

AGROECOLOGY AND RICE PRODUCTION IN MYANMAR

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What is agroecology?

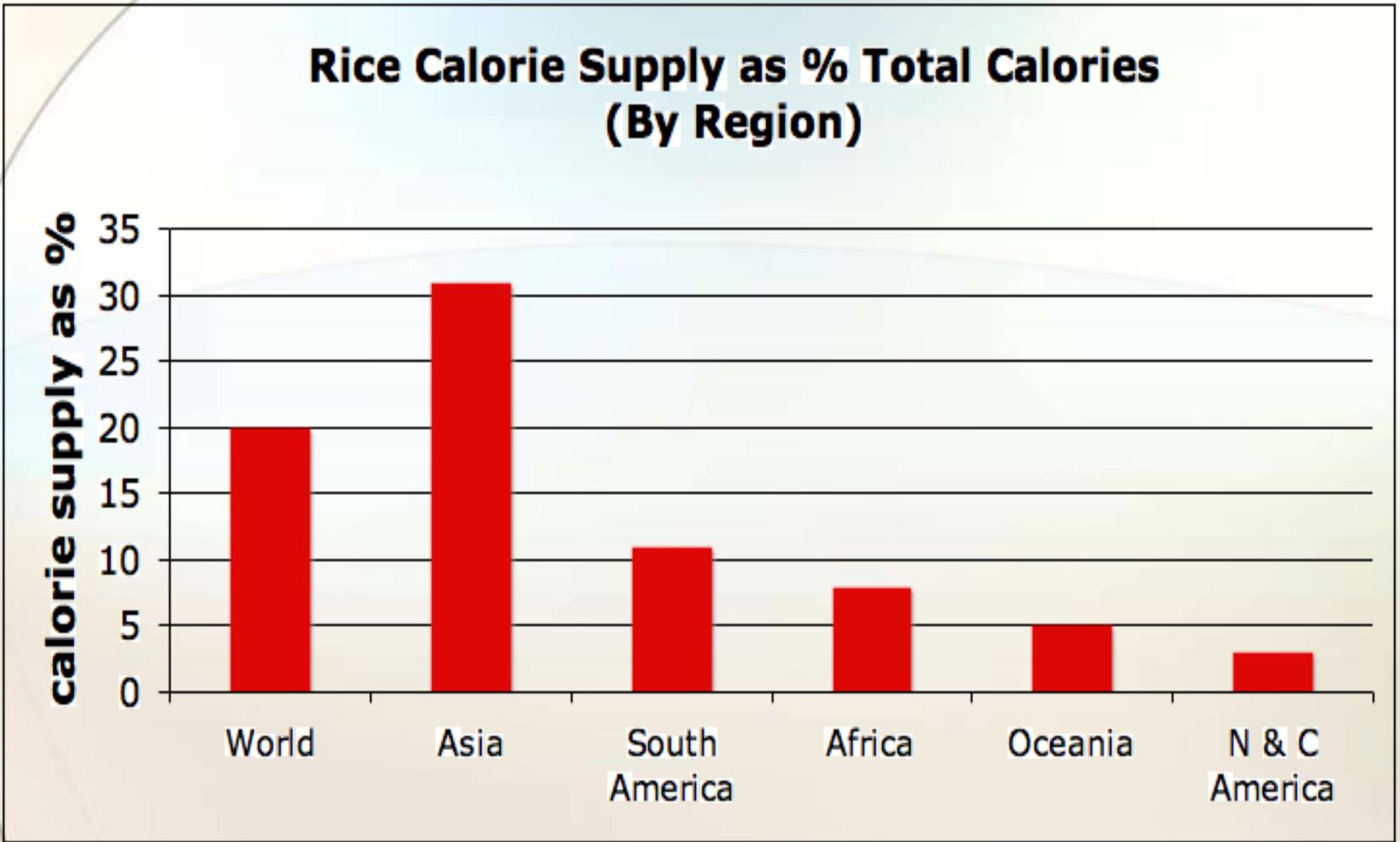
Agroecology

- **‘the application of ecological concepts and principles to the design and management of sustainable agro-ecosystems’.**

(Laura 2014)

Importance of Rice

- **As a staple food, about 3 billion people, nearly half the world's population, depend on rice for survival.**
- **Ninety percent of the world crop is grown and consumed in Asia as rice in every meal.**



**Figure 1. Rice calories supply as percentage of total calories intake by region (2000)
(FAO 2000)**

Rice Calorie Supply as Total % Calories (By Country)

