



**The Republic of the Union of Myanmar
Ministry of Agriculture and Irrigation
Irrigation Department**



**WATER MANAGEMENT FOR
AGRIBUSINESS DEVELOPMENT IN
MYANMAR**

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Myanmar, Its Water Potential and Water Resources Status



17 January 2014

MYANMAR AGRIBUSINESS INVESTMENT SUMMIT,
21-22 JANUARY 2014, INYA LAKE HOTEL,
YANGON, MYANMAR

Location of Myanmar



Location:

Latitude 9°32' – 28° 31' N

Longitude 92°10' – 101°11' E

Land wise:

North to South

2060 Km

East to West

945 Km

Area:

67.65 million-hectares

(676,553 sq km)

Common international borders with

China in the North

Thailand and Laos PDR in the East

India and Bangladesh in the West and

Thailand in the South

Isohyetal Map of Myanmar
(Annual Rainfall in millimeter)



Climate & Rainfall

Cold Season

November - January

Hot Season

February - April

Wet Season

May - October

Rainfall

South & West Coastal Strip

- 5000 mm

Delta

2000 - 3000 mm

North & Eastern Hilly Region

1250 - 3000 mm

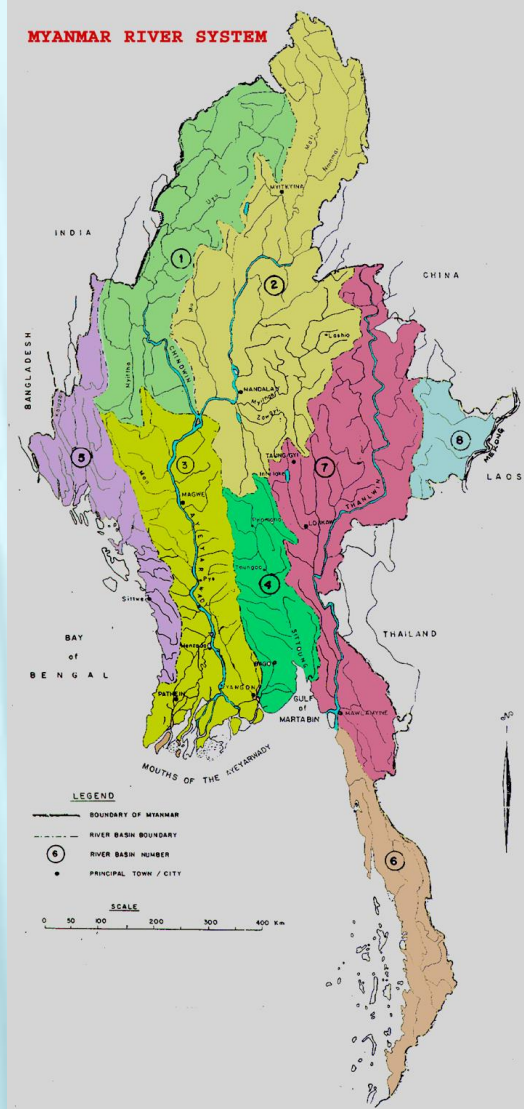
Central Myanmar

below 750 mm

Water Potential in Myanmar

Water Resources Potential

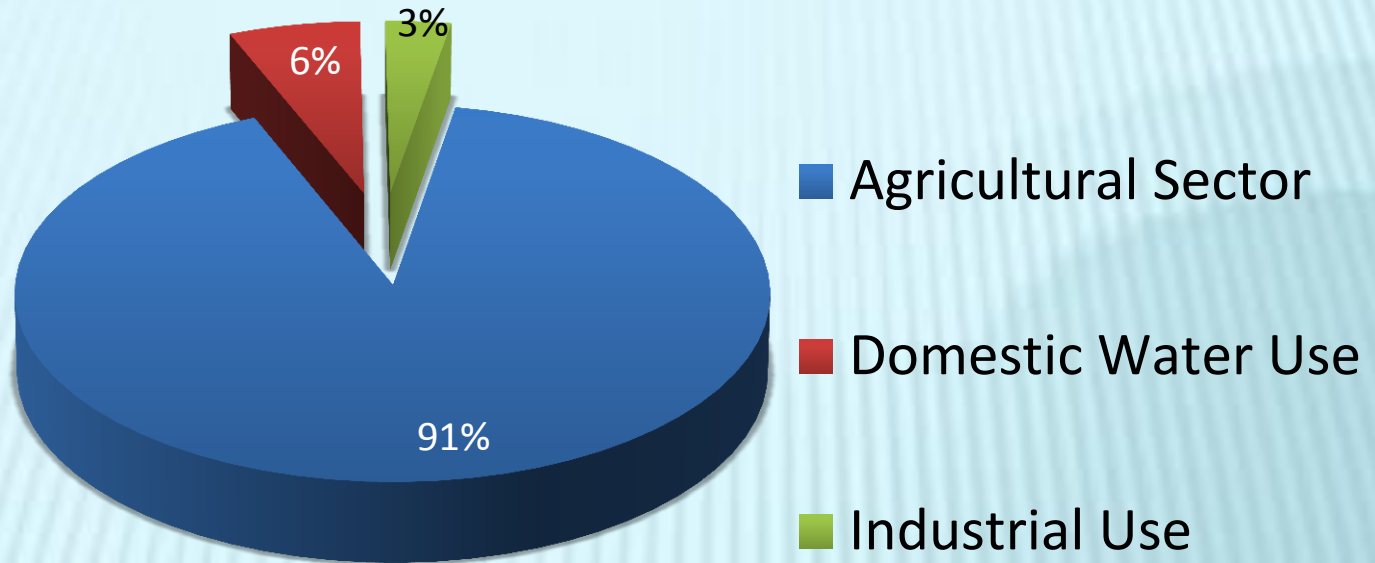
River Basin No.	Name of the River Basin	Drainage Area (10 ³ km ²)	Avg. Annual Surface Water (km ³)	Ground Water Potential (km ³)
I	Chindwin	115.30	141.293	57.578
II	Upper Ayeyarwady	193.30	227.920	92.599
III	Lower Ayeyarwady	95.60	85.800	153.249
IV	Sittaung	48.10	81.148	28.402
V	Rakhine State	58.30	139.245	41.774
VI	Taninthari Region	40.60	130.927	39.278
VII	Thanlwin	158.00	257.918	74.779
VIII	Mekong	28.60	17.634	7.054
	Total	737.80	1081.885	494.713



Major River System

1. Ayeyarwady River
2. Chindwin River
3. Sittaung River
4. Thanlwin River
- 5.

Present Water Use Situation



Rich in water resources and the total utilization of nation's water at present is about 56 km³ and that is only 5% of total potential, mainly for agriculture sector and some smaller quantities for domestic use, industrial use and other purposes.

Water Resources Utilization

- ◆ Several government agencies and departments under different ministries are engaged independently both in surface and ground water use and the extent and type of water use are different from each other.
- ◆ Private and public users from various sectors such as agriculture, water supply and sanitation, industry, mining and environment, etc, have been utilizing the water resources and competitive water use exists in some cases.
- ◆ Myanmar is set to define water quotas for changing trend and pattern of water use by different sectors in both immediate and long term future.

Water Resources Management

- Forest cover of country is decreased to 52% in 1998 and 47% in 2010.
- **Has abundant water resources and little scarcity of water in some places at present** so that it needs proper management and strong policy for sustainable water use for development of country economy, conservation of nature and environment for future generations.
- A number of water resources facilities such as dams, bridges and pumping facilities has been emerging in Myanmar river systems.
- Implemented a long term prevention measures and emergency relief measures of unexpected extreme condition such as flood and drought.
- **The government is implementing plans for water conservation with appropriate management and practices** so as to support the rapid socio economic development of the country as well as for protection against water related environmental degradation.

