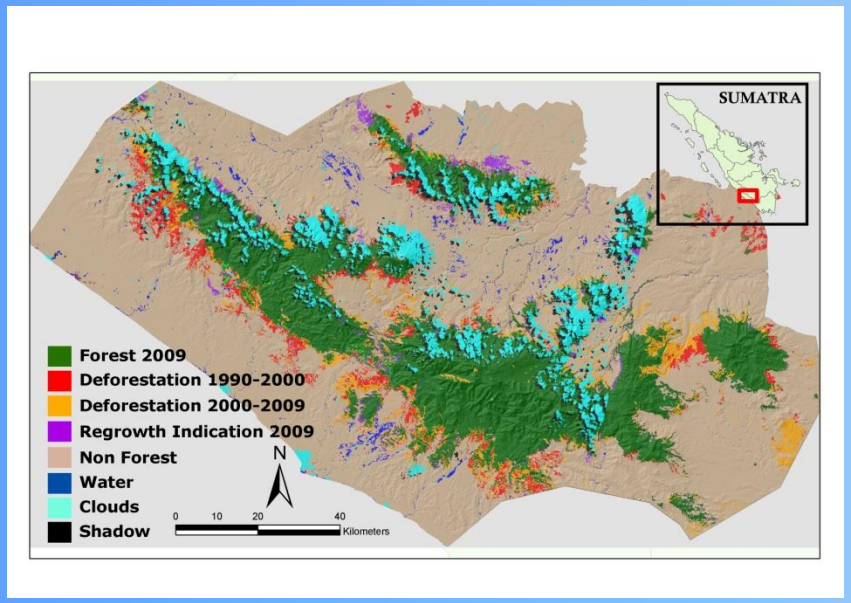
Elevation (m)	Forest 2010 (Ha)	Av. Carbon (TC/Ha)	Total TC 2010	Predicted loss by 2020 (Ha)	Predicted loss TC by 2020	Emission TCO^2e 2010-2020
0-500	28,271	205	5,806,157	12,767	2,622,074	9,615,146
500-1000	96,042	266	25,512,478	50,092	13,306,377	48,794,485
1000-1500	69,105	253	17,483,166	26,741	6,765,357	24,808,563
1500-2000	47,671	243	11,575,942	15,005	3,643,553	13,360,908
2000-2500	29,203	334	9,745,893	5,596	1,867,398	6,847,750
>2500	4,667	400	1,866,698	815	325,922	1,195,157
Total	**274,959**	**-**	**71,990,335**	**111,015**	**28,530,681**	**104,622,008**

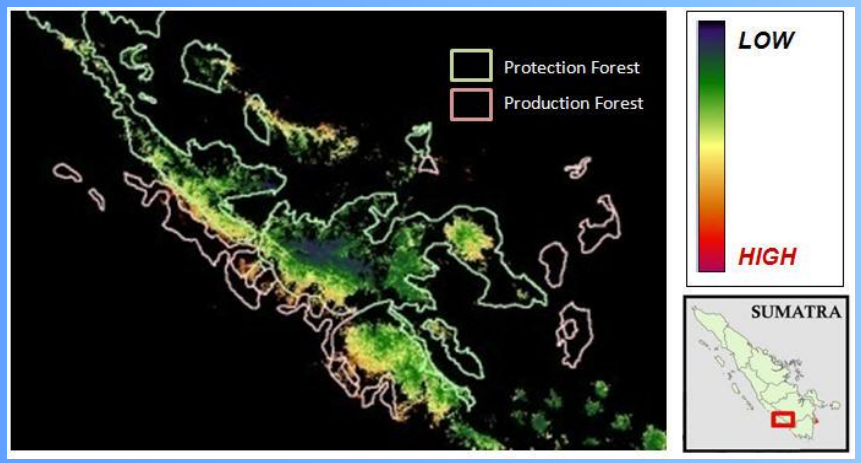
Probability	Median	Total (Ha)	2010 area by elevation range (Ha)					
			0-500	-1000	-1500	-2000	-2500	> 2500
0.0-0.1	0.05	0	0	0	0	0	0	0
0.1-0.2	0.15	21,474	0	0	0	0	17,932	3,542
0.2-0.3	0.25	61,974	15,430	2	9,378	25,653	10,409	1,102
0.3-0.4	0.35	63,135	1,334	11,758	34,069	15,107	844	23
0.4-0.5	0.45	58,393	0	34,886	18,188	5,301	18	0
0.5-0.6	0.55	33,774	0	26,546	5,903	1,325	0	0
0.6-0.7	0.65	20,715	3,429	15,676	1,366	244	0	0
0.7-0.8	0.75	13,123	6,747	6,162	176	38	0	0
0.8-0.9	0.85	2,085	1,107	951	24	3	0	0
0.9-1.0	0.95	286	224	61	1	0	0	0
Total		**274,959**	**28,271**	**96,042**	**69,105**	**47,671**	**29,203**	**4,667**

