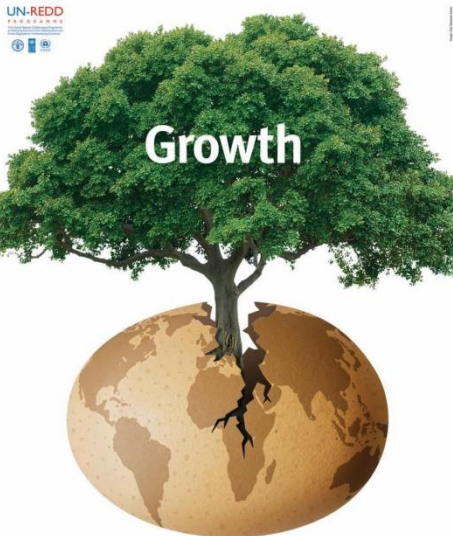


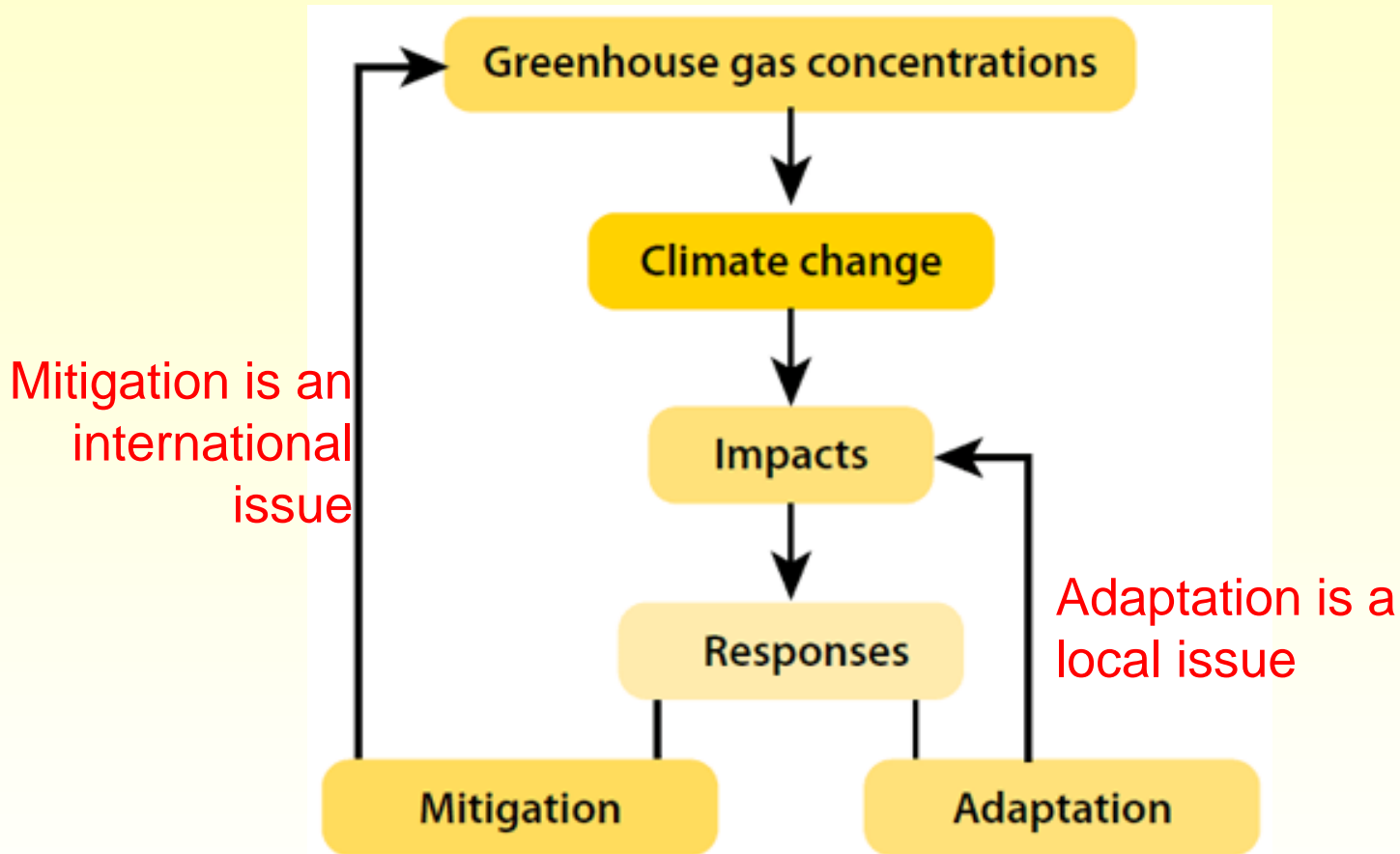
REDD-plus: Opportunities for India

11th Dec 2015
IGNFA, Dehradun

