

IMPROVING WATER MANAGEMENT AND IRRIGATION DEVELOPMENT IN MYANMAR FOR FOOD SECURITY

ရခိုင်ရိုးမတောင်တန်း

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ရေလှောင်တံ

မုန်းချောင်းရေလှောင်တံ

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The West Bank Rice Granary of Bagan Dynasty

Known as “Salin Chauk Khayaing” (6 District)

Estd. by **King Anawrahta** in 1044-77 AD

မင်းဘူးမြို့

မုန်းချောင်း

စလင်းမြို့

ဆင်ဖြူကျွန်းမြို့

ရောဝတီမြစ်

စလေးမြို့

ချောက်မြို့

Presented by
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Contents of Presentation

Part I

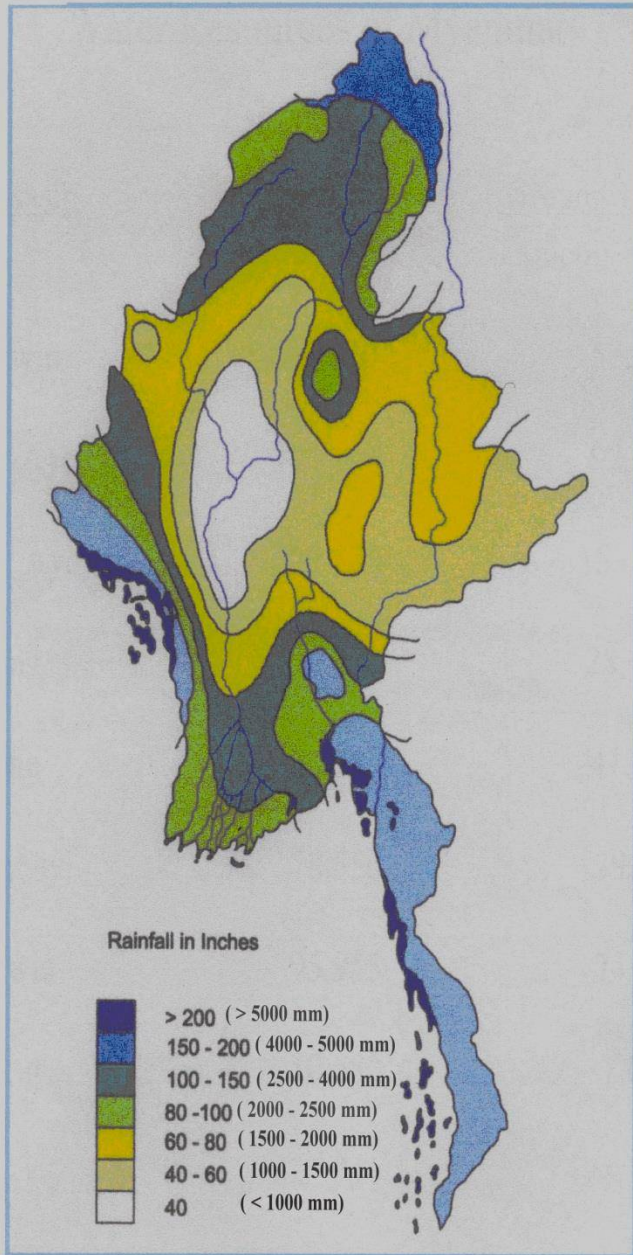
Myanmar and Its Water Potential

Myanmar

- Location: South East Asia Peninsula
Between 10° N to 28° N (latitude)
92.5 ° E to 101.5 ° E (longitude)
- Border: Bangladesh, India, China, Laos, Thailand, Bay of Bengal, Andaman Sea
- Land Area: 676,553 sq km
- Topography: Flat land, river valleys, hills, plateau and mountains
- Climate: Tropical and sub-tropical
- Rainfall: Max: 5000 mm rainfall along the coast with less than 750mm in CDZ
- Temperature: Average Temperature: 32 °C
Max: Temperature : 45 °C (Summer) in CDZ
Min: Temperature : -2°C in Northern Mountainous Region
- Population: 51.4 million, over 70% is in rural area