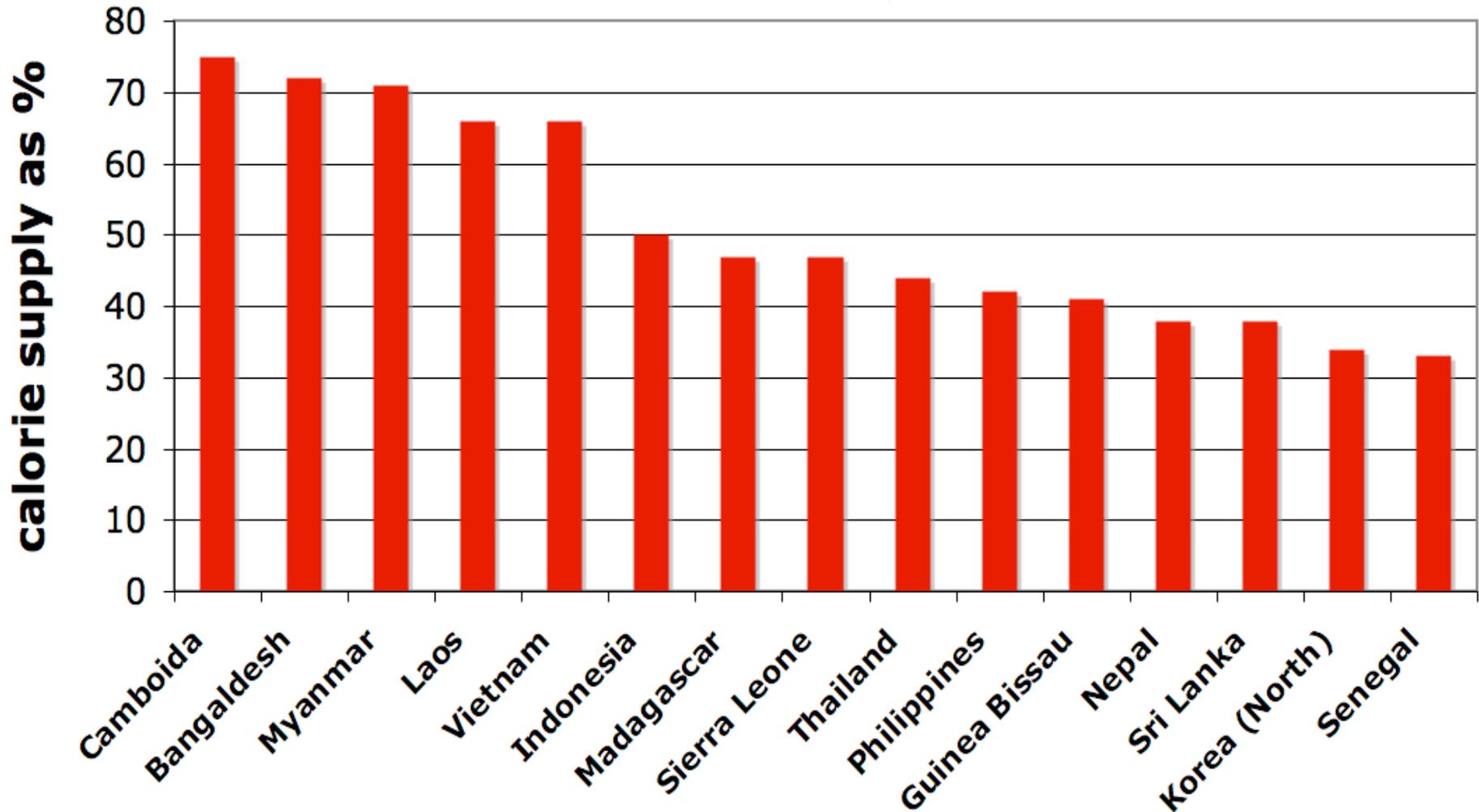


Figure 2: Rice calorie supply as total % calories by countries (FAO 2001)

Rice Production in Myanmar

- **Agriculture is very important in Myanmar's economy: it employs 70% of the country's labor force and comprises 38.2% of its GDP.**
- **Rice is considered both a major food crop and major export food item.**
- **Myanmar ranks sixth in area sown to rice and seventh in total production in the world.**
- **Rice can be grown across the country throughout the year and is grown on over 7.53 million ha, or more than half of its arable land.**
- **Rice is grown during the monsoon (80%) and summer seasons (20%) in four growing zones: the delta, dry zone, coastal zone, and mountainous areas.**

