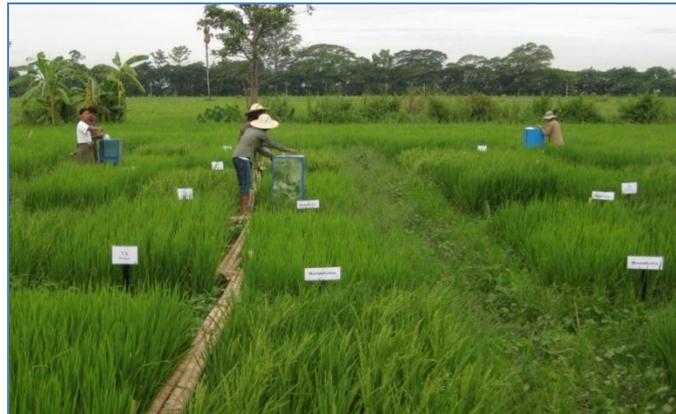


The 10th Workshop on GHG Inventory in Asia

July 11-12, 2012

Hanoi, Vietnam

National GHG Inventory in Myanmar



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**Team Leader, National GHG Inventory and
Mitigation Option Analysis Team**

- Myanmar : Seven States – hilly areas, ethnic people

- Seven Regions – plain areas, Bamar nationals



1. Northern Mountain
2. Western Mountains: 2000-5800 m
3. Shan Plateau: >2000 m
4. Central Basin
5. Coastal Strips

19 45' N, 96 12' E

Total Area: 676,578 Km²

Population: 58 millions

- According to the **numerical model MAGICC/SENGEN**, at the end of the year 2100, Myanmar will be warmer 1.25 – 1.60 °C during June-November, 2.0 °C during March-May and 2.5 °C during December- February. As for the precipitation, the whole country will generally 10 % increase during March-November including rainy season at the end of the year 2100.

- PRECIS model shows an increase of temperature 2-3 °C with standard deviation of about 0.9 °C in the whole country. Regarding the rainfall, there is an increase of 1582 mm at Sittwe, about 600 mm at Myitkyina, Patheingyi and Dawei region and about 300 mm elsewhere at the end of the year 2100.

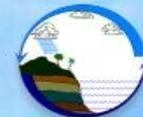
- In the vulnerability assessment, six potential climate change impacts are selected such as tropical storm/ strong wind, flood/ storm surge, intense rain, extreme day temperature, drought and sea level rise .There are also six key socio-economic sector are considered.

- Vulnerability index is maximum 6.13 in Ayeyawady Region and minimum is 1.19 in Chin State