Climate & Rainfall



Monsoon

May – October

Winter

November - January

Summer

February - April

Rainfall

South & West

Coastal Strip - 5000 mm

Delta - 2000 - 3000 mm

North & Eastern

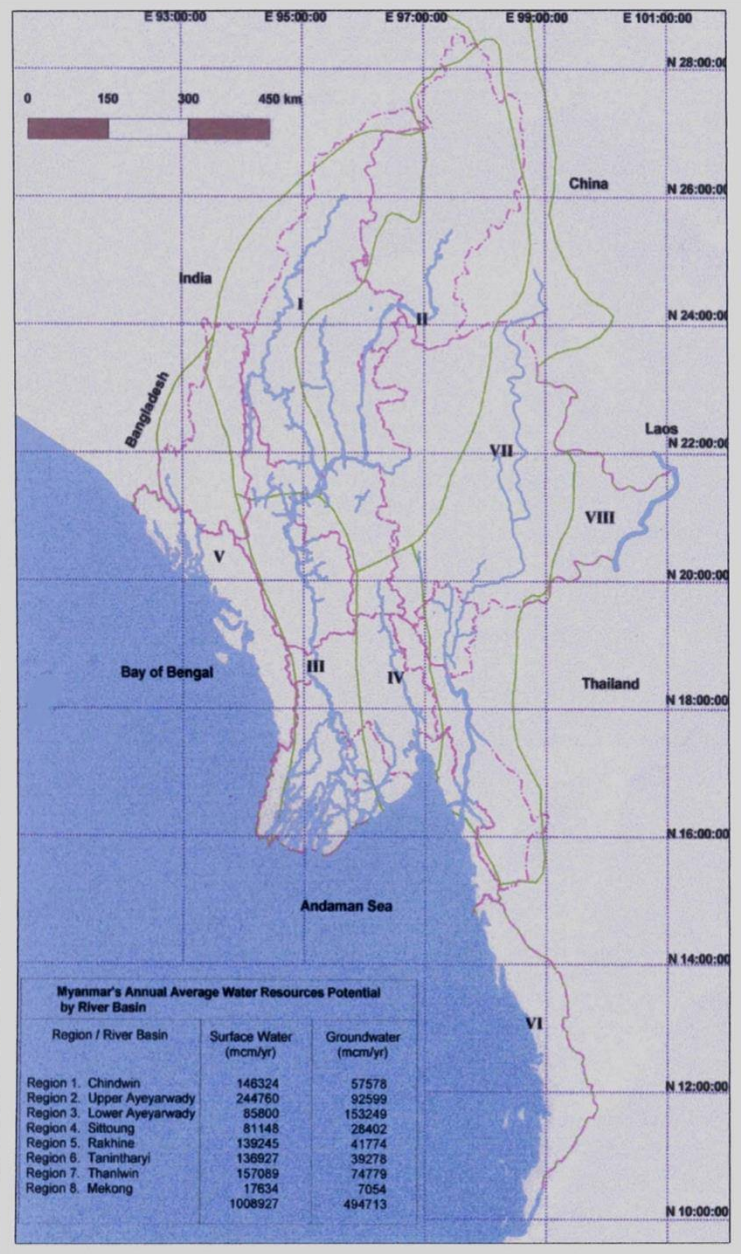
Hilly Region - 1250 - 3000 mm

Central Myanmar - below 750 mm

Scarcity of Water in dry season

all over the country

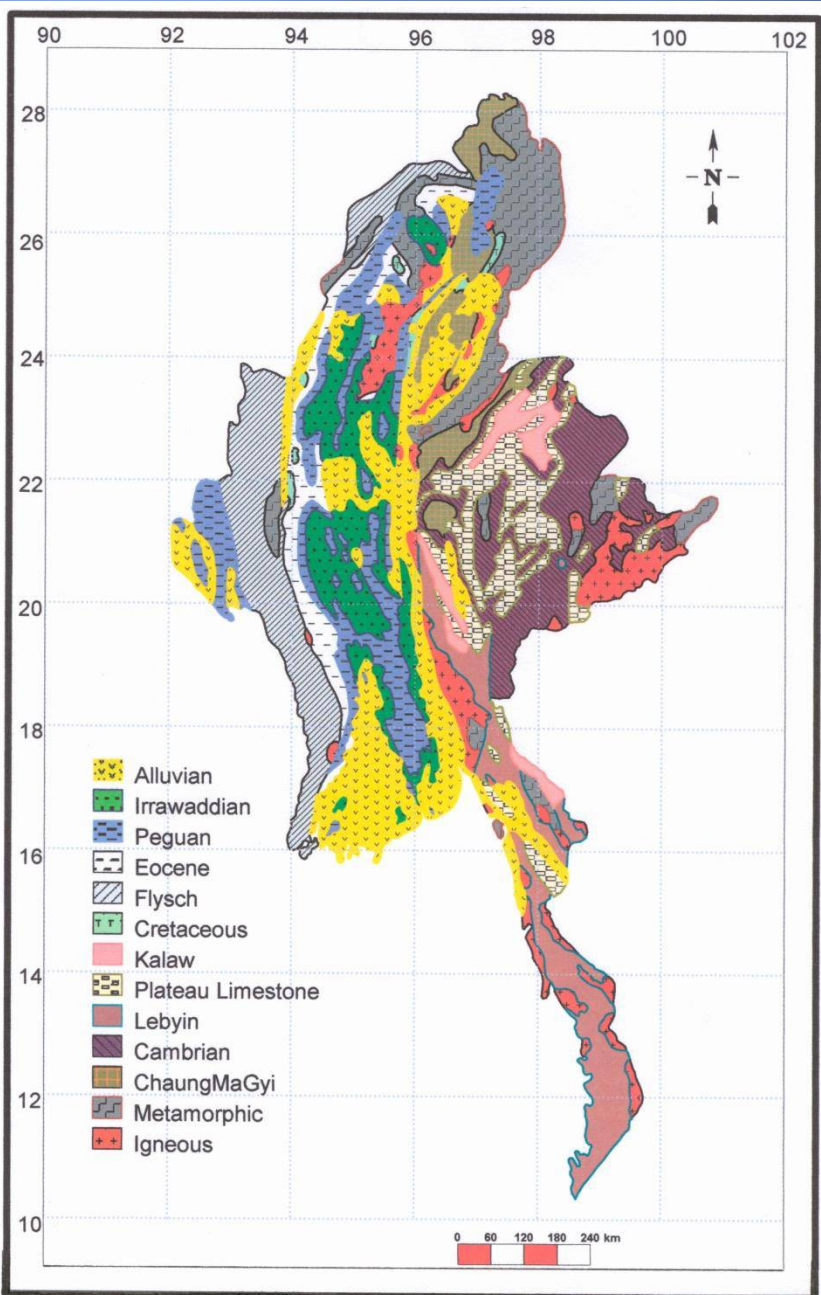
Annual Surface and Groundwater Potential



No.	Name	Catchment area (thou. sq.km)	Est. Average annual surface water (km ³)	Est. ground-water Potential (km ³)
I	Chindwin	115.30	141.293	57.578
II	Upper Ayeyarwaddy (up to its confluence with Chindwin)	193.30	227.920	92.599
III	Lower Ayeyarwaddy (From confluence with Chindwin to its mouth)	95.60	85.80	153.249
IV	Sittaung	48.10	81.148	28.402
V	Rakhine	58.30	139.245	41.774
VI	Taninthari	40.60	130.927	39.278
VII	Thanlwin River (From Myanmar boundary To its mouth)	158.00	257.918	74.779
VIII	Mekong (within Myanmar Territory)	28.60	17.634	7.054
TOTAL		737.80	1081.88	494.71

Major Aquifers

5



- On the basis of stratigraphy, there are 11 different types of aquifer in Myanmar.
- Depending on their lithology and depositional environments, groundwater from those aquifers has disparities in quality and quantity.
- Out of those, groundwater quality of Alluvial and Irrawaddian aquifers is more potable for both irrigation and domestic water use.
- In the water scarce regions, groundwater from Peguan, Eocene and Plateau limestone aquifers, through not totally suitable for drinking purpose from hygienic point of view, are extracted for domestic purpose

Land Utilization

Particulars	1995/96	2000/01	2010/11	2012/13	2013/14	2014/15
Net area sown	8910	9909	12021	11841	11869	11986
Fallow Land	1231	686	230	439	457	443
Cultivable waste Land	7971	7205	5396	5361	5285	5267
Reserved Forests	10321	12914	17916	18305	18596	18574
Other Forest Area	22079	19786	15630	15207	14842	14734
Other Land	17147	17159	16467	16506	16611	16656
Total	67659	67659	67659	67659	67659	67659

Source: Department of Agricultural Land Management and Statistics ,
Ministry of Agriculture, Livestock and Irrigation

Contents of Presentation

Part II

**Status of Water Legislation, its Development
and Challenges in Myanmar**

Laws, Regulations, Legislation and Legal Support

- ▣ **Since the 1900s, there has been established laws, regulations, legislation and legal support for water resources development, management and utilization in the water related sectors.**