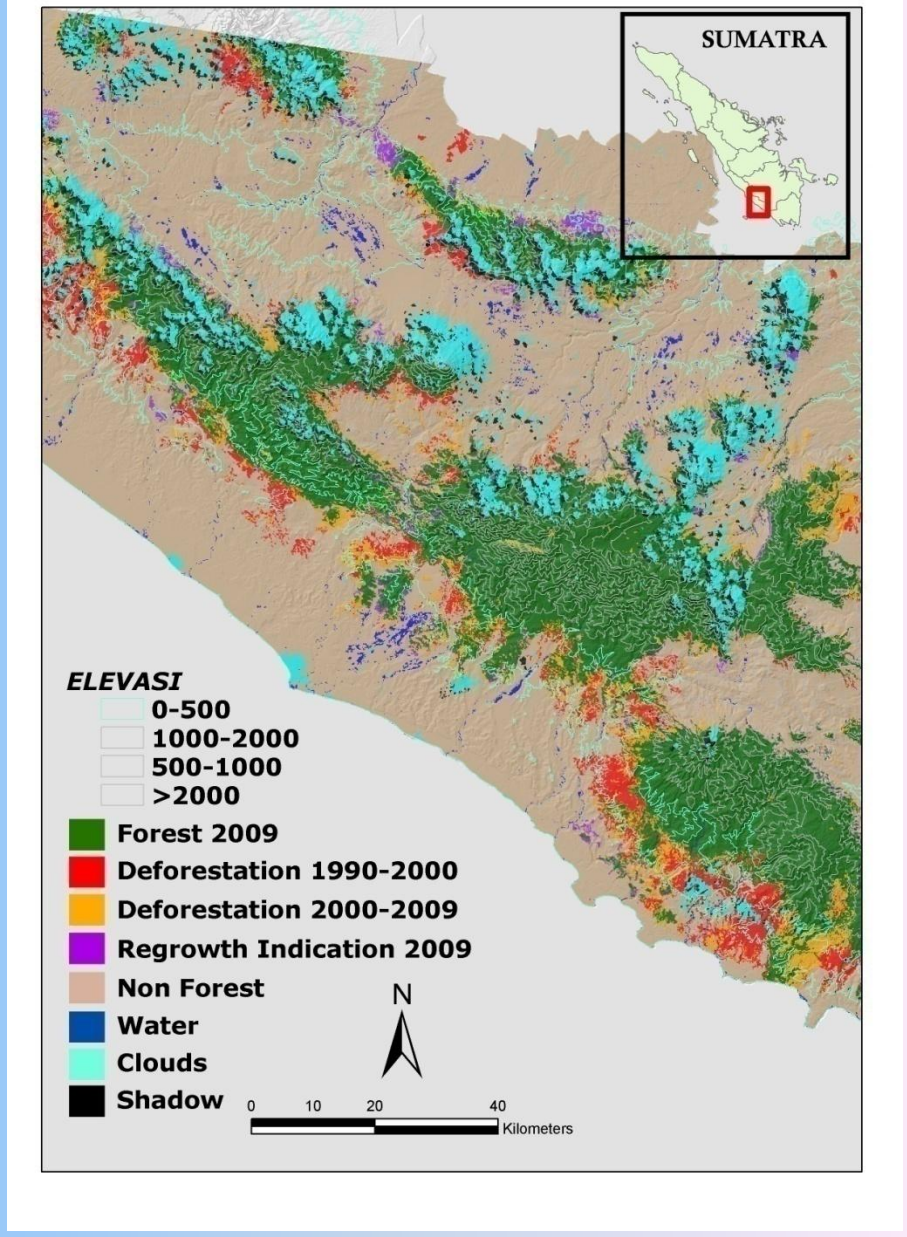
- Need fixed boundary from Pemda, in order to consequently area calculation.
- Need yearly deforestation prediction for Kaur District