Dr. Mohit Gera, IFS
Professor, IGNFA



Forests & Climate Change Interface

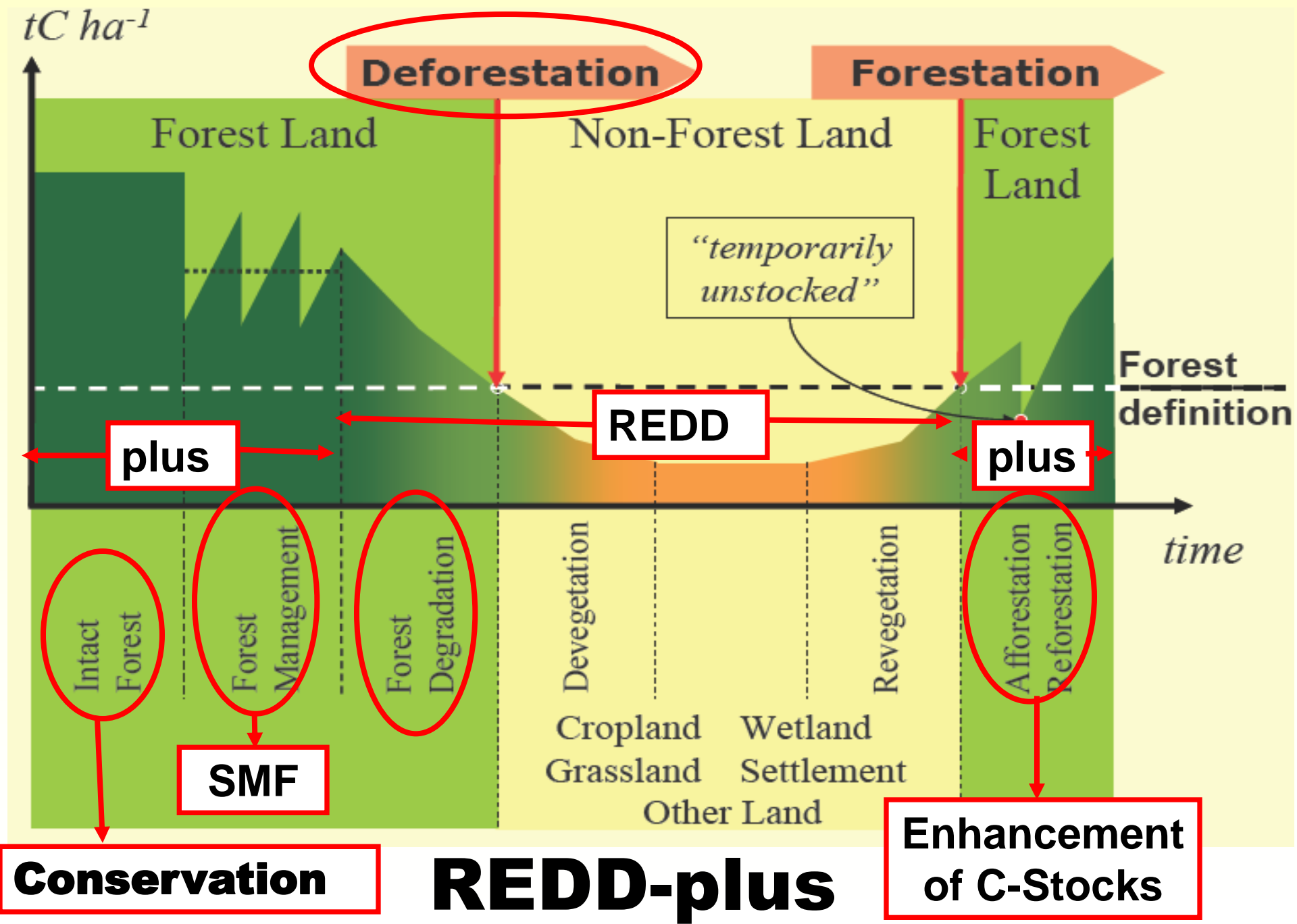


Why is adaptation important?