Agriculture Sector



Population

- Present Population 60.38 Million (2011-12 Data)
- Population growth rate 0.98 %
- Urban population 30.76%
- Rural population 69.24%
- Workforce engaged in agriculture sector 61.20%

Myanmar is an agricultural country and agriculture sector is the back bone of its economy

Source: Myanmar Agriculture at a Glance, 2013

Agricultural Inputs

Land

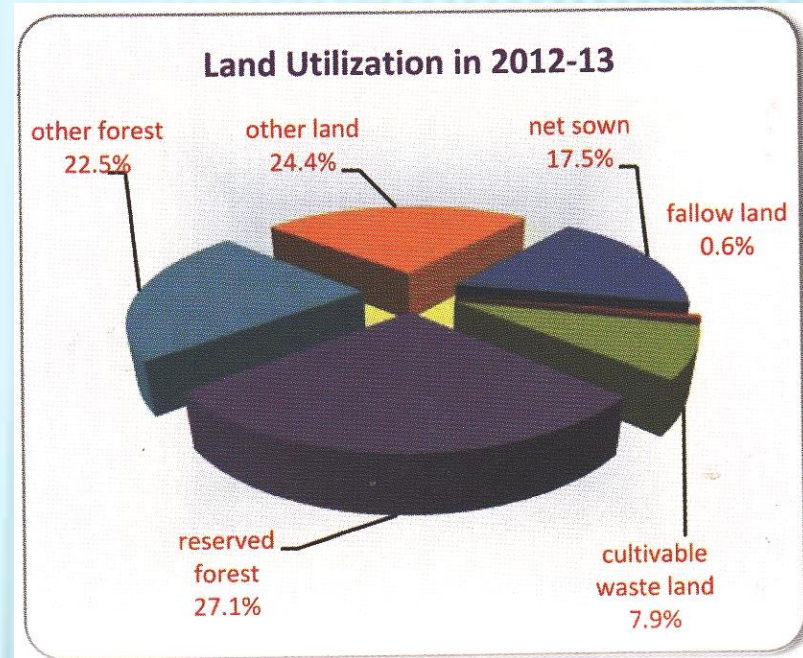
Irrigation

Machinery

Technology

Quality seeds

Other inputs



Irrigation is one of the main inputs for the expansion of new agricultural land and provision of sufficient irrigation water.

The government's policy objectives to boost up agricultural production.

Main Crops Cultivated in Myanmar Agriculture Sector

● Cereals	Paddy, Wheat, Maize, Sorghum
● Oilseeds	Groundnut, Sesame
● Pulses	17 kinds of Pulses
● Industrial Crops	Cotton, Sugarcane, Rubber
● Kitchen Crops	Chilly, Onion, Potato
● Fruits and Vegetables	Mango, Banana, Citrus