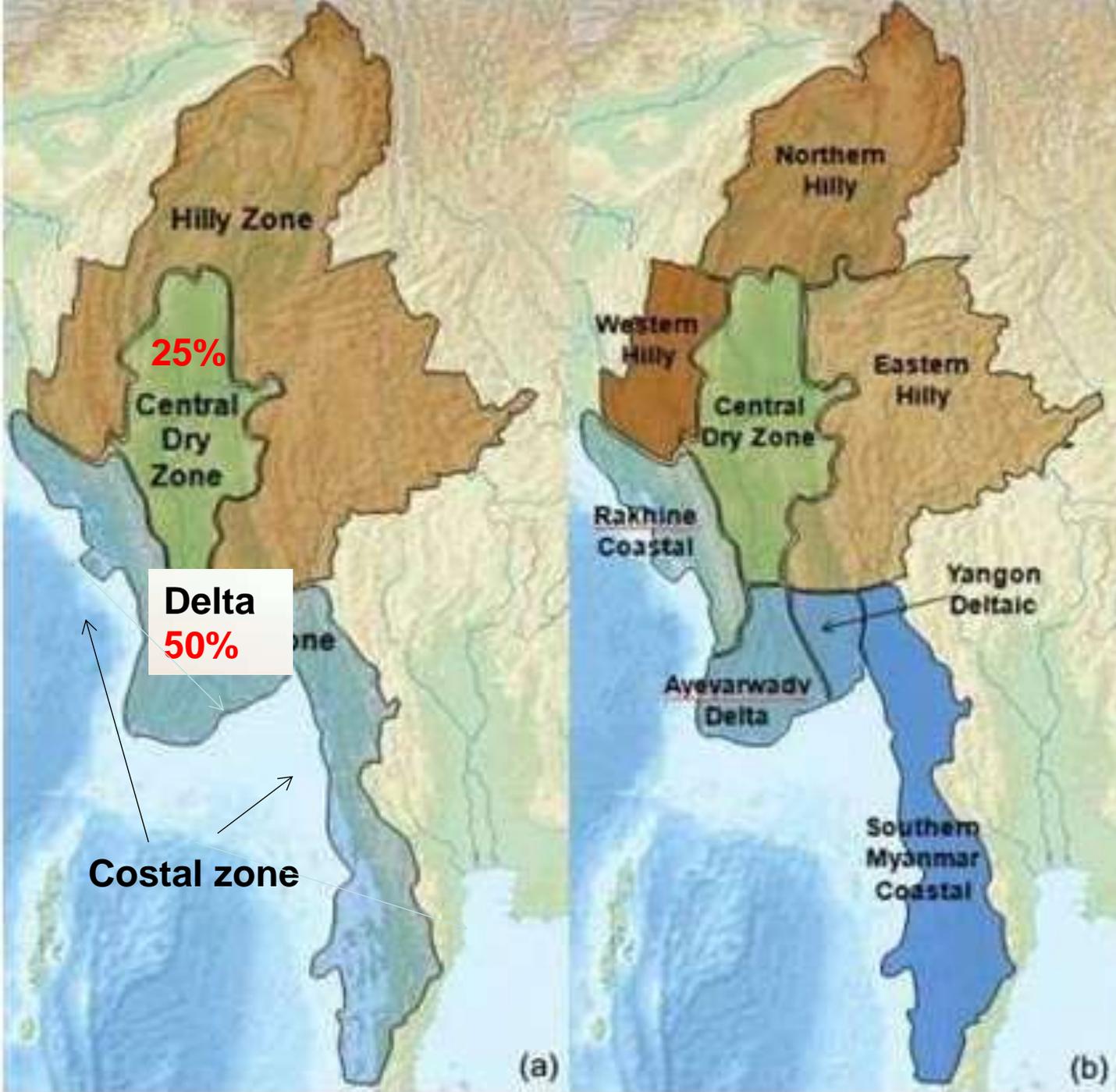


Figure 3. Map of Myanmar's agroecozones (a) and the eco-physiographic zones (b) (Adopted from NAPA 2012)

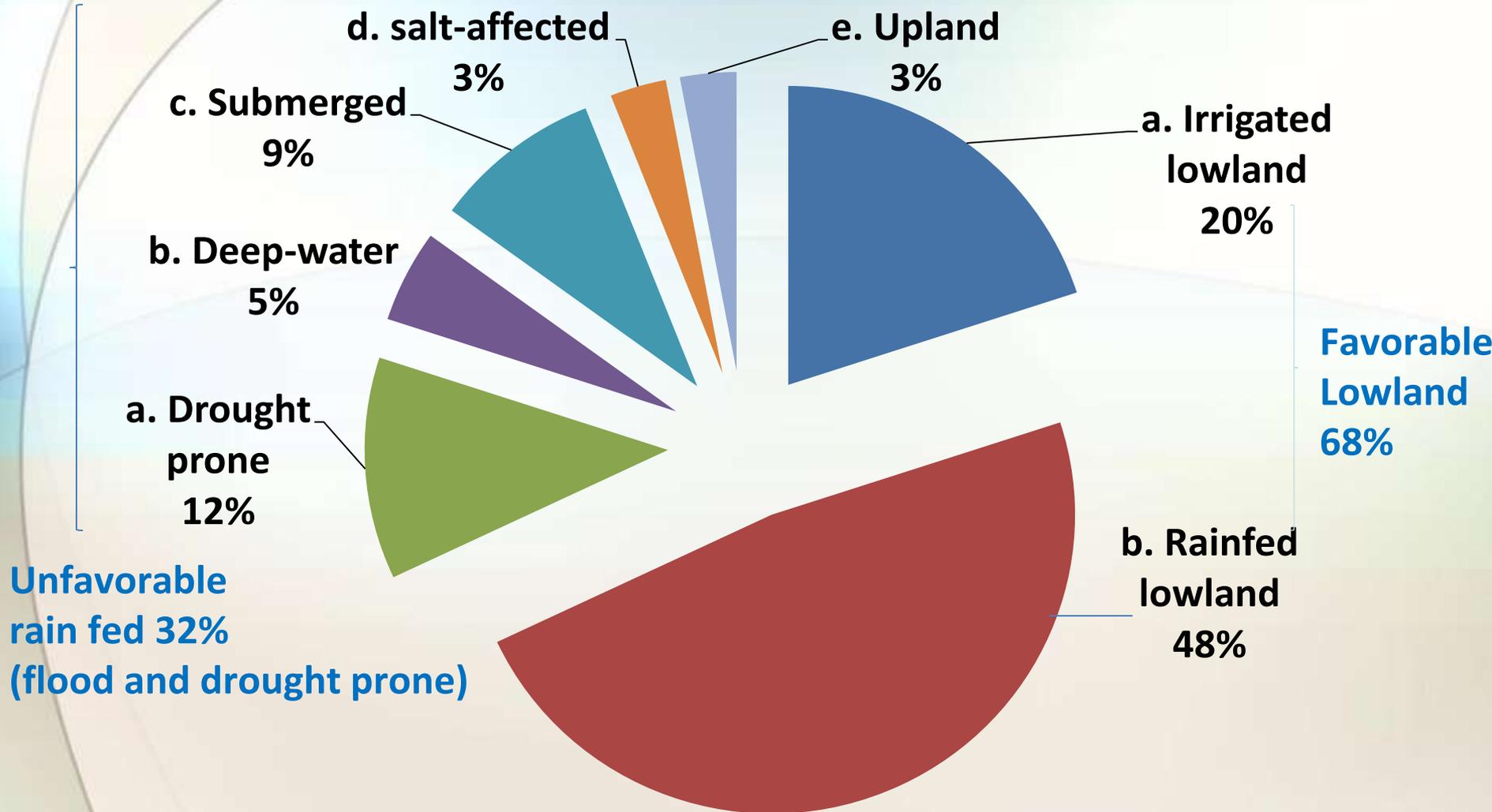


Figure 4: Rice ecosystem in Myanmar

History of rice production

- **Before World War II,**
- **Myanmar became the largest rice exporter in the world. The rice area - 5 million hectares
exports - 3 million tons (t).**
- **Rice area and production declined during the post-war era and has since failed to reach the levels achieved during the pre-war period.**