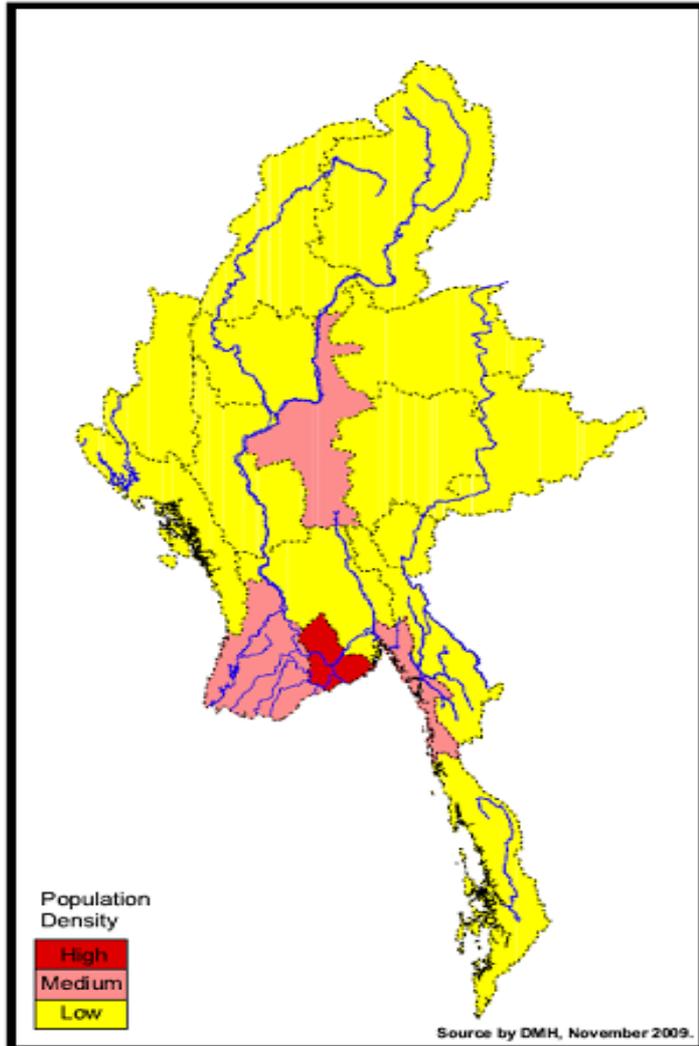


မိုးလေဝသနှင့် ဇလဗေဒညွှန်ကြားမှုဦးစီးဌာန

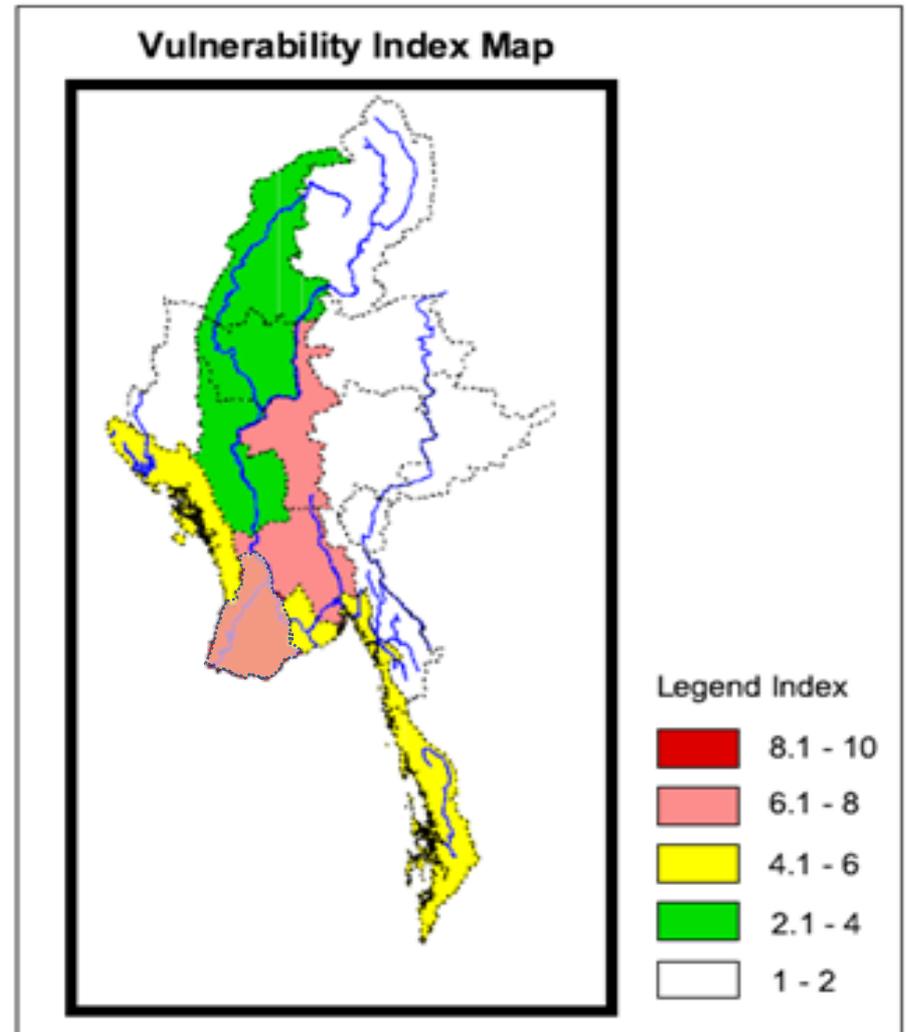
Department of Meteorology and Hydrology (Myanmar)



Population density of the States and Divisions of Myanmar



Vulnerability indices of the overall key socio-economic sectors for the States and Divisions of Myanmar