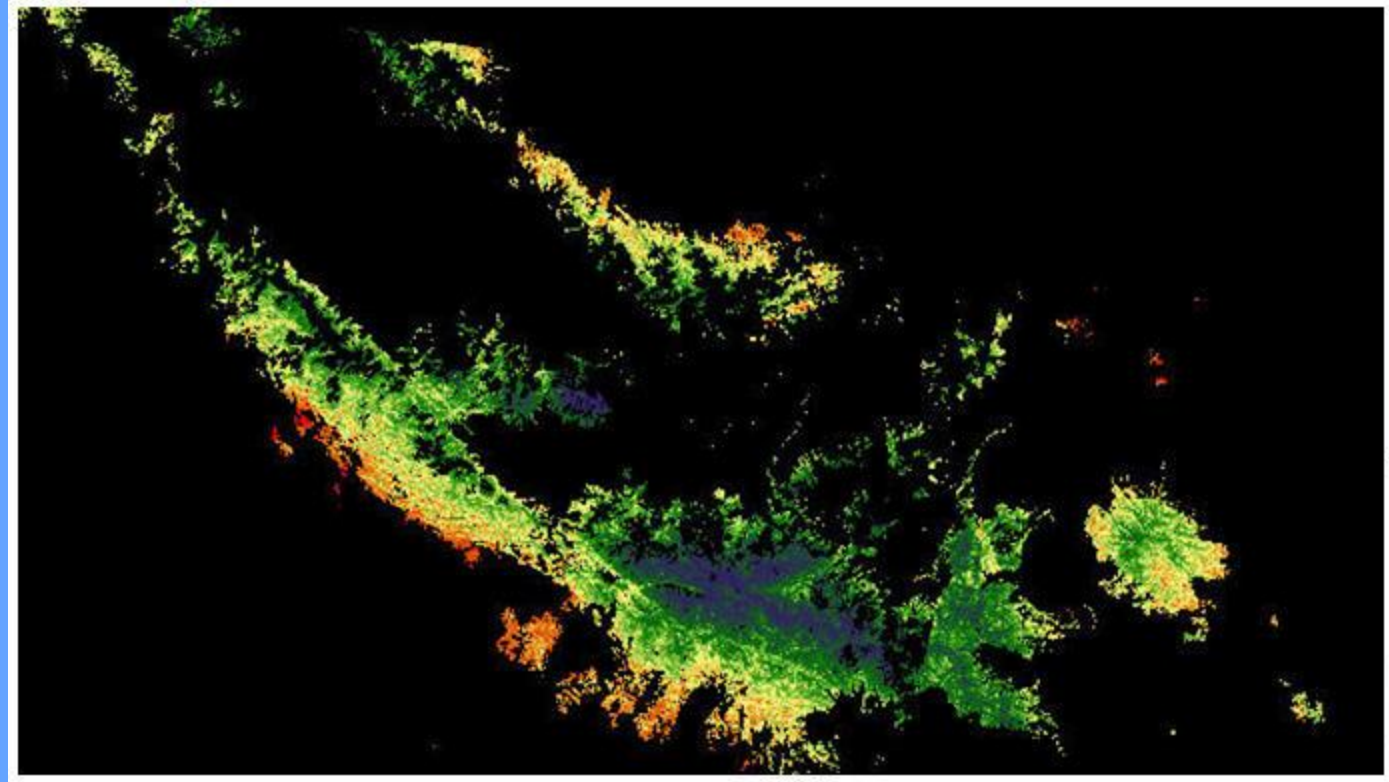


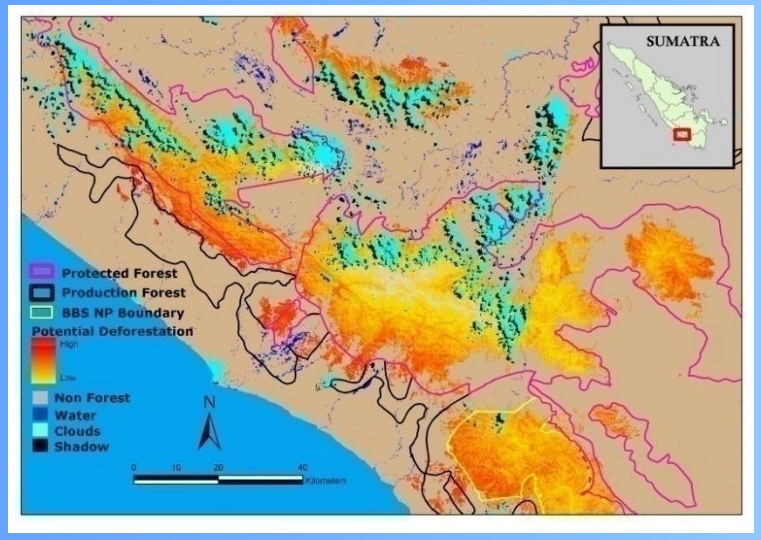


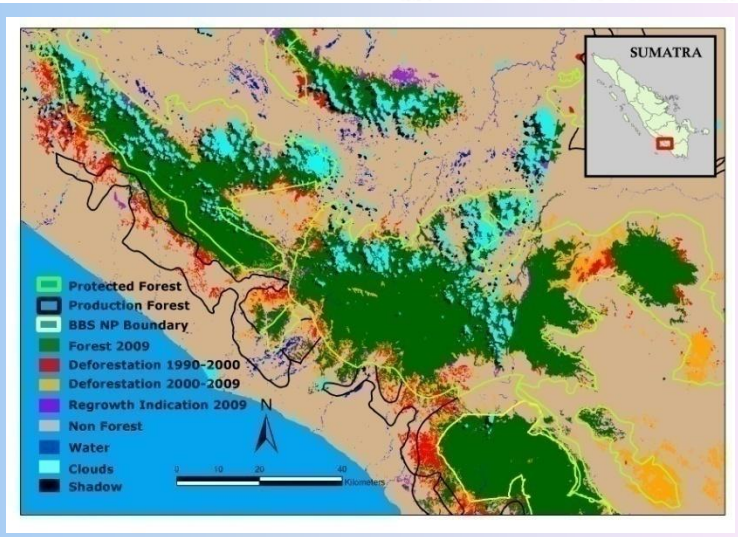

SUMATRA
Forest 2009
Deforestation 1990-2000
Deforestation 2000-2009
Regrowth Indication 2009
Non Forest
Water
Clouds
Shadow
N
0 10 20 40
Kilometers