- **1970-80 First Green Revolution - IRRI launched a high-yielding variety (HYV) “Yar Gyaw” pilot project to support the distribution of technology and inputs, Whole Township Paddy Production Programme from 1977 to 1978.**
- **In delta area paddy land development project supported by World Bank and the Asian Development Bank from 1976 to 1988.**
- **The yields doubled with the application of improved techniques, such as the use of chemical fertilizers and pesticides, as well as proper water management.**
- **Rice has been designated as a national crop and a priority crop for area expansion and yield increase.**
- **Green revolution - introduced the fossil-fuel based chemical agriculture and transformed agriculture in the country from poly-cultures to monocultures.**

(DAP-MOAI 2013)

- **In 1992, summer rice was introduced to regions across the country where irrigation facilities were available by using short-duration varieties HYVs (Thihtutyin, Shwethweyin etc.)**
- **The government of Myanmar strongly supported summer rice.**
- **The monsoon rice is sown in May to October and summer rice in November to March.**
- **New irrigation dams, weirs, and reservoirs were established; existing irrigation facilities were improved; and groundwater was explored to further rice production.**

Table 1. Myanmar rice growing area, harvested area and yield

	Sown area	Harvested area	Yield
	(,000 ha)	(,000 ha)	(t ha⁻¹)
1995-96	6138	6033	3.08
2000-01	6359	6302	3.38
2005-06	7389	7384	3.75
2009-10	8064	8058	4.06
2010-11	8047	8011	4.07
2011-12	7593	7567	3.83
2012-13	7241	7284	3.84
2013-14	7284	7264	3.90
2014-15	7172	7153	3.94

Source: Myanmar Agriculture at a Glance, 2015

- **In 2011 Paw San Rice (Pearl Paw San) -worlds best rice at the World Rice Conference 2011 held in Ho Chi Minh, Vietnam.**



- **1974 Second green revolution - China started Hybrid Rice**
- **Myanmar started hybrid seed production in 2011; support to the Development of Hybrid Rice in Myanmar Project with FAO**
- **Hybrid Rice (Paletwe) Demonstration plots - at 7 Divisions and 9 Township, during 2014-15
2 seasons**

(DOA and FAO)

- **In 2011, the country opened to door to democratic economic transformation**
- **One of the development goal is to increase rice exports while maintaining domestic food security, and open borders trade (MRF 2014)**
- **To boost rice yield, MOAI laid down 14 guidelines for Good Agricultural Practices (GAP) emphasized in 2011 (DOA-MOAI 2013)**