- Adaptation is a local or national issue & will have direct impact on us, whereas mitigation is a global issue
- Climate change is a reality and is happening.
- **Adaptation is complex** - it is difficult to estimate vulnerability and to quantify the impact of adaptation, unlike mitigation
- **There are no markets** or international funds for adaptation except with in UNFCCC

Need for more action to understand the Vulnerability of Forest Sector

- Impact studies with fine resolution data, & vulnerability assessment of our forests
- Use of India specific multi-dimensional CC impact assessment models
- Laying out of sample plots for long term (FSI) observations
- Long term scientific studies
 - *Natural regeneration;*
 - *Species migration, habitat; range*
 - *Incidences of fire; droughts; trends*
 - *Species phenology, growth & establishment.*



REDD-plus in Indian Context

- Forest & tree cover not only stabilised but gradually increasing over the last many years
- Large scale plantation and forest restoration programmes in the form of NAP, GIM, CAMPA and several other schemes
- Systems in place for biennial reporting of forest & tree cover, C-stocks etc. using modern technologies (*Latest report-ISFR, 2015*).
- Huge potential for “plus” side of REDD-plus

REDD-plus potential in India

- Reducing deforestation
 - 11.33 lakh ha forest land diverted during 1980 – 2011 for non-forest purpose.
- Reducing forest degradation
 - Huge potential exists to reduce degradation in most states (40% forests are degraded)
- Conservation - 16.5 m ha PAs network
- SMF - All forests being managed under approved working plans
- ECS – Large potential for Afforestation & Reforestation, and other kinds of forest restoration

REDD-plus activities & framework

- **REDD-plus includes**
 - **‘REDD’ - reducing emissions from deforestation and forest degradation**
 - **‘Plus’ - conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries**
- **Countries are expected to develop (Cancun, 2010)**
 - **National strategy on REDD-plus**
 - **NFREL/NFRL**
 - **A robust MRV**
- **Implementation of REDD-plus in three phases**
 - **Readiness, Implementation and Reporting**
- **Financing of REDD-plus: Green Climate Fund**
- **Social & environmental safeguards**

REDD-plus – A case study

Khasi Hills REDD-plus Project (Mawphlang, Meghalaya)

Source: REDD and ANR technical specifications, CFI, Nov 2012

Khasi Hills REDD-plus Project (Mawphlang, Meghalaya)

Title	Khasi Hills REDD-plus Project: Restoring through Conserving Meghalaya's Hills Forests through Community Action
Location	Khasi Hills, Meghalaya, India
Project Size	27,139 ha (Community Forest)
Project design organization	Community Forestry International (CFI)
Implemented by	Ka Synjuk Ki Hima Arliang Wah Umiam ("FEDERATION")
Technical Support	REDD Technical Support Unit based at Bethany Society & CFI

Source: Mark Poffenberger's chapter 13 on the project.