Chronology of Myanmar's Legal Framework with Water Environmental Implication

# Penal Code, 1860	# Law relating to the Fishing Right of Foreign Fishing Vessels, 1989
# Land Improvement loan Act, 1883	# Myanmar Marine Fisheries Law, 1990
# Rangoon Waterworks Act, 1885	# Pesticide Law, 1990
# Burma Municipal Act, 1898	# Forest Act, 1992
# Canal Act, 1905; Embankment Act, 1909	# Fresh Water Fisheries Law, 1992
# Rangoon Port Act, 1905; Port Act, 1908	# Development Committees Law, 1993
# Water Hyacinth Act, 1917	# Myanmar Hotel and Tourism Law, 1993
# City of Rangoon Municipal Act, 1922	# Protection of Wild Animals, Wild Plants and Preservation of Natural Areas Law, 1994
# Water Power Act, 1927	# Myanmar Mines Law, 1994
# Underground Water Act, 1930	# Conservation of Water Resources and River Law, 2006
# Emergency Provisions Act, 1950	# Environmental Conservation Law, 2012
# Factor Act, 1951	
# Territorial Sea and Continuous Zone Law, 1977	
# Law relating to Aquaculture, 1989	

(a) For Urban Water Utilization

- ▣ (1) Penal Code, 1861**
- ▣ (2) The Rangoon Water Works Act (1885)**
- ▣ (3) The Burma Municipal Act (1898)**
- ▣ (4) The Burma Canal Act 1905, as amended by Burma Act of 1914, of 1924 of 1928 and of 1934**
- ▣ (5) The Burma Embankment Act, 1909 as amended by Burma Act of 1923, and of 1931**
- ▣ (6) The City of Rangoon Municipal Act (1922). The law amended the City of Yangon Municipal Act (1991)**
- ▣ (7) The Underground Water Act (1930) , Burma Act IV 1930) 21 June 1930**
- ▣ (8) The Burma Water Power Rules (1932)**

(b) For Irrigation Water Supply

- **Canal Act, 1905(Amendment Canal Act in 1928)**
 - **Myanmar Embankment Act, 1909 (Amendment Embankment Act in 1928)**
- Myanmar Irrigation Manual, 1945 (Revised: Edit)**