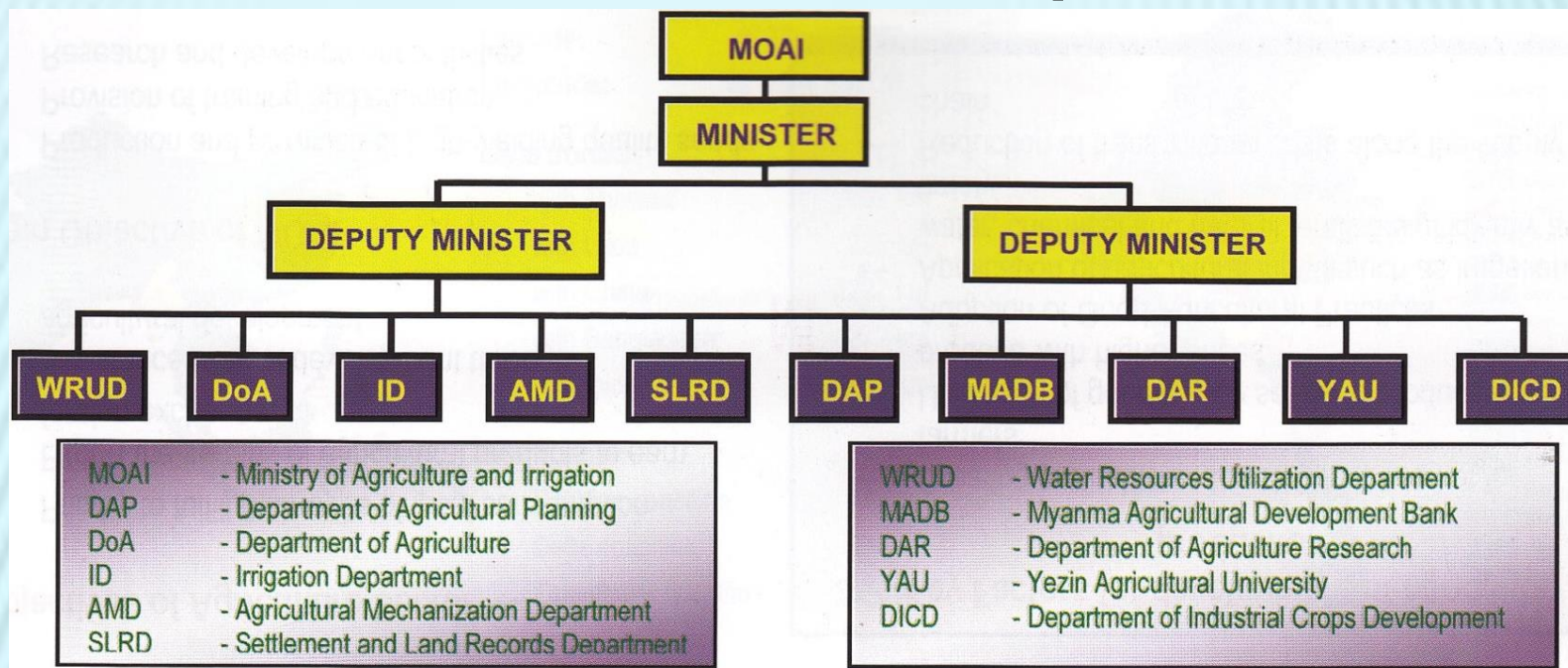
Food and Agriculture Sector

- **The government is trying to keep up** with the United Nation's strategy to achieve the MDGs by 2015, especially in poverty reduction.
- **Growth in agriculture productivity has been recognized and targeted** to raising the incomes of the rural poor & thus reducing poverty so that agricultural infrastructures have also been built accordingly in the country.
- **The government has initiated** for the development of efficient food supply chain management systems for major agricultural commodities especially for rice and pulses crops, the main foreign exchange earners of the agricultural sector, has great potential to lead socio-economic growth and to reduce poverty.

A large dam with a spillway, a reservoir, and a power station. The dam is made of concrete and has a long spillway on the right side. The reservoir is on the left, and the power station is in the middle. The dam is surrounded by a rocky landscape with some vegetation. The sky is blue and the water is greenish-brown.

Irrigation Department

Institutional Setup



Ministry of Agriculture and Irrigation is the main institution for administrative tasks. There are (10) departments under the ministry and their main functions are as follows:

1	Department of Agricultural Planning	Formulation of various Agricultural plan
2	Department of Agriculture	Production of good quality seed varieties for main crops
3	Irrigation Department	Planning and implementation of new irrigation projects and O&M works

4	Agricultural Mechanization Department	Provision of farm mechanization services on land preparation, harvesting and threshing
5	Settlement and Land Records Department	Updating land maps and registers
6	Water Resources Utilization Department	To supply irrigation water by pumping water from river and streams and also utilization of groundwater
7	Myanmar Agricultural Development Bank	Lending seasonal, short, medium and long term loans to farmers
8	Department of Agricultural Research	Research development on high yielding crop varieties
9	Yezin Agricultural University	To produce high qualified agriculturalists needed for the development of the agriculture sector
10	Department of Industrial crops Development	To produce high-yield and qualified seeds for industrial crops