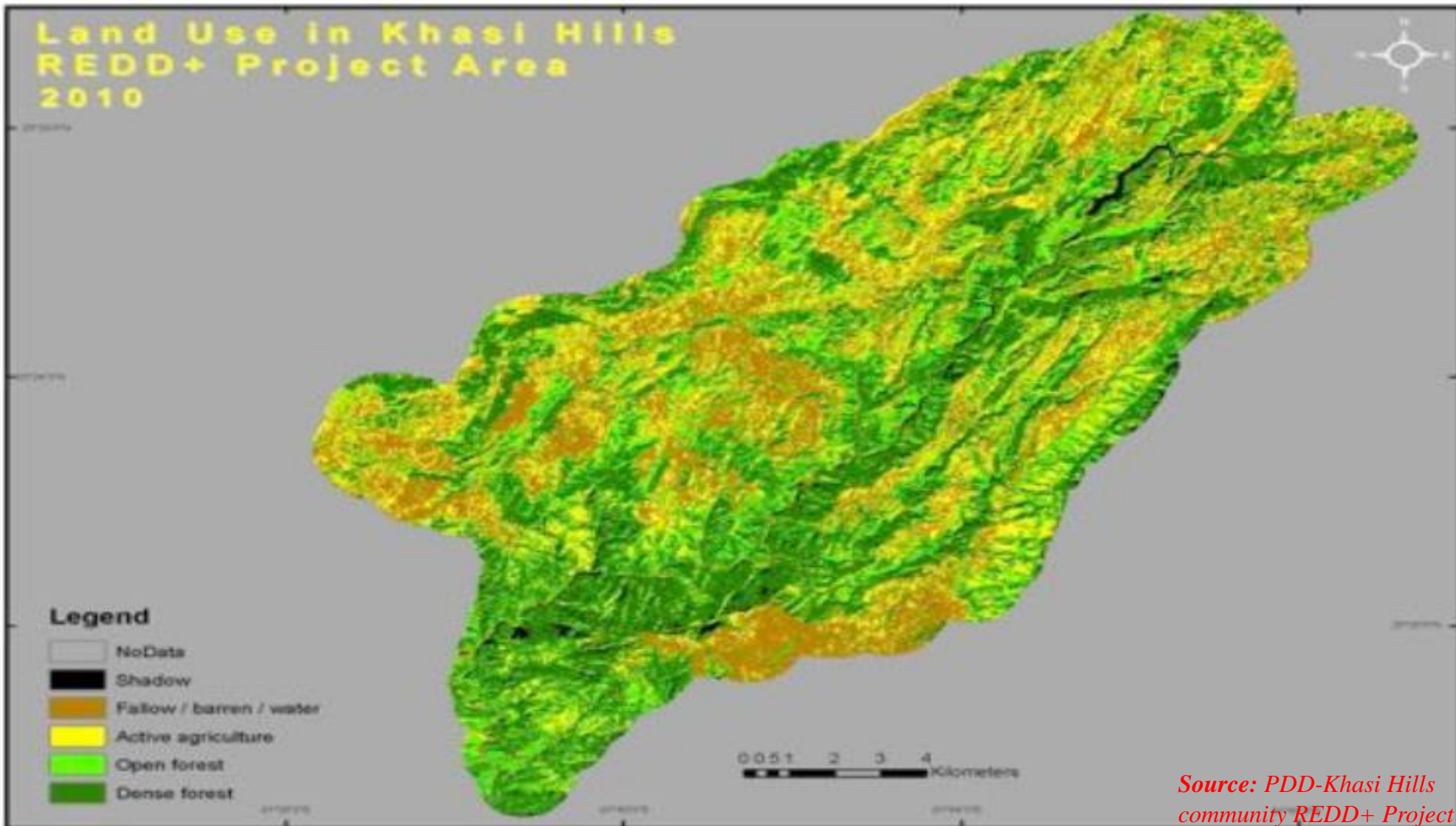
Project Area

Land Use in the Project Area and Buffer: 1990



Project Area

Land Use in the Project Area and Buffer: 2010



Land Cover Types

LAND COVER	AREA 2010 (ha)
Dense forest	9,270
Open forest	5,947
Barren or fallow	6,330
Agriculture	4,777
Other (shadow/water/no data)	814
Total Area	27,139

Local tree species – Khasi pine, Q. griffithi and Chestnut

Drivers of Deforestation & Degradation

- i. Forest fires
- ii. Unsustainable wood collection
- iii. Charcoal making
- iv. Uncontrolled grazing
- v. Agriculture expansion

Project Timelines

- Pilot activity – 2006-2010 (*For GS assessment & estimating trends of degradation*)
- Project design & preparation – 2010-2012
- Ist implementation phase – 2012-2016
- IInd implementation phase – 2017-2021
- REDD base line – *Status of C-pools in 2010 and trends of degradation as per BAU.*
- Project scenario – *Reduced degradation & ANR*
- C-Pools (*for estimating carbon benefits*)
 - Above Ground Biomass
- C-Stock in DF – 62 t/ha, OF – 3.34 t/ha and NF - 0

Land Use change in 2006-10 (BAU)

LAND USE	2006 (HA)	2010 (HA)
Dense forest	10,446	9,270
Open forest	5,908	5,947
Barren or fallow	5,794	6,330
Agriculture	3,179	4,777
Other (shadow/water/no data)	1,812	814
Total Area	27,139	27,139

Land Use Change	Area (ha)	Change/yr
DF to NF	1,136	2.8%
DF to OF	40	0.1%
OF to NF	0	0%

C-Stock in DF – 62 t/ha, OF – 3.34 t/ha and NF - 0

REDD Baseline

YEAR	DENSE FOREST CHANGED TO NON-FOREST (HA)	DENSE FOREST CHANGED TO OPEN FOREST (HA)	DENSE FOREST (HA)	FOREST LOSS (TC)	EMISSIONS (TCO2E)
2010	--	--	9,270	--	--
2011	263	9	8,998	16,830	61,709
2012	255	9	8,734	16,336	59,899
2013	248	8	8,478	15,857	58,142
2014	241	8	8,229	15,392	56,436
2015	234	8	7,988	14,940	54,781
2016	227	8	7,754	14,502	53,174
2017	220	7	7,526	14,077	51,614
2018	214	7	7,306	13,664	50,100
2019	207	7	7,091	13,263	48,631
2020	201	7	6,883	12,874	47,204
2021	195	7	6,681	12,496	45,820
Total	2504	84		160,230	587,511

C-Stock in DF – 62 t/ha, OF – 3.34 t/ha and NF - 0

ANR Baseline

LAND USE	Carbon (tC/Ha)	Area (Ha)	Carbon Stocks (tC)	Carbon Dioxide (tCO₂E)
Open Forest	3.3	5,947	19,864	72,836

Project Activities

- i. **REDD**-Protection of dense and open forests threatened by deforestation & forest degradation.
- ii. **ANR**-Protection, Management & Regeneration of open forest.