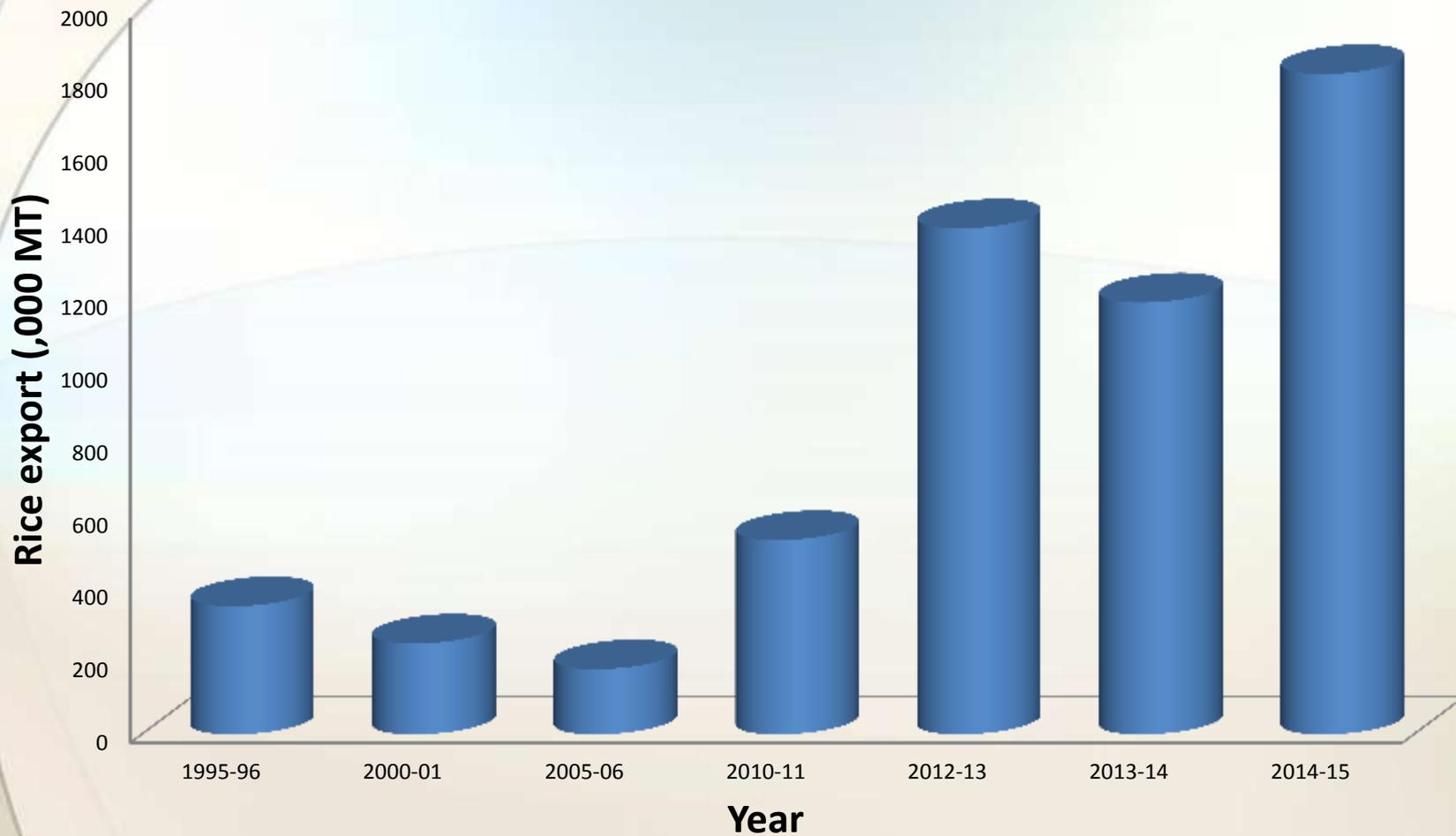
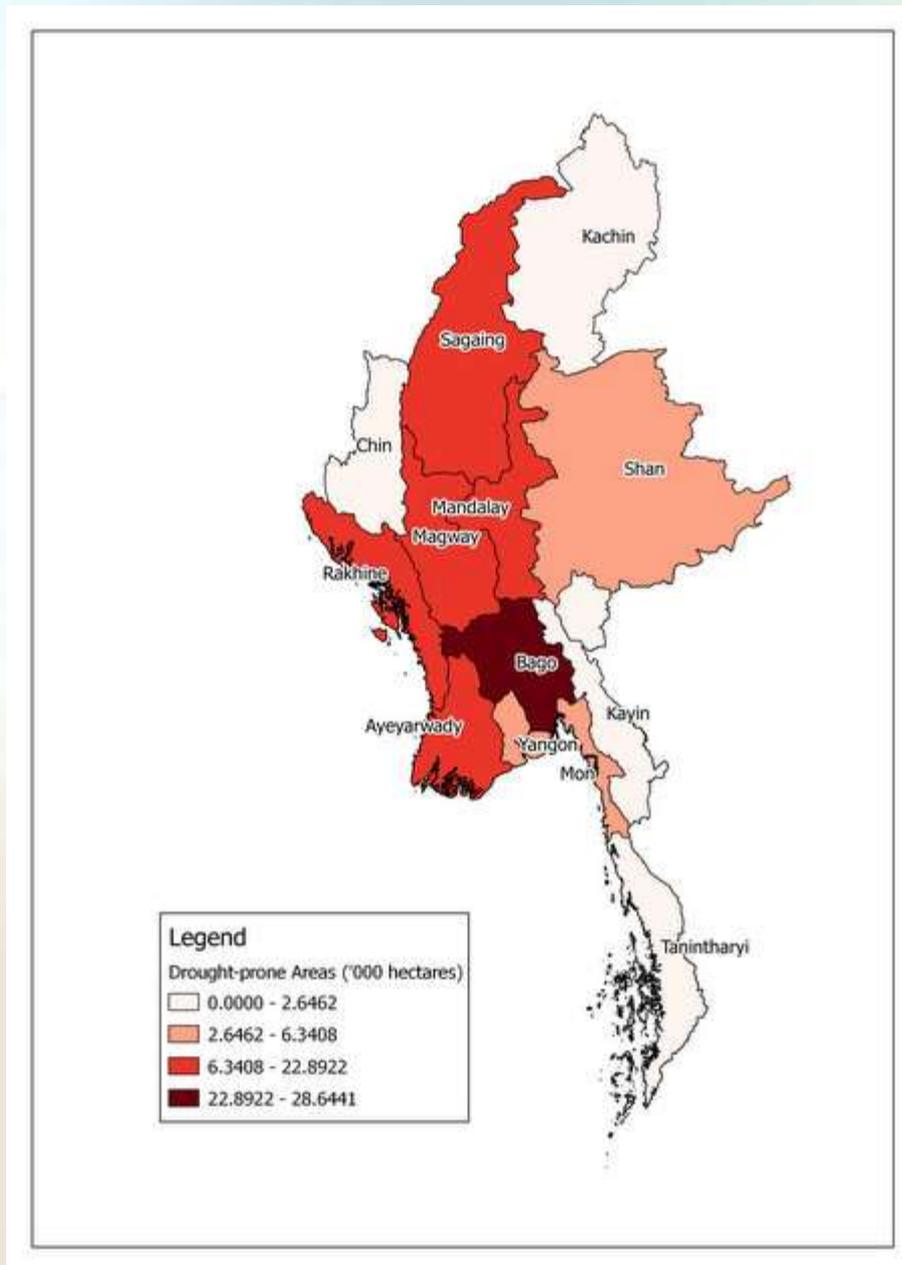


Figure 8: Myanmar's rice export (,000MT)
(Source- Myanmar Agriculture at a Glance 2015)

- **The construction of polders provided with embankments, sluice gates, and drainage systems protected the rice farms from salt water intrusion.**
- **However, the polders degraded and 2008 cyclone Nargis damaged many of the polders, resulting in the uncontrolled entry of salt water and, thus, reducing rice yield.**
- **Many of the damaged rice areas remain prone to salt water intrusion even in the monsoon season.**