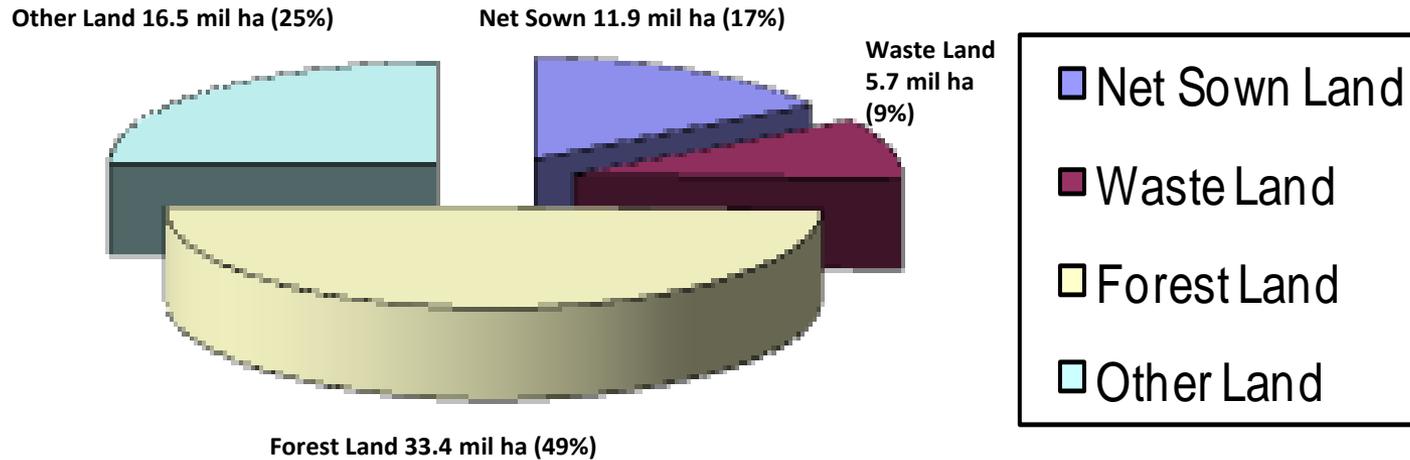
Country Profile:

- **Export: US\$ 6.8 billion***
- **Import: US\$ 4.5 billion***
- **Main Exports: Agriculture, livestock and forestry products, natural gas**
- **Main Imports: Machinery, transportation and construction materials, industrial raw materials, consumer goods**

Role of Agriculture sector

- **43% of GDP (including crops (35%), livestock & fisheries (7%) and forestry (1%))**
- **61% of Labor Force**
- **44% of Export Earnings (crops (17%), livestock & fisheries (20%) and forestry (7%))**