Protection Forest
Production Forest
LOW
HIGH
SUMATRA

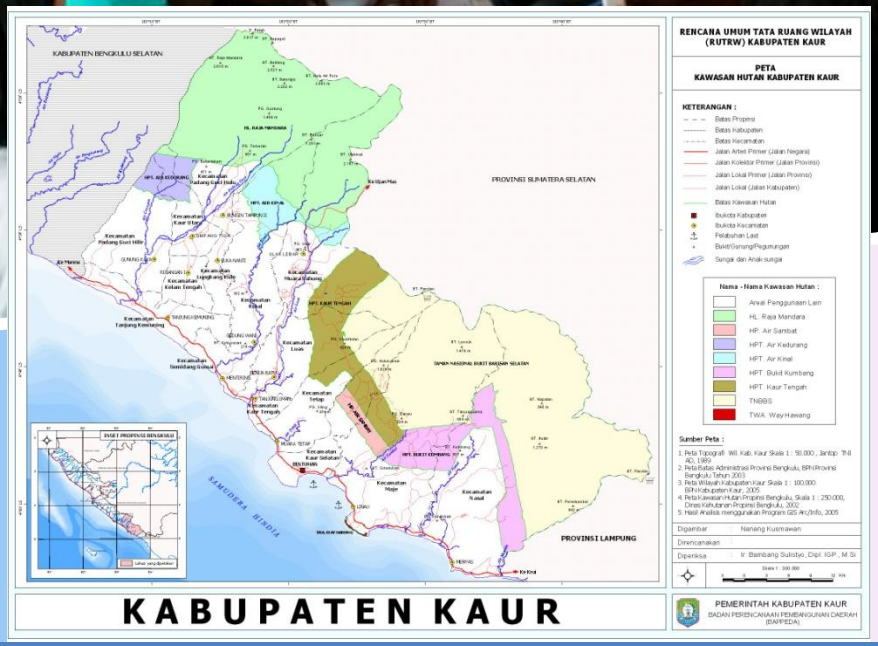

SUMATRA
ELEVASI
0-500
1000-2000
500-1000
>2000
Forest 2009
Deforestation 1990-2000
Deforestation 2000-2009
Regrowth Indication 2009
Non Forest
Water
Clouds
Shadow
N
0 10 20 40
Kilometers