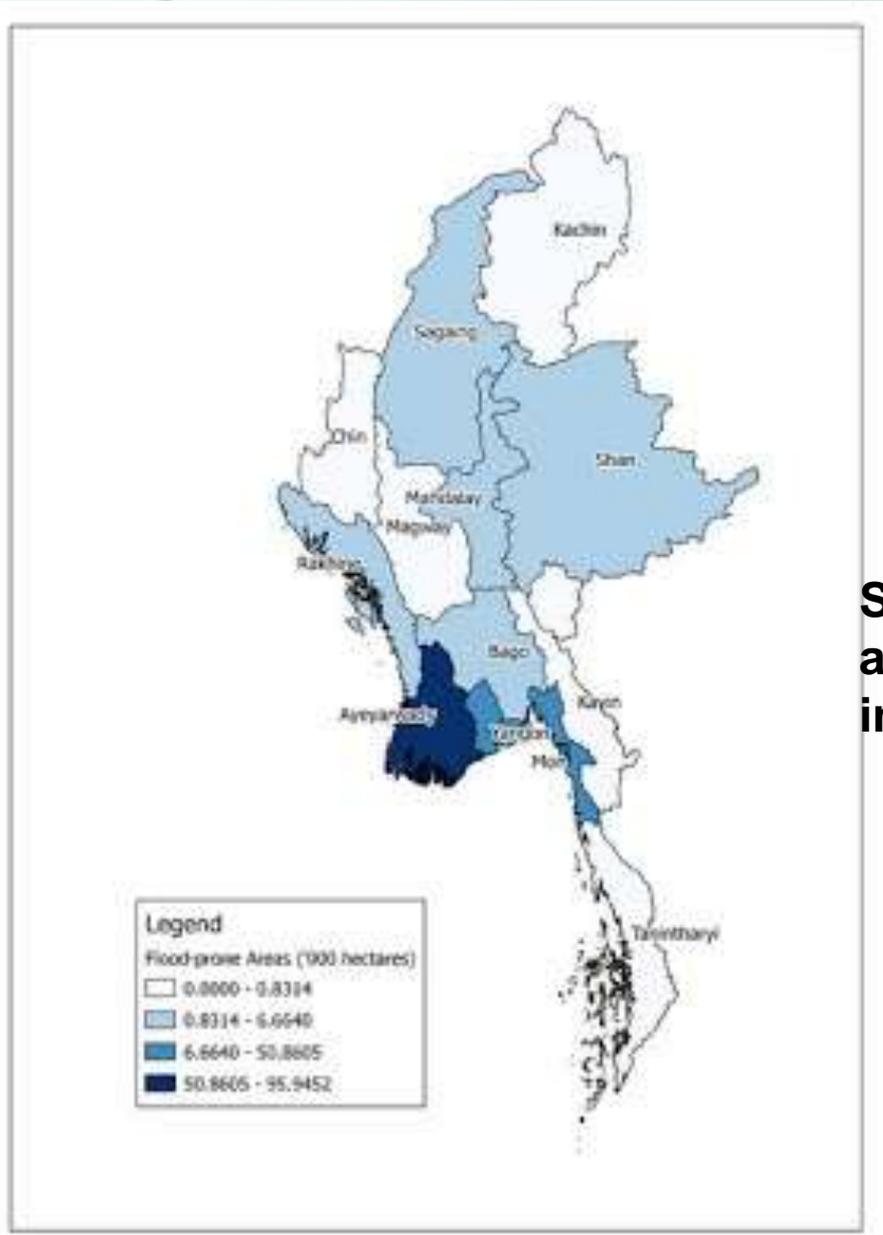
(Driel and Nauta 2013)

- **Nowadays, natural resource degradation is rampant because of mismanagement, population pressure, and poverty, among others.**
- **Moreover, climate changes are great challenges and Myanmar has already experienced in climate changes, such as declining precipitation, increasing water scarcity, rising temperatures, flooding and growing frequency of extreme weather events.**
- **These changes pose a serious threat to agro-ecosystems and natural resources that underpin agriculture.**



**The drought area
 (155,140 hectares)**

Figure 5: Drought prone area



Some 173,560 hectares of rice area are affected by submergence in Myanmar.

Figure 6 : Flood affected rice area

The total rice crop area affected by salinity is 513,780 hectares in Myanmar.