Land Utilization in Myanmar

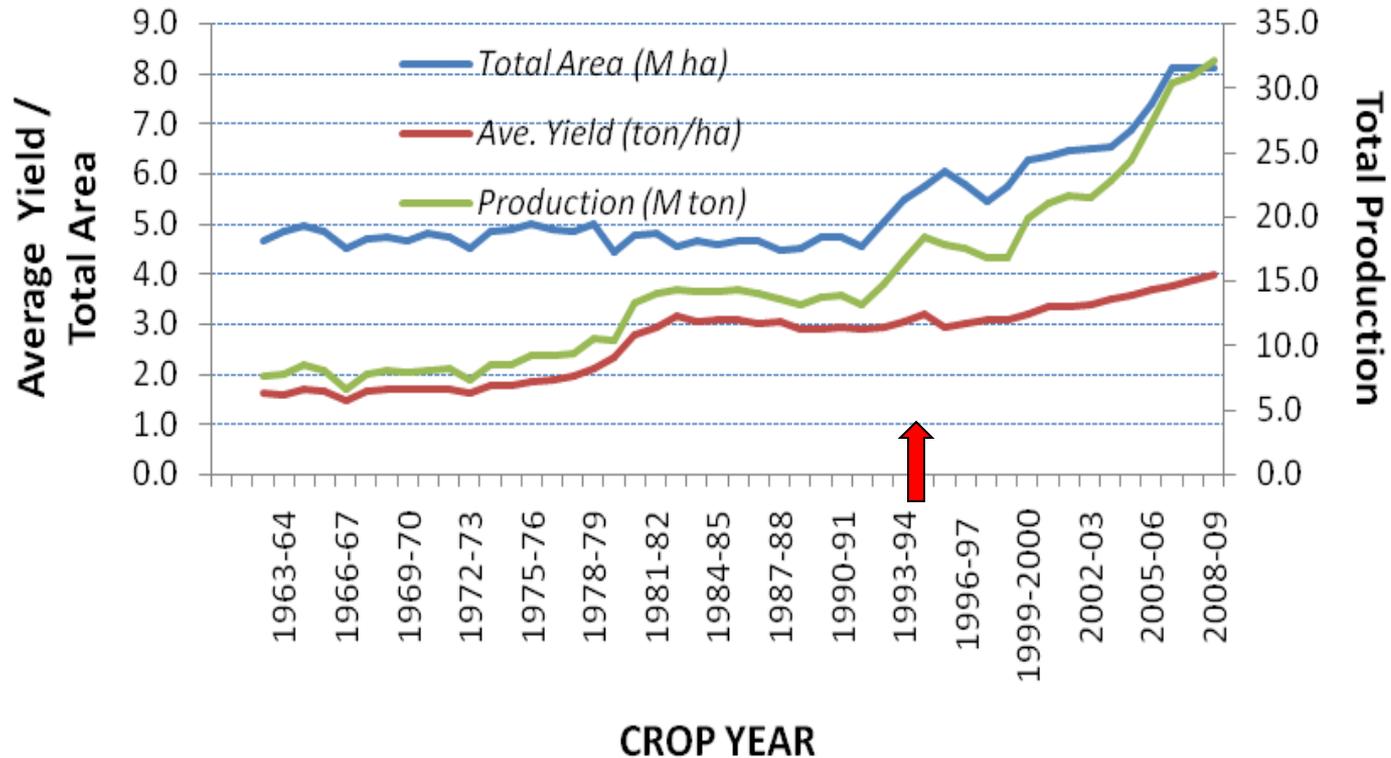


Source: Ministry of Agriculture and Irrigation 2008

Sown Area of Major Crops (,000 ha)

Sr. No.	Crop Name	2009-2010	Percentage
1.	Paddy	8067	47.5
2.	Sesamum	1634	9.6
3.	Green gram	1077	6.3
4.	Black gram	1023	6.0
5.	Sunflower	883	5.2
6.	Groundnut	866	5.1
7.	Pigeon pea	616	
8.	Other Pulses	706	
9.	Wheat & Maize	466	
10.	Rubber	463	
11.	Cotton	359	
12.	Sorghum	224	
13.	Sugercane	160	
14.	Oil Palm	112	
15.	Coffee	24	
16.	Vegetables	270	
17.	Others	19	
	Total Crop Area	16969	

Fig 28. Total area, average yield and total production of rice (1963-2009)



- The sharp increase in rice area after 1993 attributed to the additional rice area for summer rice.
- The increase summer rice area, coupled with the yield increase, resulted in a significant increase in rice production after 1993

“Lowland Rice-based Ecosystems in Nyaungdon Township of Ayeyarwaddy” Garcia, et.al. 2010, ASEAN Round Table Meeting, Myanmar

INC Report for Myanmar

- **Since Myanmar ratified UNFCCC in 1994 as a non-Annex I Party, Myanmar sought Global Environment Facility (GEF) funding in 2006 to fulfill its commitments and obligations for preparing and reporting its INC.**
- **In this context, NCEA (National Communication for Environmental Affairs) of Myanmar launched an INC project in 2008**
- **The project comprised working groups that deal with (i) GHG Inventory and Mitigation Option Analysis; (ii) Vulnerability and Adaptation Assessment; (iii) Development and Transfer of Environmentally Sound Technologies; (iv) Research and Systematic Observation; (v) Education, Training and Public Awareness, and (vi) Compilation of the National Communication.**
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Estimation of Methane Emission from Flooded Rice Fields in Myanmar

			A		C	D	E
Water Management Regime			Harvested Area	Scaling Factor for Methane Emissions	Correction Factor for Organic Amendment	Seasonally Integrated Emission Factor for Continuously Flooded Rice without Organic Amendment	CH₄ Emissions E = (A x B x C x D)/100
			(1000 ha)			(g/m²)	(Gg)
Irrigated	Intermittently Flooded	Multiple Aeration	1853	0.52	1.6	14.3	220.46
Rainfed	Flood Prone		2433	0.19	1.6	18.2	134.61
	Drought Prone		756	0.17	1.6	16.9	34.75
Deep Water	Water Depth 50-100 cm		1071	0.31	1.6	22.1	117.40
Totals			6113				507.23