LOW
HIGH
SUMATRA

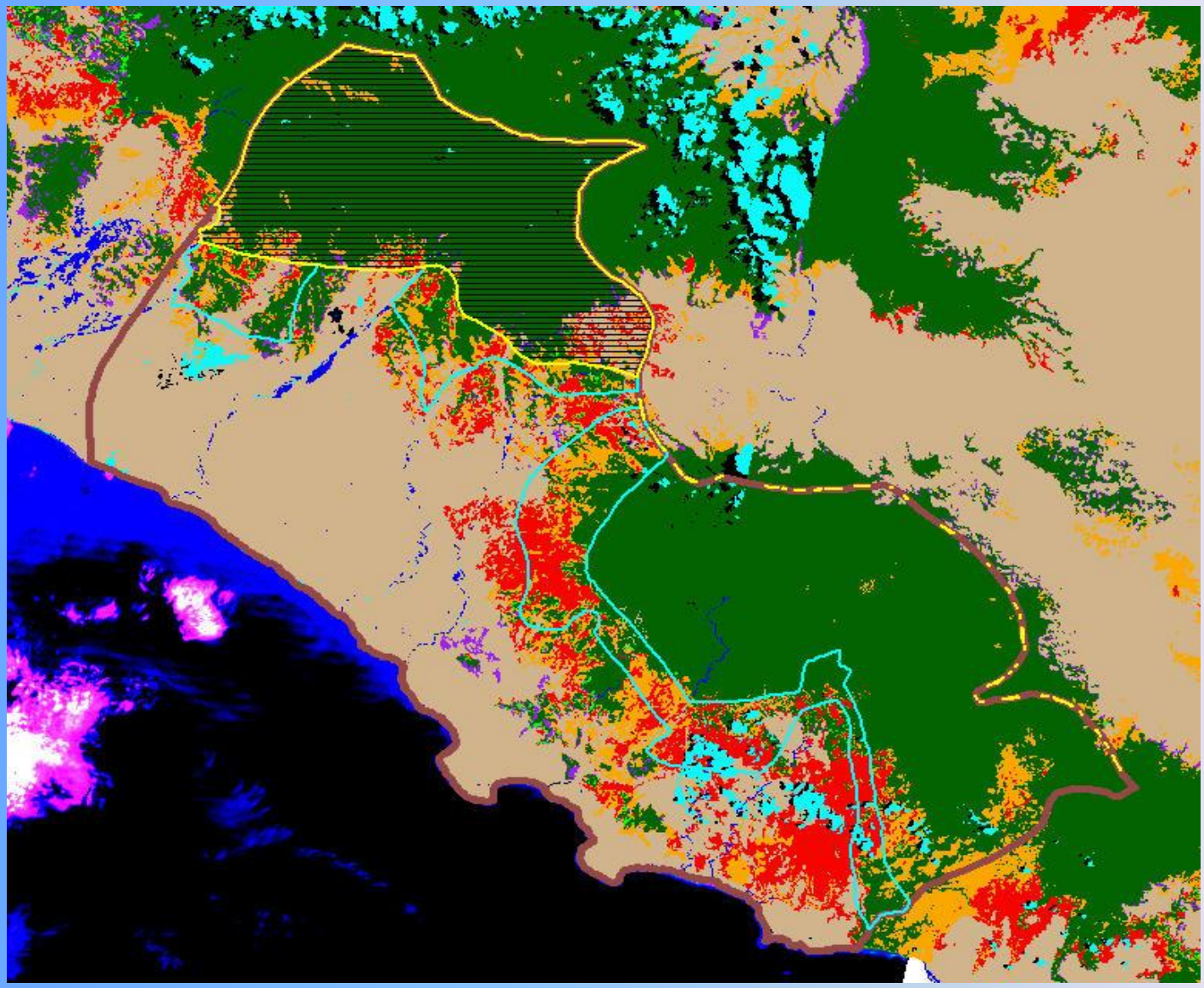

SUMATRA
Protected Forest
Production Forest
BBS NP Boundary
Potential Deforestation
High
Low
Non Forest
Water
Clouds
Shadow
N
0 10 20 40
Kilometers