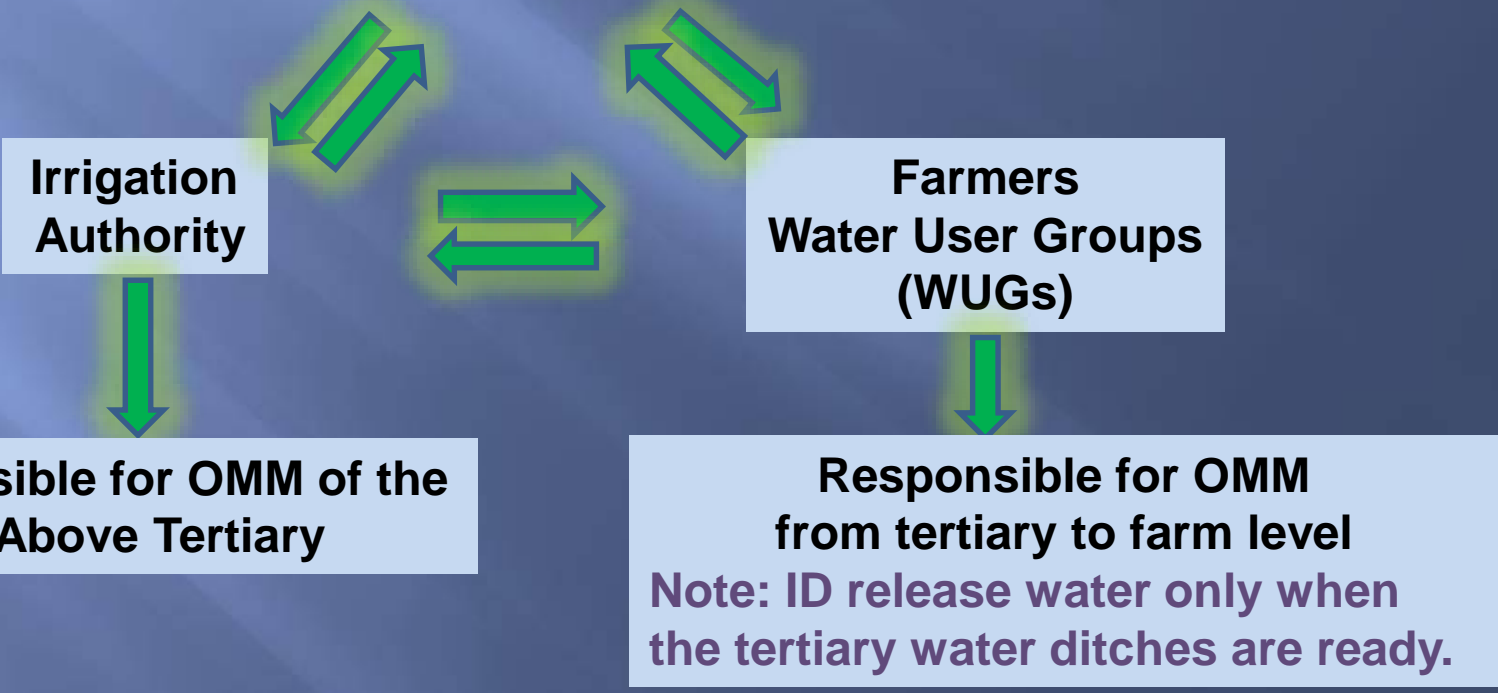
Irrigation Water Management in Myanmar

- 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 the past systems

Irrigation System Water Management in Myanmar in reality is a dual water management system.

Supply Management System

1905 Canal Act, Myanmar Irrigation Manual (1945)



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”
- Capacity building is required.

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"> ▶ Regulated discharge ▶ 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

National Water Resources Committee (NWRC)

- ▣ **National Apex body for water related matters was established in 2013 July 25**
- ▣ **Chair: Vice President 2, Government of Myanmar**
- ▣ **Vice Chair: Minister, Ministry of Transport**
- ▣ **Secretary: Director General, Directorate of Water Resources and Improvement of River Systems(DWIR), Ministry of Transport**
- ▣ **Members: Ministers, Dy. Ministers, Mayors, Rep. State/Regional Ministers, DGs, Rector, Advisor, Expert Group Chair/Secretary**

National Water Resources Committee (NWRC)

➤ **Members:**

- **Ministers:** MOAI; MOECAAF; MOEP; MONPED; MOLFRD
- **Dy. Ministers:** MOT; MOI; MOH; MOC; MOBA
- **Mayors:** Napyitaw; Yangon; Mandalay
- **Representative Minister** from State/Regional Government
- **DGs:** General Administrative Department;
Irrigation Department; Water Resources Utilization Department;
Environmental Conservation Department;
Fisheries Department;
Department of Rural Development;
Department of Meteorology and Hydrology;
Department of Hydro Power Implementation
- **Rector:** Myanmar Maritime University
- **Advisor** from President's Office
- **Chair/Secretary** of Water Experts Group

The enabling environment: Policies

- ❑ **No Single comprehensive National Water Resources Policy in the past periods.**
- ❑ **Existence of several sectoral policies related to WRM.**
 - **Policy for Agriculture**
 - **Policy for Watershed Conservation**
 - **Policy for Environmental Conservation**
 - **Policy for Water Resources Management**
 - **Policy for Energy**

The enabling environment: Policies

- ❑ **Brief description related to National Water Resources Policy was firstly included in the publication of Myanmar Agenda 21 in 1997.**
- ❑ **Some member of Expert Group (EG) of National Water Resources Committee (NWRC) has been working for National Water Resources Policy since 2012.**
- ❑ **The National Water Resources Policy has been approved by National Water Resources Committee (NWRC) in 2014**
- ❑ **It has been published in March 2014 with the commemoration of World Water Day 2014 in Myanmar.**

The enabling environment: Legislation

- ▣ **No specific comprehensive WRM Law.**
- ▣ **Most existing laws were enacted before year 2000.**
- ▣ **The very first law on water pollution, the Penal Code, was enacted in 1860.**
- ▣ **Conservation of Water Resources and River Law enacted in 2006.**
- ▣ **Environmental Conservation Law enacted in 30th March 2012.**

Overview of Legislative Issues

❖ Irrigation Water Supply:

Burma Irrigation Manual 1945 (Volume 1)

- **contain the text of the Burma Canal Act and the Burma Embankment Act**
- **contain Rules and Notifications addressing in detailed issues regarding irrigation works, waterways, village canals and drainage works, and embankments.**

Contents of Presentation

Part III

Myanmar Irrigation System and Improvement

Myanmar Monachy Era (1044 to 1885)