Project Activities

contd...

i. REDD

- Forest fire control (*21 km fire line & fire watchers*)
- Sustainable firewood (*Fuelwood plantation on periphery*)
- Regulation of grazing (*Shifting to pigs & broilers*)
- Agricultural containment (*Organic cultivation & Orchards*)
- Alternatives to charcoal making (*Alternate livelihoods*)

ii. ANR

- Advanced closure (*Initial phase-absolute protection*)
 - Fire
 - Grazing
 - Fuelwood collection
- ANR treatment (*Second phase*)
 - Weeding, thinning & enrichment planting

Project scenario

- Ist implementation phase: 2012-16
- IInd implementation phase: 2017-21
- Expected reduction in rate of DFD in Ist phase: 33%
- Expected reduction in rate of DFD in IInd phase: 57%

REDD Project Scenario

YEAR	REDUCTION IN DEFORESTATION AND FOREST DEGRADATION RATE	DENSE FOREST CHANGED TO NON-FOREST (HA)	DENSE FOREST CHANGED TO OPEN FOREST (HA)	DENSE FOREST (HA)	FOREST LOSS (TC)	EMISSIONS (TCO2)
2010	--	--	--	9,270	--	
2011	0.0%	263	9	8,998	16,830	61,709
2012	33%	171	6	8,821	10,945	40,132
2013	36%	161	5	8,655	10,303	37,778
2014	38%	151	5	8,498	9,690	35,528
2015	41%	142	5	8,351	9,103	33,377
2016	44%	133	5	8,213	8,541	31,317
2017	46%	125	4	8,084	8,002	29,342
2018	49%	117	4	7,963	7,485	27,445
2019	52%	109	4	7,850	6,987	25,621
2020	54%	102	3	7,745	6,508	23,864
2021	57%	95	3	7,647	6,046	22,169
Total		1,570	53		100,440	368,282

ANR Project scenario

Assumption: Open forests can regenerate into dense forests in 30 yrs

Annual C-sequestration potential = 1.95 tc/ha/year

Assumed C-sequestration rate under ANR

=1tc/ha/year (first 10 years);

=1.5 tc/ha/year (for next 20 years)

Annual REDD and ANR Benefits

(Difference between base line & project scenario)

YEAR	REDD BENEFIT (tCO₂E)	ANR BENEFIT (tCO₂E)	TOTAL (tCO₂E)
2012	19,767	2,038	21,805
2013	20,364	6,114	26,479
2014	20,908	12,228	33,137
2015	21,404	20,381	41,785
2016	21,857	30,571	52,428
2017	22,273	41,928	64,201
2018	22,656	54,451	77,107
2019	23,010	68,140	91,150
2020	23,340	82,996	106,336
2021	23,650	99,018	122,668

[A short film on the Project](#)

REDD-plus Project Benefits

- 1st certification in 2013 – 21,805 tCO₂ C-certificates issued
- By 2013 end, 5193 tCO₂ sold @US\$6-7/tCO₂
- Federation received US\$ 25,947
- Remaining certificates are being sold
- **"Umiam Watershed Trust Fund"** being established
- C-revenue utilized in
 - Project management & monitoring
 - Awareness raising
 - Establishment of 21 community nurseries
 - Support to Women micro-finance groups & famer's clubs
 - Forest restoration activities

“Pilot study on REDD-plus”

Timli Forest Range, Kalsi Soil Conservation Forest
Division, Shiwalik Circle, Uttarakhand, India