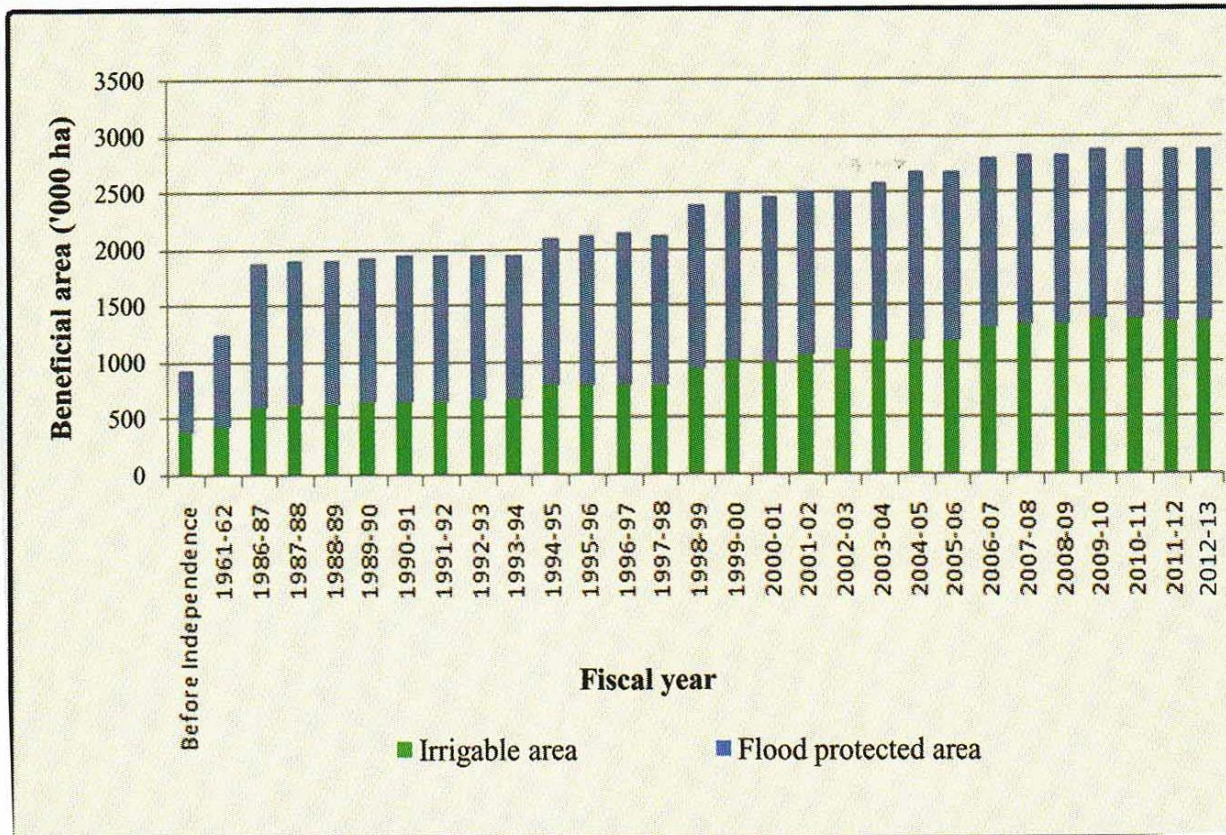
Irrigation Policy

- **To develop** the upstream (resource) and downstream (canal system) including the on-farm facilities simultaneously by participation of farmers in construction and maintenance of tertiary units.
- **To establish** the water users' association (WUA) in each level of newly developed irrigation system, to strengthen the existing water users' association and to support the farmers' autonomous irrigation system for sustainable development of irrigation.
- **To support** the farmers to have more efficient and effective water use practice in on-farm level and to have an equity of water allocation or adoption of farmers preferable water allocation system.

Irrigation Department

- ➡ **Responsible for operating and maintenance** of irrigation, drainage and flood control works.
- ➡ **New types of irrigation** such as pumping irrigation and ground water irrigation were attempted apart from the formal storage reservoirs projects.
- ➡ **Some major irrigation works** incorporating hydropower, flood control and domestic water supply are also included
- ➡ **Plays a major role as the prime water user**, for the main purpose of supplying water for agricultural irrigation and protection of cultivable areas from floods.