- East Bank Irrigation Area
(Letwin Koe Khayaing)**
 - established in 1044, Bagan Period
 - By King AnawRahta
- Maikhtila Reservoir and
Ponds**
 - established in 1044, Bagan Period
 - By King AnawRahta
- Together with many rain
harvesting ponds**
- West Bank Irrigation Area
(Salin Chauk Khayaing)**
 - established in 1044, Bagan Period
 - By King AnawRahta
- ShweBo – YeOo Canal
Systems**
 - established in 1044, Kone Baung Period
 - By King AnawRahta
- (Alaung Payar Canal)**

Colonial Era (1885 to 1948)

- **The British reestablished the Myanmar Kings Irrigation System - Mone Mann Salin Irrigation System of the West Bank**
- **Kyauk Se Irrigation District**
- **Meikhtila, Nyaung Yan, Min Hla Tanks Irrigation System**
- **ShweBo – YeOo – Mu Canal System**

Myanmar Irrigation Development by Era (Surface Water)

Sr. No.	Year	No. of Irrigation Schemes	Beneficial Area (Ha)
1	Myanmar Kings, Colonial and Democratic Independence Era to (1961/62)	69	345315
2	1961/62 to 1988/89	69	195433
3	1988/89 - 2009	222	1134882
4	2009 - 2015	19	56439
		379	1732074

*Source: Department of Planning, Ministry of Agriculture and Irrigation
Myanmar Agriculture at a glance*

Irrigation Works in Myanmar

Year	Number of Projects	Beneficial Area (A)	Beneficial Area (ha)
1948 to 1962	69	853,647	345459
1962 to 1988	69	482,915	195512
-	-	-	-
-	-	-	-
1990 - 1991	10	420,679.243	170,243
1991 - 1992	8	28,394.8543	11,491
1992 - 1993	6	5,226.2742	2,115
1993 - 1994	9	145,903.2435	59,045
1994 - 1995	16	93,571.3121	37,867
1995 - 1996	16	271,106	109,713
1996 - 1997	12	207,756.1369	84,076
1997 - 1998	9	149,295.9974	60,418
1998 - 1999	9	120,745.4669	48,864
1999 - 2000	12	87,801.4065	35,532
2000 - 2001	12	131,751.5308	53,318
2001 - 2002	13	233,724.4184	94,585
2002 - 2003	12	161,203.9951	65,237
2003 - 2004	14	89,101.1797	36,058
2004 - 2005	14	189,247.9601	76,586
2005 - 2006	12	251,721.0875	101,868
2006 - 2007	13	33,196.1076	13,434
2007 - 2008	12	155,602.1212	62,970
2008 - 2009	11	5,349.8268	2,165
2009 - 2010	12	457,515.2093	18,515
2010 - 2011	1	177.9157	72
2011 - 2012	2	24,999.6293	10,117
2012 - 2013	5	1,499.9283	607
2013 - 2014	-	-	-
2014 - 2015	1	90,003.1135	36423
Total	379	4,692,135.9435	1,732,065.0686

*Source: Department of Planning, Ministry of Agriculture and Irrigation
Myanmar Agriculture at a glance*

IRRIGATION WORKS OF MYANMAR

CONSTRUCTED IN THREE DIFFERENT ERAS OF

ANCIENT MYANMAR KINGDOM,

COLONIAL PERIOD AND THE TIME OF 1948 - 1962

IRRIGATION WORKS OF MYANMAR CONSTRUCTED IN THREE DIFFERENT ERAS OF ANCIENT MYANMAR KINGDOM, COLONIAL PERIOD AND THE TIME OF 1948-1962

(SUMMARY)

NO.	STATE / DIVISION	NO. OF IRRIGATION WORKS	BENEFICIAL AREA (Ha)
1.	KACHIN STATE	-	-
2.	KAYAR STATE	2	1311.74
3.	KAYIN STATE	-	-
4.	CHIN STATE	-	-
5.	SAGAING DIVISION	6	154277
6.	TANINTHAYI DIVISION	-	-
7.	BAGO DIVISION	10	5823
8.	MAGWAY DIVISION	7	65843
9.	MANDALAY DIVISION	38	116700
10.	MON STATE	2	323
11.	RAKHINE STATE	-	-
12.	YANGON DIVISION	-	-
13.	SHAN STATE	-	-
14.	AYEYAWADY DIVISION	4	1178
TOTAL		69	345459

Source: Irrigation Department, October 2008
U Hla Min (Director) Groundwater Division