Dr. Mohit Gera,
Prof. & Member Secretry,
REDD-plus Cell, IGNFA

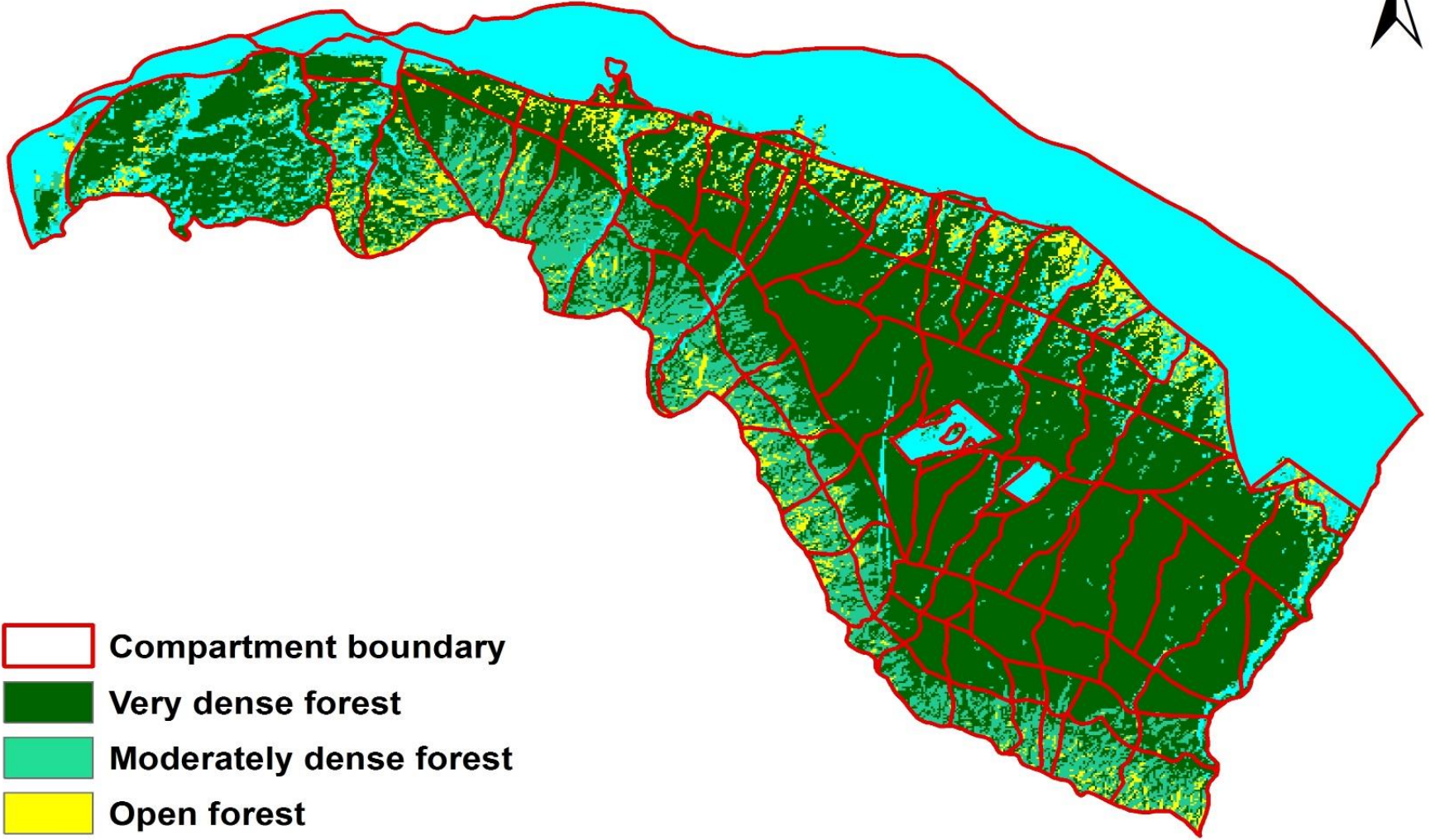


Objectives of Pilot Study

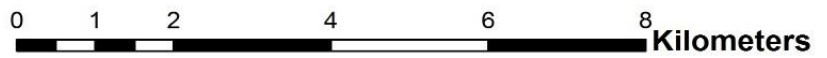
- To estimate the **potential of Emission Reduction** due to avoidance of **forest degradation**.
- To study the **drivers of forest degradation** and ways to address them for Emission Reduction.
- To estimate C-sequestration potential of **enhancement of carbon stocks by reforestation** including **ANR**.
- To estimate **costs effectiveness** of REDD-plus mitigation interventions.