CH₄ Emissions From Rice Cultivation, 2000 = 507.23 Gg

Trends of CH₄ Emission from Rice Fields In Myanmar

Year	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Harvested Area (ha,000)	6302	6412	6377	6528	6806	7384	8074	8011
CH ₄ (Gg)	526	535.18	532.26	544.86	568.23	616.31	673.90	668.64
Increase %	1.745	-0.55	2.37	4.29	8.46	9.34	-0.78	

Average Annual Growth Rate (from 2000 to 2007) = 3.55

Livestock Population Census

(in millions)

No.	Kind of Animal	2000-01
1	Cattle	10.98
2	Buffalo	2.44
3	Sheep & Goat	1.80
4	Pigs	3.97
5	Chickens	47.75

Methane Emission from Livestock

No	Kind of Animal	CH ₄ Emissions	
		Enteric fermentation (Gg)	Manure management (Gg)
1	Cattle	305.43	17.11
2	Buffalo	83.78	5.39
3	Sheep	1.95	0.08
4	Goats	7.08	0.31
5	Horses	2.11	0.25
6	Mules and asses	0.10	0.01
7	Swine	3.97	27.82
89	Poultry	-	0.96
		404.43	51.92
	Total	456.35	

Myanmar National GHG Inventory of Agriculture Sector in 2000

Sources	CH4 (Gg)	N2O (Gg)	Nox (Gg)	CO (Gg)	CO2 (Gg) Equavalen t
Rice Cultivation	507.23				10651.83
Agricultural soils		8.27			2563.7
Agricultural residue burning	0.0238	0.0006	0.81	0.022	1.6058
Livestock sector	456.35				9583.35
Enteric fermentation	404.43				8316
Manure management	51.92				915
TOTAL					22800.486

GHG emissions and removals in Myanmar for the year 2000

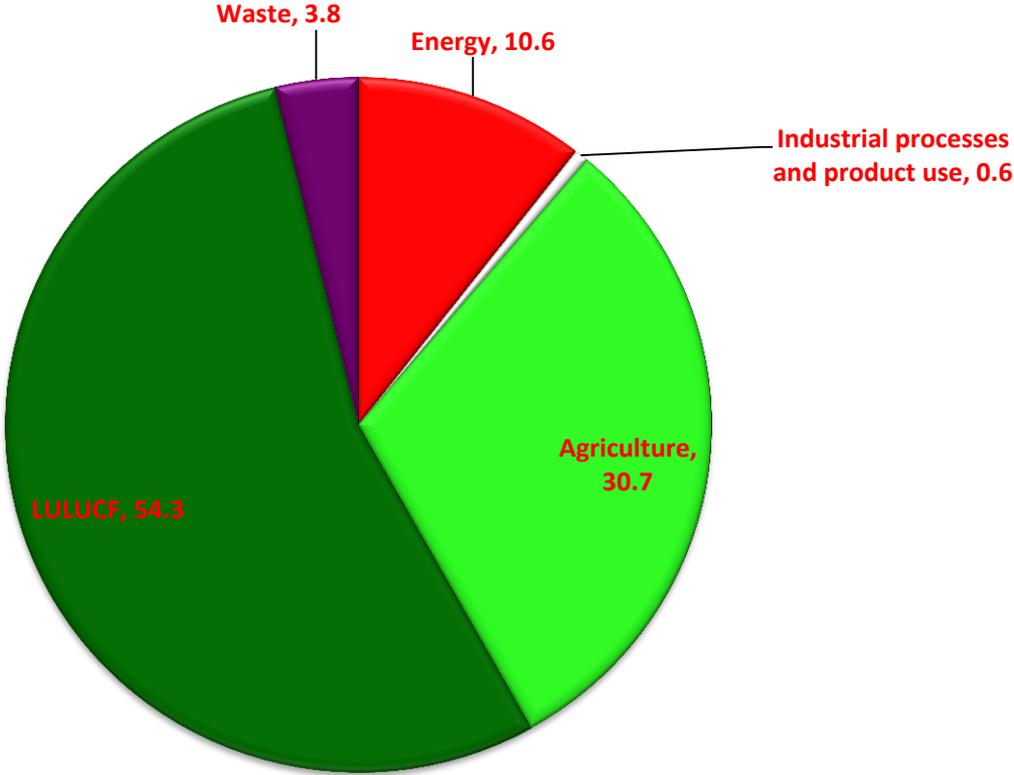
Source/Sink	CO₂ removal (Gg)	CO₂e total emission (Gg)	CO₂e net emission (Gg)	Share of emission (%)
Energy sector	0	7863.47	7863.47	10.6
Industrial sector	0	463.29	463.29	0.6
Agriculture sector including livestock	0	22,843.25	22,843.25	30.7
Land use change and Forestry sector	142,221.20	40,404.73	-101,816.50	54.3
Waste sector	0	2825.97	2,825.97	3.8
Total	142,221.40	74,400.71	-67,820.50	100.0