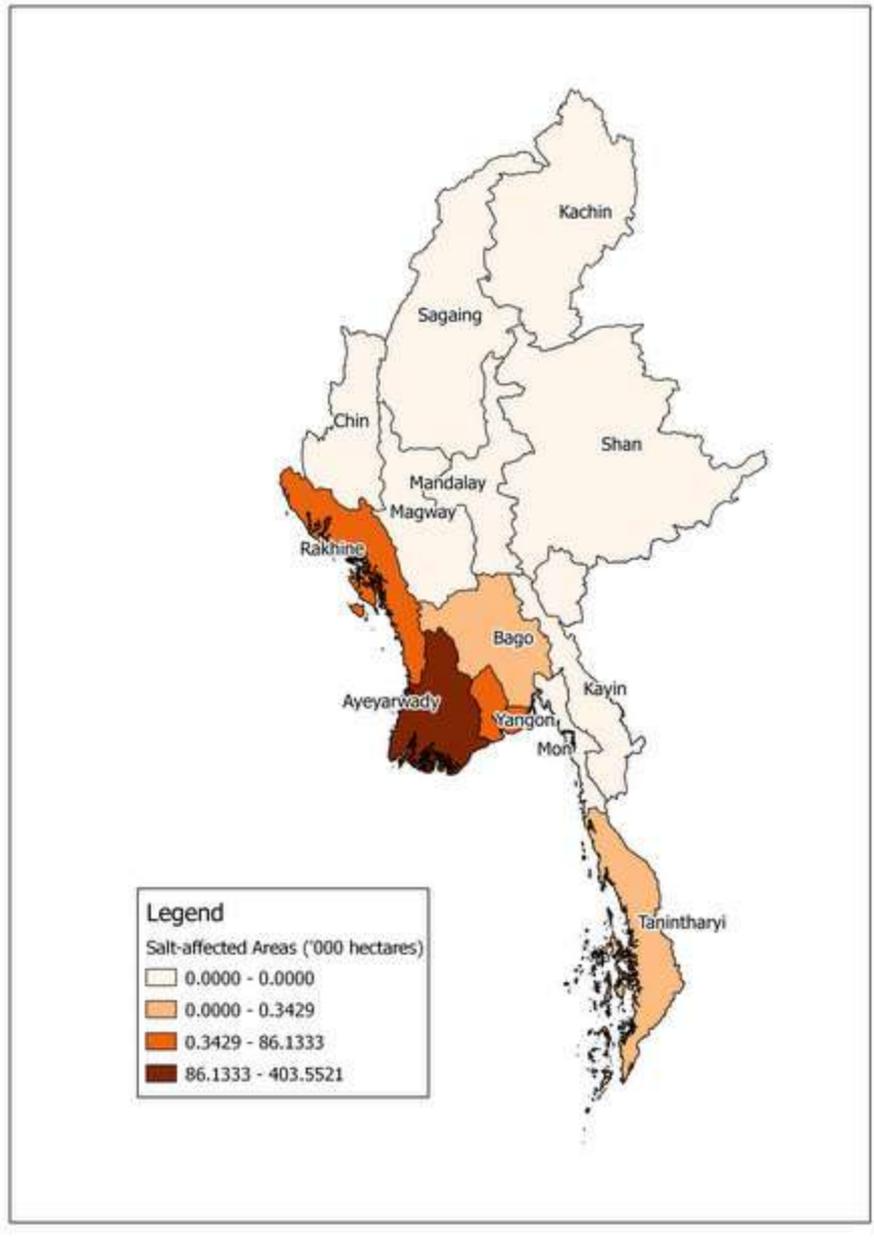


Figure 7 : Salt affected rice area

- **Rice cultivation is responsible for 10% of Green House Gas (GHG) emissions from agriculture.**
- **Myanmar needs to adopt a path of climate resilience, low carbon, and sustainable development in agriculture.**
- **Understanding the negative economic, health and environmental impacts of green revolution to rice farmers; government, NGO and INGO intensified work with scientists to evolve a more integrated and less environmental impact rice production techniques**

System of Rice Intensification (SRI)

- **Developed and disseminated in Madagascar in 1986**
- **Myanmar at 2001 (Myatta Foundation) then was incorporated by agricultural services in government extension strategies**

- **(1) using young seedlings,**
- **(2) planting a small number of seedlings per hill,**
- **(3) intermittent irrigation, and**
- **(4) Integrated Pest Management (IPM) and Integrated Nutrient Management (INM), among others.**

(GRET, feasibility study ACTAE 2013)

Integrated Pest Management IPM

- **Focuses on pest prevention.**
- **Uses pesticides only as needed.**
- **IPM is not a single pest control method but rather involves integrating multiple control methods based on site information obtained through:**
- **inspection; monitoring; and reports.**

- **To reduce methane from rice fields, the following practices also used:**
 - **Periodic draining of fields**
 - **Off-season application of rice crop waste**
 - **Discouraging straw burning**
 - **Modified water management strategies coupled with efficient application of fertilizer**
 - **Promoting water harvesting technologies like alternate wetting and drying (AWD)**

AWD is a **water saving and methane mitigation** technology that irrigated (paddy) rice farmers can use to reduce their water consumption.



- **Mid-season drainage** involves the removal of surface flood water from the rice crop for **about seven days** towards the end of **tillering**. (IRRI 2009)

Figure 9: AWD and mid-season drainage



Figure 10: Direct seeding reduce methane emission

Ongoing project - IRRI and DOA (Best Management Practice)

- **Intensifying rice-based systems.**
- **Improving postharvest technologies.**
- **Improving the livelihoods of rice-farming rural household**
- **Integrated crop management**

UNOPS Increasing rice production

- **UNOPS, LIFT and Metta Development Foundation are working together to develop farmer education programme 2010-13.**
- **to create 200 farm field schools in Shan and Kachin states, helping promote a sustainable approach to enhancing agricultural productivity.**

- providing farmers with relevant **knowledge and technology** quickly increases rice yields from small and mid-sized farms.
- The **farm field schools** initiative focuses on locally-produced weed control technology, high-yield seeds and **low-technology tools, and provide training for maintenance services** to increase yields while protecting the environment.
- They helped more than **4,700** rural households increase rice production



Myanmar Rice Development Strategy

Ten key themes to guide for developing the rice sector.

- (1) sustainable increase in rice productivity,**
- (2) increased farm mechanization,**
- (3) adaptation to climate change,**
- (4) efficient and sustainable management of natural resources**
- (5) postharvest loss reduction,**
- (6) increased access to credit,**
- (7) capacity building,**
- (8) increased investments in agriculture,**
- (9) quality control and safety in rice production and marketing**
- (10) enhanced rice research and development.**

- **Therefore, current Myanmar rice production is based on agroecology to improve economics and ecological sustainability of agroecosystem with the proper management system especially in tune with the local resource based and operational framework of existing events and socioecological conditions.**

A photograph of a rice paddy field with rows of young green rice seedlings. The plants are densely packed in straight lines, and the soil between the rows is visible. The overall scene is a lush green field under bright light.

Thank You

Flood – 2011-12,13-14, 2016

SRI benefits

- **Effective Fertilizer application** • **20%**
- **Cost and benefit** • **20%**
- **Yield increase** • **30%**
- **Water requirement** • **30%**
- **Net profit** • **20%**
- **CH₄ emission** • **30-60% reduce**

Recently promoted by a number of scientists and NGO

Complain -No economic return, not yield increase, weeds problem, leveling and farmer's mind set

Constraints

- (1) Problems of land ownership and land preparation
- (2) Poor knowledge and practice of farmers in land preparation, selection of seeds, and cultivation
- (3) High cost of inputs such as labor, seeds, machines, fertilizer and poor development of local credit market
- (4) Low price of rice that reduces earnings
- (5) Poor Coping mechanisms Of problems such as local flooding, droughts and untimely rains

IPM advantages.