Forest density map of Timli reserve forest - Year 1998



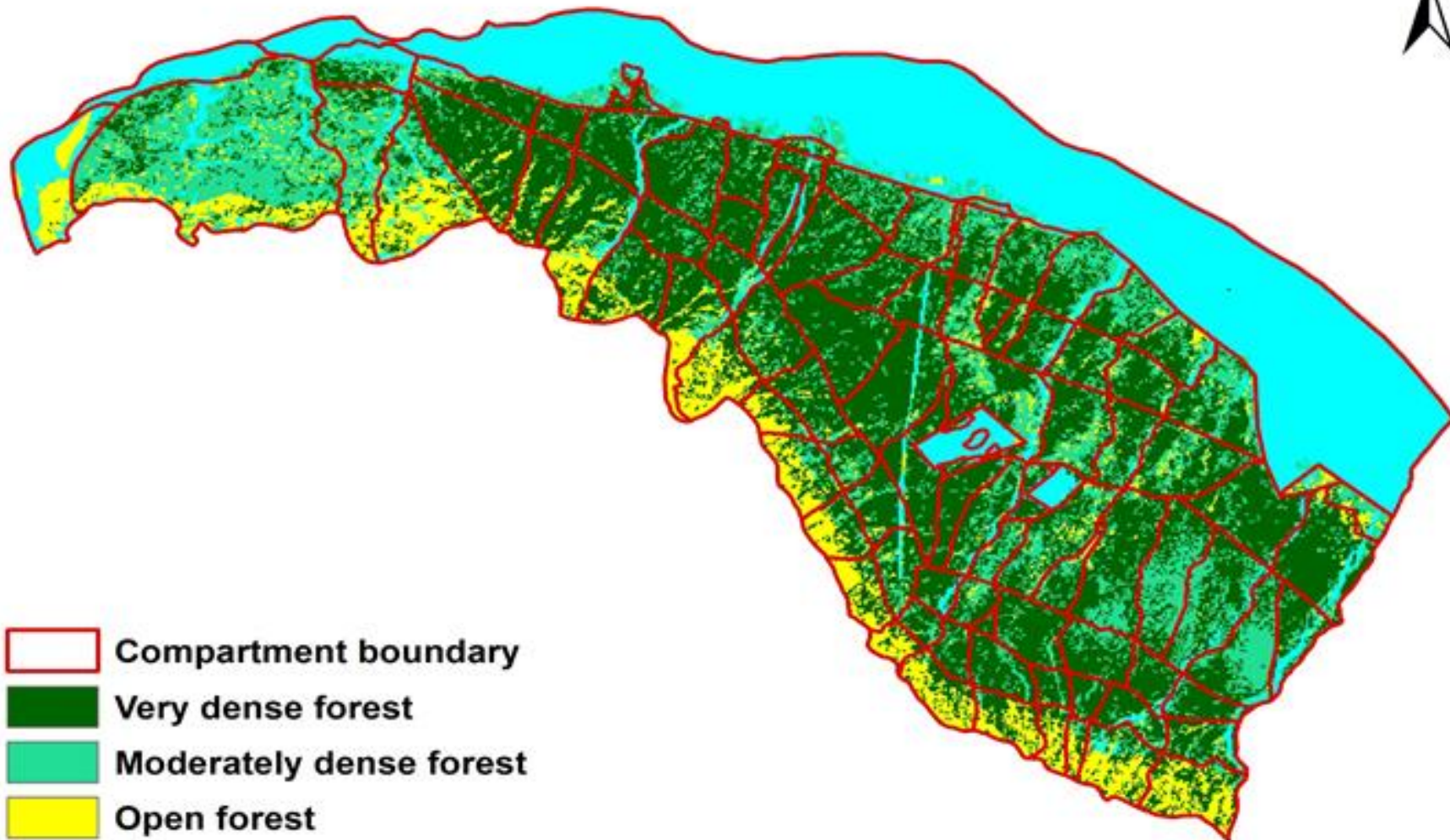
-  **Compartment boundary**
-  **Very dense forest**
-  **Moderately dense forest**
-  **Open forest**
-  **Non forest**