**IRRIGATION WORKS OF MYANMAR
CONSTRUCTED IN THE YEARS
BETWEEN 1962 AND 1988**

IRRIGATION WORKS OF MYANMAR CONSTRUCTED IN THE YEARS BETWEEN 1962 AND 1988 (SUMMARY)

NO.	STATE / DIVISION	NO.OF IRRIGATION WORKS	BENEFICIAL AREA (Ha)
1.	KACHIN STATE	3	9650
2.	KAYAR STATE	5	11482
3.	KAYIN STATE	6	2317
4.	CHIN STATE-	-	
5.	SAGAING DIVISION	2	1417
6.	TANINTHAYI DIVISION	-	-
7.	BAGO DIVISION	6	43517
8.	MAGWAY DIVISION	4	8687
9.	MANDALAY DIVISION	23	94931
10.	MON STATE1	1	
11.	RAKHINE STATE	2	24.29+ TOWN WATER
12.	YANGON DIVISION	-	-
13.	SHAN STATE	17	23259
14.	AYEYAWADY DIVISION	-	-
TOTAL		69	195512

Source: Irrigation Department, October 2008
U Hla Min (Director) Groundwater Division

Beneficial Area by Type in Myanmar

Sr. No.	Method	No. of Structures	Beneficial Area (Ha)
1	Weir	28	97543
2	Dam	258	1215643
3	Tank	48	82342
4	Pump	8	15488
5	Sluice Gate	32	196620
6	Flume	2	546
7	Others	3	87518
		379	1732074

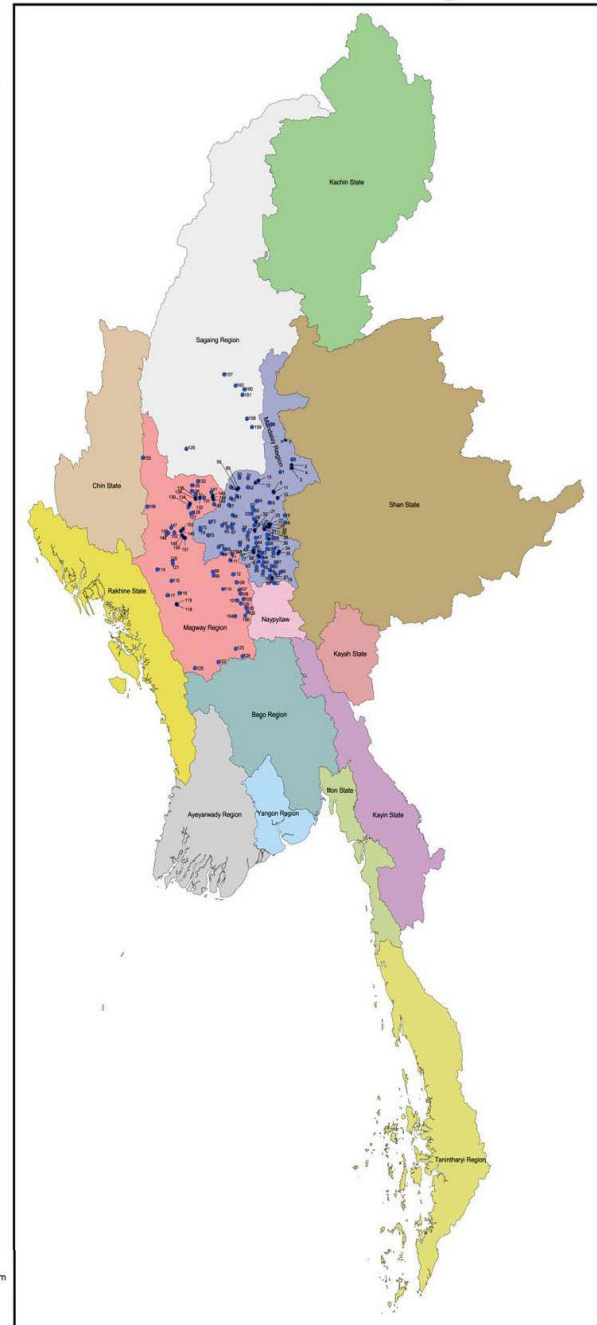
Source: ST/ESCAP/1573 UN 1996, Myanmar Agriculture at a glance, Department of Planning, Ministry of Agriculture, Livestock and Irrigation

Legend

- Dam Locations
- States and Regions (250km)
- Ayeyarwady Region
- Bago Region
- Chin State
- Kachin State
- Kayah State
- Kayah State
- Magway Region
- Mandalay Region
- Mon State
- Naypyitaw
- Rakhine State
- Sagaying Region
- Shan State
- Tanintharyi Region
- Yangon Region