Irrigable and Flood Protected Areas under the Irrigation Department



Effects

1. Many Paddy fields were damaged by flood that leads to reduction of paddy rice production.
2. Adverse impact on social and economic life of the people in the flooded region.

Recent Flood In Myanmar, 2012 August



Flooded farmlands in Thapaung Township, of Ayeyarwaddy Region seen on 11 August



Flooded farmlands in Darka Township of Ayeyarwaddy Region seen on 18 August



17 January 2014

Flooded farmlands in Bago Township seen on 17 August



Flooded farmlands in Taungoo seen on 13 August

Aerial View of a Typical Regulating Sluice for Irrigation & Drainage works in Ayeyarwady Delta of Myanmar



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Provision of Irrigation Water by other means

Electric - pumping	136 no.	beneficial area	155,132 ha
Diesel - pumping	191 no.	beneficial area	45,963 ha

**Total pumping projects 327 no and beneficial area 201,095 ha
(2010/2011)**

Deep tube wells	5,298 no.
Shallow tube wells	3,067 no.

Total groundwater projects 8,365 no. & beneficial area 41,966 ha

Progress in Irrigated Area and Multiple Crop Irrigated Area

Year	Total Irrigated area (Million-ha)	Multiple crop Irrigated area (Million-ha)	% of Total Irrigated area	% of multiple crop Irrigated area
1988-89	1.02	0.15	12.70	14.70
1998-99	1.69	0.39	17.50	23.10
2008-09	2.27	0.55	16.86	23.98
2011-12	2.12	0.59	15.60	27.70
2012-13	2.12	0.48	15.90	22.80

Cropping Intensity

Year	Net sown area (million ha)	Total sown area (million ha)	Cropping intensity (percent)
1998-99	9.67	13.31	137.6
2003-04	11.04	16.62	150.5
2008-09	13.49	22.96	170.2
2010-11	13.75	23.57	171.4
2011-12	13.58	22.50	165.6
2012-13	13.30	21.05	158.3

Total net sown area increased from 8.06 million-ha in 1988-89 to 13.30 million-ha in 2012-13.

Increased in irrigation facilities and irrigated area, and also cropping intensity increased to 158.3% in 2012-2013.

Source : Myanmar Agriculture in Brief 2013

Annual Budget for Irrigation Development (kyats in million)

Year	Current	Capital	Total
1989-90	295.79	334.06	629.85
2000-01	3,168.81	9,474.04	12,642.85
2010- 11	59,697.31	97,389.69	157,087.00
2012-13	92,775.68	195,425.23	288,200.91

It is clear that massive infusion of Government Budget led to remarkable progress in the pace of irrigation development during the year 1989 to 2013.

Source- ID, Only for ID Budget

Structure of Production (2010-2011)

- Agriculture (including livestock, Fisheries and Forestry) 36.3%
- Mining, Energy 0.9%
- Manufacturing 19.5%
- Power 1.0%
- Construction 4.5%
- Other Services 17.8%
- Trade 19.8%

Agriculture sector contributes 30% of GDP (2010-2011) and 13.7% of total export earnings.

Irrigation Water Management in Myanmar

- Irrigation systems in Central Myanmar had regulations and good practice for systematic management
- During the colonial period, traditional rules and regulations were strengthened
- Most of old irrigation systems in Central Myanmar have farmer groups for irrigation
- The newly implemented irrigation projects are copied from the management system of neighboring systems

Irrigation Water Management in Myanmar

- The farmers do not understand their role in irrigation management and importance of irrigation system in their livelihood
- Irrigation managers used to organize the water user groups or canal committee yearly but the farmers do not participate in any movement
- It can be clarified that **‘the irrigation system management is not perfect without the on-farm irrigation management by farmers’**