77°34'30"E 77°36'0"E 77°37'30"E 77°39'0"E 77°40'30"E 77°42'0"E 77°43'30"E 77°45'0"E 77°46'30"E 77°48'0"E

30°19'30"N 30°21'0"N 30°22'30"N 30°24'0"N 30°25'30"N 30°27'0"N

Forest density map of Timli reserve forest - Year 2008



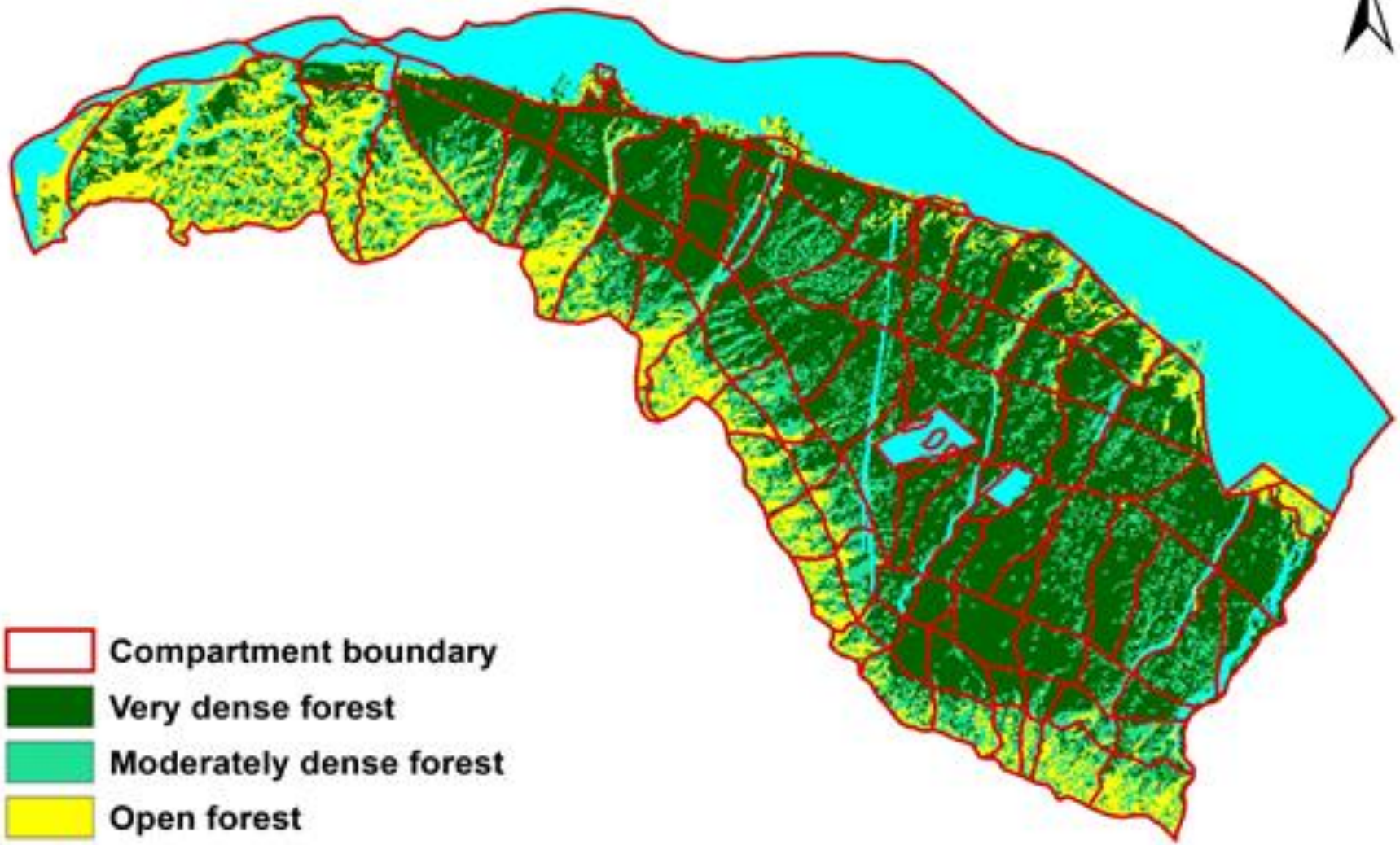
-  Compartment boundary
-  Very dense forest
-  Moderately dense forest
-  Open forest
-  Non forest



77°34'30"E 77°36'0"E 77°37'30"E 77°39'0"E 77°40'30"E 77°42'0"E 77°43'30"E 77°45'0"E 77°46'30"E 77°48'0"E

30°19'30"N 30°21'0"N 30°22'30"N 30°24'0"N 30°25'30"N 30°27'0"N

Forest density map of Timli reserve forest - Year 2014



-  **Compartment boundary**
-  **Very dense forest**
-  **Moderately dense forest**
-  **Open forest**
-  **Non forest**

0 1 2 4 6 8 Kilometers

77°34'30"E 77°36'0"E 77°37'30"E 77°39'0"E 77°40'30"E 77°42'0"E 77°43'30"E 77°45'0"E 77°46'30"E 77°48'0"E

30°19'30"N 30°21'0"N 30°22'30"N 30°24'0"N 30°25'30"N 30°27'0"N

Area statistics of Timli Forest Range for 1998, 2008 and 2014

Year	Density class (Area in Hectares)			
	Very dense forest	Moderately dense forest	Open forest	Non-forest
1998	6811.7	1486.4	592.9	979.2
2008	5563.5	2301.3	1222.1	659.1
2014	5680.9	2127.5	1642.7	602.7

Change in area (1998-2014)

Dense Forest = -1130.8 ha

MDF = 641.1 ha

OF = 1049.78 ha

Assessment of drivers of degradation and forest resource extraction in Timli Range

- Small timber extraction from forests
- Fuelwood collection from forests for bonafide use as well as for **income**.
- Fodder collection from forest
- Grazing in forests by domestic animals
- NTFP collection from forests
- Incidence of forest fire, Invasive species
- Insect attack



Data on drivers of degradation in Timli based on primary survey

Sl. no	Information	Quantity
1	Total no. of village	21
2	Total Population	49,345
3	Timber extraction from forests	$0.052 \times 49345 = 2812.66$ cu m/year
4	Fuelwood extraction	27435.82 t/annum
5	Fodder removal	18504.37 t/annum
6	Grazing pressure	2852141 ACU/annum

Discussion...