GHG Inventory in Myanmar

- National GHG Inventory team successfully conducted national GHG inventories for the base year 2000 by using 2006 IPCC Guidelines.
- According to the INC draft report, total emission was estimated to be 74,400.7 Gg CO₂-e of which the GHG emissions by the land use change and forestry sector was the largest portion (54 %) among all sectors
- However, CO₂ removal by this sector accounted for 142,221.2 Gg from the atmosphere so that the country's net emissions turned out to be - 67.8 million tons of CO₂, i.e. Myanmar is a net negative emitter of greenhouse gases.

Share of Emission by Sector in 2000

Share of emission by sector (%)



Share of Emission by Sector in 2000

It can be the underestimation of the actual national emissions for the following two reasons.

- The first reason is that, although CO₂ emissions from traditional biomass for fuel combustion were described in the energy sector, these substantial amounts (28,297.8 GgCO₂-e) were included neither in the energy sector nor in the National Totals according to IPCC 2006 Guidelines.
- The second reason is that, Annual decreases in biomass carbon stocks due to biomass losses for the year 2000 were calculated based on the official data available for the activities of loss of carbon by wood removal, harvested wood products, shifting cultivation and deforestation.
- The large area of deforestation was encountered in Myanmar but the deforested areas by various causes, such as illegal logging and land use change patterns cannot be available.
- Moreover, the data on actual biomass burning during land use change (e.g., shifting cultivation, land clearing, etc.) and actual areas burnt (e.g., forest fire) annually were still lacking

GHG Inventory in Myanmar

- It was observed that the Land use change and Forestry sector was the only sink of CO₂ in Myanmar and at the same time the biggest CO₂ emitter.
- But with decreasing forest cover and increasing forest degradation, if this trend is left unchecked, the only carbon reservoir in the country will shrink gradually.
- On the other hand, GHG emissions from other economic sectors will increase as a result of mechanized agriculture, industrialization and national economic development.
- The draft report already updated in the year 2011 is now under the process of seeking the approval by the MoECAF (Ministry of Environmental Conservation and Forestry).

Projects and Activities on Climate Change Adaptation and Mitigation

- Myanmar - endowed with natural resources
- Several decades ago - degrading environment and depleting natural resources - due to the unsustainable management practices.
- The situation is compounded by the adverse impacts of the climate change ;
- The most affected people - poor farmers whose livelihoods are highly dependent on natural resources and very vulnerable to climate variability
- For the planning designs of the rural development and poverty alleviation, - an urgent and crucial need to get the information of village communities on their existing technologies relating with climate change issues
- With the different ecosystems they are dealing with, the climate change impact on their livelihood, and their mitigation and adaption mechanisms to climate change may vary

Projects and Activities on Climate Change Adaptation and Mitigation

- ✓ **Myanmar National Adaptation Programs of Action (NAPA) project, 2012 draft Report**
- ✓ **Myanmar Action Plan for Disaster Risk Reduction (MAPDRR), 2009**
- ✓ **Dry Zone Greening Action Plan, 1997**
- ✓ **Clean Development Mechanism (CDM) Project**
- ✓ **REDD-plus Initiatives**
- ✓ **Early Warning System**

*** Environmental and Climate change issues : MOECAAF, currently established; Recruitment of staff is under way.**



Thank You