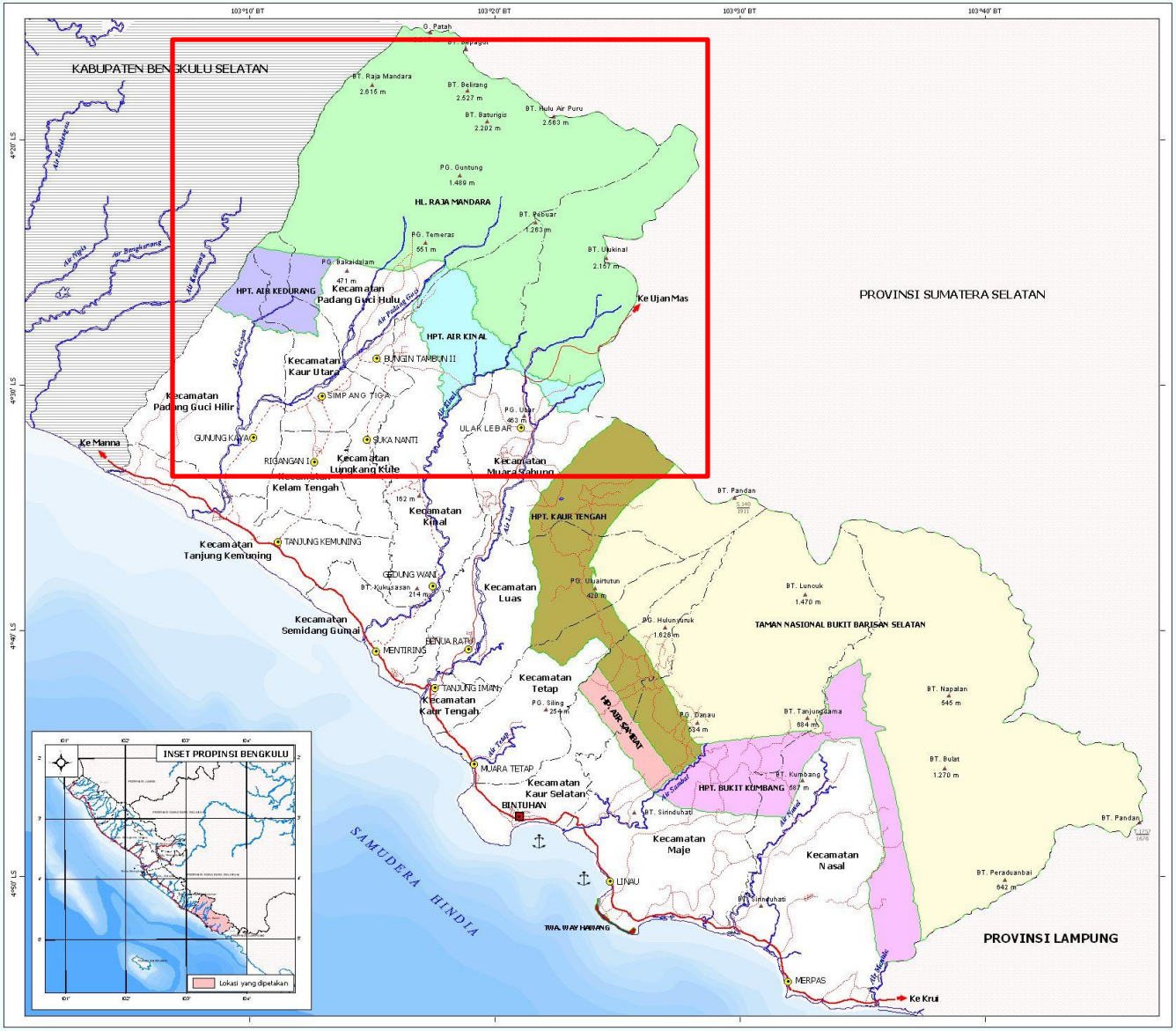

SUMATRA
Protected Forest
Production Forest
BBS NP Boundary
Forest 2009
Deforestation 1990-2000
Deforestation 2000-2009
Regrowth Indication 2009
Non Forest
Water
Clouds
Shadow
N
0 10 20 40
Kilometers

Community Forest Engagement



As an approach for Carbon Project site





KABUPATEN KAUR

RENCANA UMUM TATA RUANG WILAYAH (RUTRW) KABUPATEN KAUR

PETA KAWASAN HUTAN KABUPATEN KAUR

KETERANGAN :

- Batas Propinsi
- Batas Kabupaten
- Batas Kecamatan
- Jalan Arteri Primer (Jalan Negara)
- Jalan Kolektor Primer (Jalan Provinsi)
- Jalan Lokal Primer (Jalan Provinsi)
- Jalan Lokal (Jalan Kabupaten)
- Batas Kawasan Hutan
- Ibukota Kabupaten
- Ibukota Kecamatan
- Pelabuhan Laut
- Bukit/Gunung/Pegunungan
- Sungai dan Anak sungai

Nama - Nama Kawasan Hutan :

- Areal Penggunaan Lain
- HL. Raja Mandara
- HP. Air Sambat
- HPT. Air Kedurang
- HPT. Air Kinal
- HPT. Bukit Kumbang
- HPT. Kaur Tengah
- TNBBS
- TWA. Way Hawang

Sumber Peta :

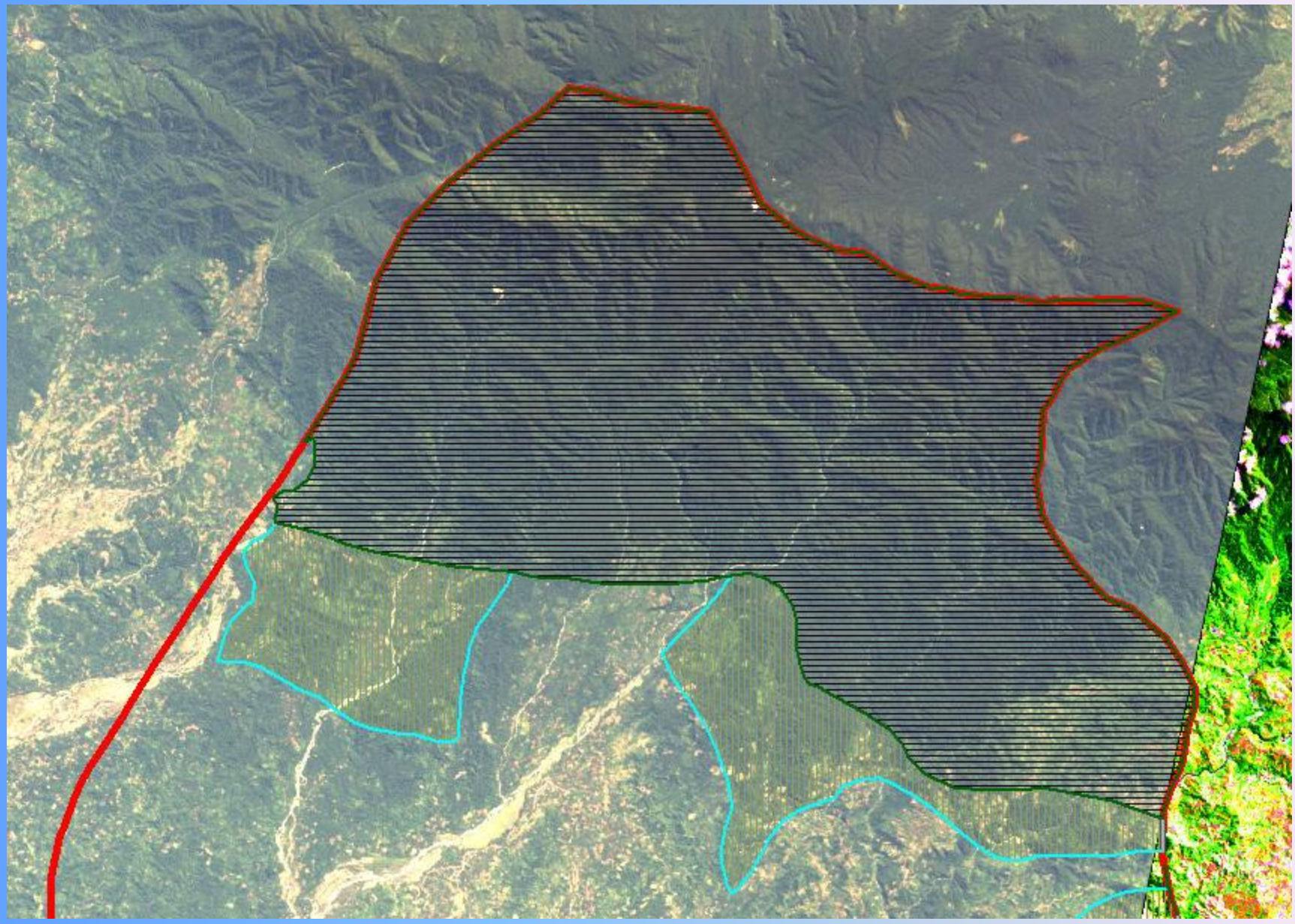
1. Peta Topografi Wil. Kab. Kaur Skala 1 : 50.000 , Jantop TNI AD, 1989
2. Peta Batas Administrasi Provinsi Bengkulu, BPN Provinsi Bengkulu Tahun 2003
3. Peta Wilayah Kabupaten Kaur Skala 1 : 100.000 BPN Kabupaten Kaur, 2005
4. Peta Kawasan Hutan Propinsi Bengkulu, Skala 1 : 250.000, Dinas Kehutanan Propinsi Bengkulu, 2002
5. Hasil Analisis menggunakan Program GIS Arc/Info, 2005