Characteristics of Irrigation Management

Activities	Irrigation office	Farmers (water users)
Operation & Maintenance	MC ⇄ DY ⇄ M	WC ⇄ farm ditches ⇄ farm plots
Work load	<ul style="list-style-type: none"> ▶ Civil works ▶ Administration works 	<ul style="list-style-type: none"> ▶ Continuous crop production ▶ Village activities
Water distribution	<ul style="list-style-type: none"> ▶ 12mm/d (design standard) ▶ Water control; <ul style="list-style-type: none"> - WL in reservoirs - WL in MCs 	<ul style="list-style-type: none"> ▶ No standard ▶ Secure/sufficient water ▶ free/uncontrollable
Priority	<ul style="list-style-type: none"> ▶ MC & DY canals 	<ul style="list-style-type: none"> ▶ Water, beneficial crops ▶ Much depend on ID in irrigation activities

➤ Role of Farmers (water users)

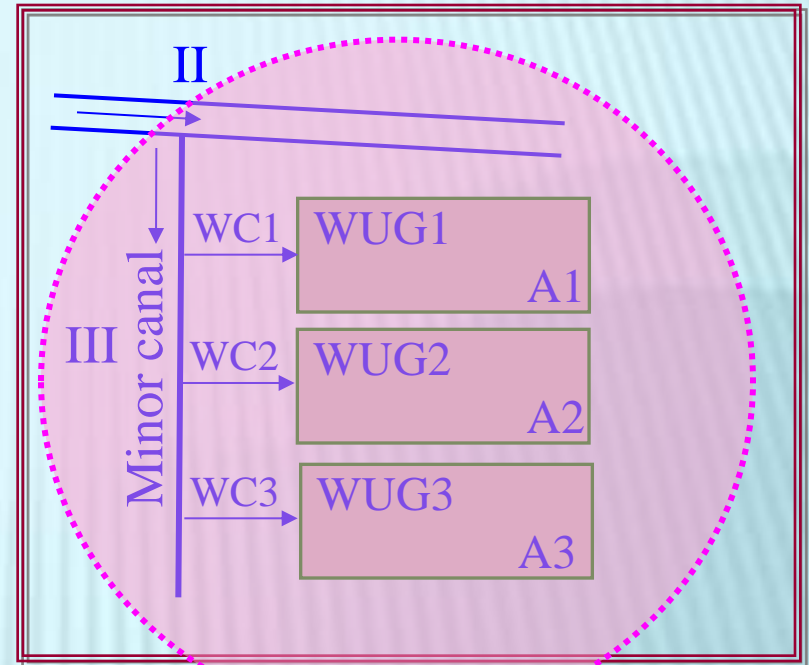
- Formation of Groups at WCs
- Formation of a Group at Minor



- Operation and Maintenance
- Drive/control farmers to keep/follow the methods/rules
- Collection of the fees associated with using irrigation/the system



Get water equally & Control water loss



Within a Village Tract

➤ A Group of Water Users at Minor Canal is very essential/effective and it is better to organize both the system and the group within a same village tract.

Five tasks under Integrated Rural Development Plan

1. Construction of roads between villages in rural areas and to link with urban areas.
2. To make water available for people as well as for cultivation.
3. To improve and upgrade school, buildings and infrastructures to uplift the education standards: to improve the quality of teachers; to enable the children of school going age to attend class and to make them literate.
4. To uplift rural health care system.
5. To bring about the economic growth of the rural populace.

Linkage between Irrigation and Poverty Alleviation

To reduce the magnitude of impact on poverty by irrigation

- (1) Irrigation infrastructure improvement.
- (2) Development in irrigation water management and allocation.
- (3) To improve quality of irrigation water.
- (4) Enhance irrigation technology.
- (5) Selection of appropriate cropping pattern.
- (6) Installation of **micro-hydro power** generation plants along the irrigation canals.
- (7) Participating in the land reform process for establishment of **mechanized farming**.

Renewable Energy

Apart from irrigation and flood protection projects, Irrigation Department constructed multi-purposed dam projects in feasible area to generate hydropower for the nation.