- a reduced amount of broad-spectrum pesticide use in the environment
- a reduced chance of pests developing resistance towards a specific pesticide
- a reduced health risk to humans
- a reduced health risk to pets and organisms that aren't being targeted
- less harm for the environment

disadvantages.

- more involved planning
- more family decision-making
- more demanding lawn and garden care
- more resources needed as substitutions for pesticides
- requires a greater amount of outside knowledge

Powered by

MYANMAR

2016 Growth Rate - 0.87%

Population Rank - 26

Density - 83

Area - 676,578 km²

Capital City - Naypyidaw

Region - Asia - Subregion South-Eastern Asia

Target yield - 5.2t/ha

2010 - 2.6 t /ha

Global demand rice Asia Africa 439 mt in 2010 496 mt in 2020 (IRRI 2010)

Delta Flood

200,000 ha of upland rice mostly Shan state

Paw san – elongate up to 3 times

Estimated milled rice production in Myanmar for MY **2015/16** has been reduced by 400,000 metric tons from the MY2014/15's level due to flooding in late July and early August. As a result of the flooding, domestic prices increased and an export ban was put in place, expected to last thru mid-September. About 250,000-300,000 metric tons of rice exports were delayed or cancelled because of this action. Trade sources now expect 2015 rice exports to total 1.6 million metric tons.

[Burma: Flood in Myanmar Impact Rice Production and Export](#) USDA

1. Seed selection
2. Land preparation
3. Crop establishment
4. Water management
5. Soil fertility management
6. Pest management
7. Harvesting and threshing
8. Drying and storage
9. Crop rotation Seed Selection:

Hybrid rice costly to produce, poor quality caution in production

Farmer used their own seeds years after years

Labour shortage

Lowest fertilizer consumption among Asean

63 Delta 76 dry zone 90-100 summer

Recommended urea 60-180: tsuper 56:MOU 56 lb/ac 40 N/ha

29 spp. and crab rice stem borer, rice gall midge, ear bug jussid

organophosphate chlorine dimethode phenthoate andosulfan USAID 2013

Background paper 2 Rice productivity improvement in Myanmar

There was a recent decrease in the overall average rate of fertilizer application, an increase in the prevalence of rice-legume cropping systems, and only localized insect pest or disease problems.

Additionally, rice yields were found to be higher in Upper Myanmar, likely the results of more suitable weather conditions, better irrigation, and ready market access.

Furthermore, a number of critical factors affecting production are identified and possible solutions discussed.

Myanmar is among the world's most vulnerable countries to climate change. One of its manifestations that is seen to seriously affect the country's rice production capacity is heat stress."

Agriculture is very important in Myanmar's economy: it employs 70% of the country's labor force and comprises 38.2% of its GDP. Rice is considered both a major food crop and major export food item.

- Through the farm field schools, farmers have learned **how to reduce pesticide use, improve soil fertility and use suitable agricultural tools**, through hands-on exercises and participatory activities.
- Local companies and mechanics were brought in to **produce farm tools** and provide ongoing **maintenance services**.



A farmer education programme in Myanmar helped more than **4,700** households increase rice production.

major problem of the Country and it calls for immediate And critical solutions. In order to promote Rice production in The country, the following are key areas to Be tackled by both public and private sectors.

(1) Problems Of land ownership and land preparation

(2) Poor knowledge and practice of farmers in land preparation,

Selection of seeds, and cultivation

(3) High cost of inputs such as labor, seeds, machines, fertilizer And poor development of local credit market

(4) Low price of Rice that reduces earnings

(5) Poor coping Mechanisms of Problems such

As Local flooding, droughts and untimely Rains

2015 The Government of Myanmar has positioned agricultural development as one of seven key pillars supporting and enabling inclusive and sustained economic growth. To achieve agricultural development, the Ministry of Agriculture and Irrigation (MoAI), with technical assistance provided by the International Rice Research Institute (IRRI), developed the Myanmar Rice Sector Development Strategy (MRSDS) that seeks to boost rice production and thus better ensure food self-sufficiency and a larger share in the international rice trade for the country. The MRSDS is anchored on improving farm productivity, raising rice farmers' incomes, and enhancing the global competitiveness of Myanmar's rice industry. Higher farm incomes, so crucial to poverty reduction and sustained food security, rely on increased productivity. Moreover, improved farm productivity enables affordable food supplies and competitive wage rates across the economy, thereby generating employment that enables the absorption of plentiful rural labor in

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Approximately 70 % population live in rural areas and depend on agriculture and the country's natural resources. Population 54.35 M in 2016

(Source: Global demographic estimates and projections by the United Nations)

- **In developing countries, the share of rice in GHG emissions from agriculture is even higher, e.g., it was 16% in 1994.**

Irrigation Facilities installed in the last 2 decades: 228 Large and Small Rural Dams Lifted 17

**Lifting water from rivers:
322 river-pump stations established
to area of 0.47 m ac**

- **In dry zone area, inland salinity is also present in some areas. Of the 1.17 M ha rice area, 149,081 ha are drought-prone and 4,900 ha are saline-affected (DAR unpublished data).**
- **Soil erosion is also a huge problem. Therefore, mostly sandy loam land, has low fertility and thus, thin vegetation.**

- **The areas for regional collaboration should take into account regional realities as well as the potential of changing cropping practices and patterns as Climate Change Adaptation strategies.**

Method of rice plant establishment: The System of Rice Intensification (SRI)

- Rice plants are transplanted 8- 15 days after germination
- Water management practice: Alternate Wet and Dry (AWD)
- 3- 5 days of flooding and 10 - 14 days of drainage
- Save water, to get more nutrient absorption, improved root growth
- Reduce the use of irrigation water without compromising the rice yield
- Short duration of flooding condition will reduce the CH₄ emission from the field