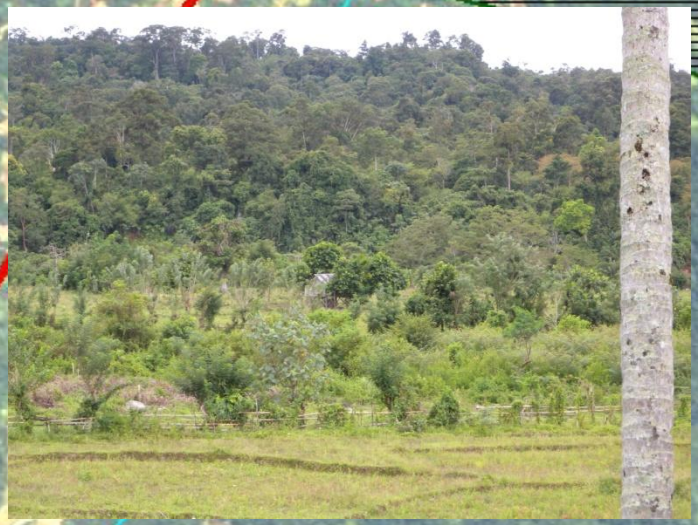
Digambar	:	Nanang Kusmawan
Direncanakan	:	
Diperiksa	:	Ir. Bambang Sulistyo, Dipl. IGP., M.Si