Hydropower Generation (at Outlet work) by completed projects

No.	Projects	Total Projects (No.)	Installed Electricity Power	
1.	Large scale projects	11	609.2	M Watts
2.	Medium & Small scale	70	2077.000	K Watts
	Hydropower Projects			

MULTIPURPOSED DAM PROJECT



**THAPHANSEIK
MULTIPURPOSED DAM**

Storage Capacity - $3,552,480 \times 10^3 \text{ m}^3$

Extent of Hydropower - $3 \times 10 \text{ MW}$

Irrigable Area - 202,350 hectares



**KINDA
MULTIPURPOSED DAM**

Storage Capacity - $1,077,561 \times 10^3 \text{ m}^3$

Extent of Hydropower - $2 \times 28 \text{ MW}$

Irrigable Area - 81,546 hectares

Hydropower Generation (at drop structures)

- Hydropower is generated by installing **small power plants** in canal and drop structures for enhancing rural area development near by adjacent projects area.
- At present, Irrigation Department studies the feasible places to generate hydropower and there are about **(900)** feasible drop structures in completed projects.



Mechanized Farming

Implemented Land Reform Project in Naypyitaw

Sr. No.	Location	Implemented Mechanized farm (hactares)		Irrigation System
1	Naypyitaw	1444	2086	Ngaleik
		20		Yezin
		258		Yanaungmyin
		364		SetSetYo
2	Leway	81	283	Chaugmange
		202		Madan
3	Pyinmana	178		Ngaleik
Total		2548		



Utilization of Tractors and Power Tillers

2000/01 and 2011/12 (prov)



Particular

Unit

2000/01

2011/12 (prov)

Tractors

Number

8,687

11,232

Power Tillers

Number

49,473

164,054

86% of tractors and 100% of Power Tillers are owned by peasants

Agricultural Loan

Loan for 2000-01

12,124.19 million Kyat

Loan for 2011-12

352,721.75 million Kyat

80% of loan is issued for paddy cultivation

International Cooperation

- Member of International Commission on Irrigation & Drainage (**ICID**) since 1982.
- Myanmar Commission on Irrigation and Drainage (**MCID**) was established since 2001.
- National Committee for International Hydrological Programme (**IHP**) was formed in 2003.
- Former **SEATAC** Member since 1999 and Member of Global Water Partnership - South East Asia (**GWP-SEA**) since 2004.
- Myanmar Water Partnership (**MmWP**) (Interim Stage) was formed in 2007.
- Close cooperation with other organizations such as Water Environmental Partnership in Asia (**WEPA**), South East Asia Capacity Building Network in IWRM (**AguaJaring**).

Conclusions

- ❖ **Good farming practices** should be found through monitoring and adopted/transferred from places to places. More technical inputs should be adopted in irrigation management from both sides (supply and demand).
- ❖ **Irrigation facilities and management systems** provided to farmers should be gradually **developed in line** with the characteristics of village administration system and within their capacity, capability and culture practices for further steps towards better irrigation management.

Conclusions

- ❖ The Irrigation Department has diligently conformed to the **State's objectives** with the construction of new infrastructures, maintenance and efficient operation of the existing irrigation facilities.
- ❖ The Department has also in addition, and as one of its main tasks, been actively engaged in **water development planning**, and the furtherance of irrigation for **food security**.
- ❖ Food security, rural development, poverty reduction and sustainable economic development should **play in parallel** with development in economic, social, health and education sectors.

Conclusions

- ❖ Need to **lay down policies** for water management as water supply is essential for agriculture sector and prepare adaptation measures for climate change.
- ❖ **Firm policies** are needed to take **effective measures** for the development of integrated farming system.
- ❖ Necessary to **initiate a micro-finance policy** so that individual requirements will be fulfilled and delivery units have been formed for ensuring direct contacts with the public.
- ❖ Policies, strategies and tactics for conservation of natural resources should be laid down.

Conclusions

- **In Myanmar**, several departments and agencies are engaged with supply and management of water so that cooperation and coordination among water related institutions is main issue for the proper WRM.
- **It is important** for the enhancement of public awareness and public participation for successful implementation of IWRM in the country.
- **It is desirable** to call on the stakeholders, national entrepreneurs, and international organizations to make concrete efforts to participate in the development of agriculture, forestry, livestock, fisheries, rural development and energy sectors, etc in Myanmar.

Thank You for Your Kind Attention