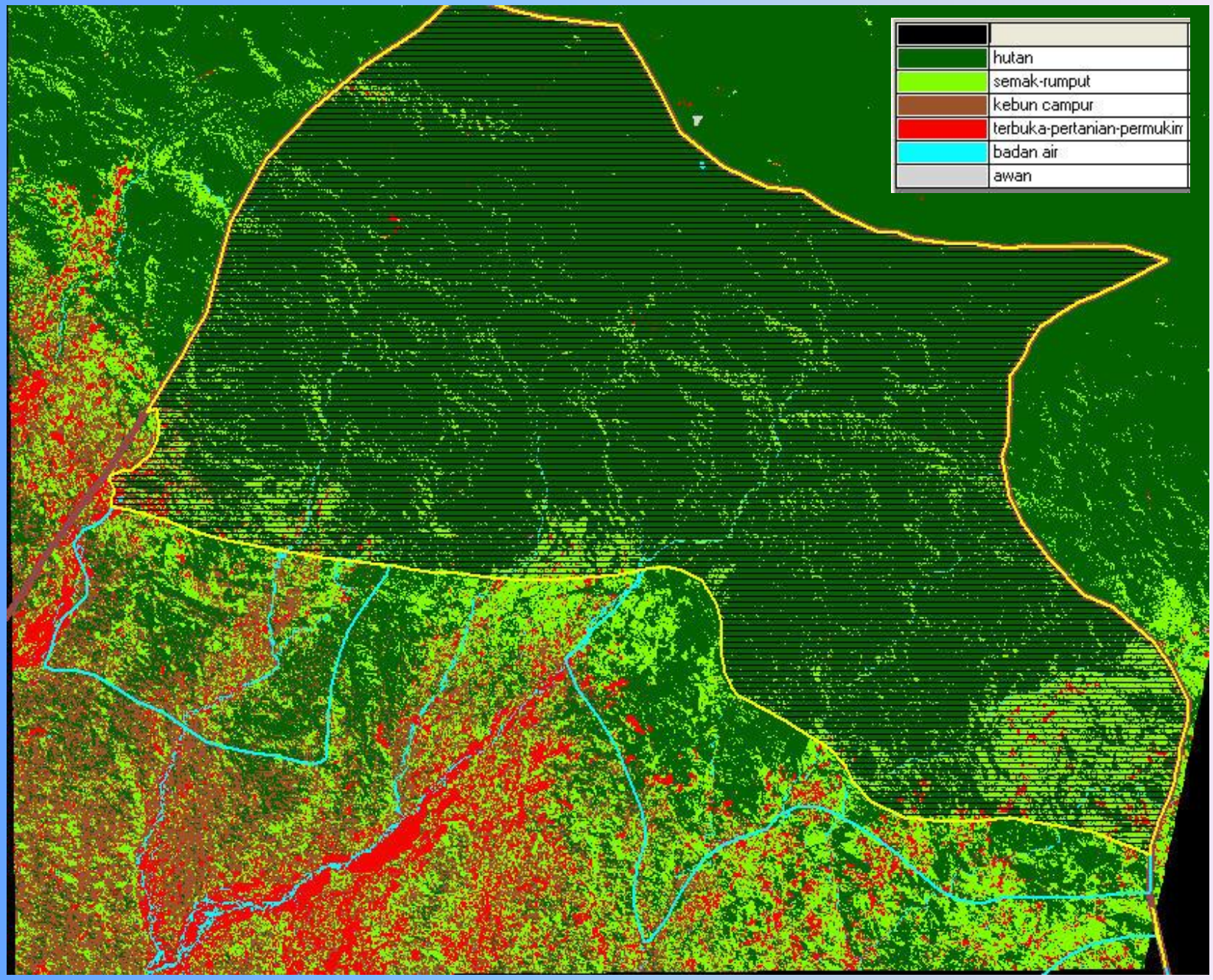
Skala 1 : 300.000

3 0 3 6 9 12 Km

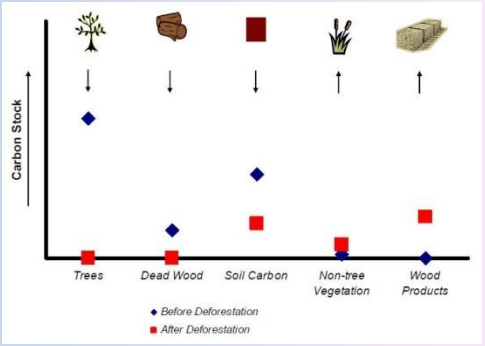
PEMERINTAH KABUPATEN KAUR
BADAN PERENCANAAN PEMBANGUNAN DAERAH (BAPPEDA)






hutan
semak-rumput
kebun campur
terbuka-pertanian-permukim
badan air
awan

Strategic Planning



- Limited Forest Production (HPT):
  - Air Kedurang 4.055,32 ha
  - Air Kinai 5.567,77 ha

- Continue to HPT Kaur Tengah and HPT Bukit Kumbang with total area 13.932,27 and 10.732,91 ha, where adjacent area with BBS NP

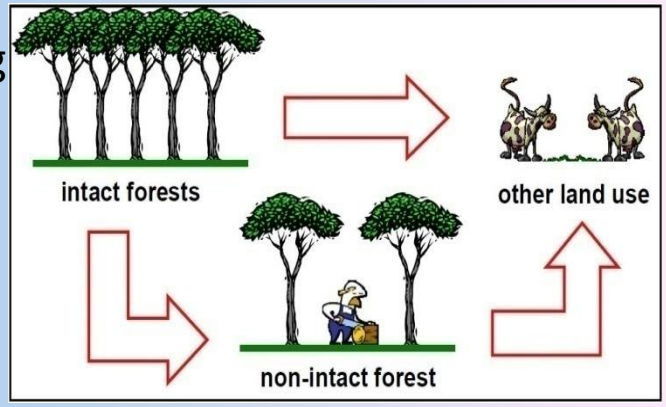
- Adjacent boundary with Protection Forest (as the Project Area)
- Additionallity for “agreement mechanism” for growing forest timber and multi purpose tree species (MPTS) with 70% : 30%, and another utilization option
- Guiding / Technical Assistance for High Value Conservation and timber extraction (meeting with the 70:30)
- Could be a part of this project area, with REDD mosaic mechanism
- Project area buffer
- TFCA (Tropical Forest Conservation Act) supporting
- Green PNPM Supporting

MENTERI KEHUTANAN
REPUBLIK INDONESIA

KEPUTUSAN MENTERI KEHUTANAN
NOMOR: SK.280/MENHUT-II/2009

TENTANG

PENCADANGAN AREAL UNTUK PEMBANGUNAN HUTAN TANAMAN RAKYAT SELUAS ± 19.660 (SEMBILAN BELAS RIBU ENAM RATUS ENAM PULUH) HEKTAR DI KABUPATEN KAUR, PROVINSI BENGKULU



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Terima Kasih