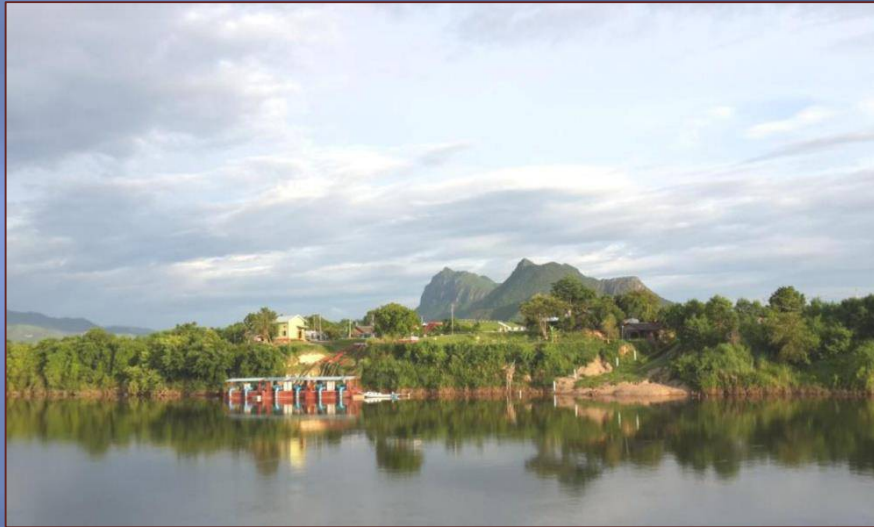
Mandalay Region		Magway Region	
ID	Dam/Weir	ID	Dam/Weir
1	Sedawlay Weir	98	Lay daing zin Dam
2	Dockwin Dam	99	Na ga Dam
3	Sitha Dam	100	Kin mun daung Dam
4	Sitha Modulating Dam	101	Kan daw gyi Tank
5	Sinlan Dam	102	Ban gon Dam
6	Sedawgyi Dam	103	Nga min Dam
7	Kyauksay Weir	104	Yan pe Dam
8	Marlattung Dam	105	Yin male Weir
9	Zawgyi Retention Dam	106	Kyauk mi gyaung Weir
10	Thintwe Weir	107	Sun chung Dam
11	Min Ye Weir	108	Sad nan Dam
12	Chaungmnet Dam	109	Palin Dam
13	Pyukan Dam	110	Boke chung Dam
14	Kinda Dam	111	Pin Tank
15	Kinda Weir	112	Nat mouk Dam
16	Thittekone Weir	113	Kyauk taga Dam
17	Ponemanyi Dam	114	Mon chung Dam
18	Thapone Dam	115	Mei zali Weir
19	Kyinda Dam	116	Aing ma Weir
20	Taungpulu Dam	117	Man chung Dam
21	Thabyayee Dam	118	Yin shay Dam
22	Zlaw Dam	119	Se sin Dam
23	Takunging Tank	120	Lin zin Weir
24	Alaungstha Tank	121	Tat tu Dam
25	Khingyi Weir	122	Pwe tha Dam
26	Kanyar Tank	123	Bwa kyi Dam
27	Oakpho Tank	124	Bade Dam
28	Kyepin Tank	125	Maday Dam
29	Windun Weir	126	Magyithone bin Dam
30	Phopaw-Nwesi Tank	127	Saba Dam
31	Hcehlaing Tank	128	Khingyibalaug Dam
32	Myakan Tank	129	Gyo pyan Dam
33	Nwanan Tank	130	Bo beck Dam
34	Thattaw Dam 1	131	Magyisai Dam
35	Thattaw Dam 2	132	Kyauk sauk Dam
36	Samon Retention Dam	133	Lapana Dam
37	Nyaungyan Tank	134	Twin ma Dam
38	Min Hla Tank	135	Kyot maak Dam
39	Bwechar Tank	136	Myaing chung Dam
40	Yaukyoe Tank	137	Thi ri nanda Dam
41	Tisogyi Tank	138	Thi kyi taw Dam
42	Nyaungbintha Weir	139	Min gam Dam
43	Hanzar Tank	140	Mye khe taung Dam
44	Meikila Tank	141	Khin mon Dam
45	Monding Dam	142	Sin gyot Dam
46	Shammang Dam	143	Owe cho Dam
47	Myintaw Tank	144	Sin chung Dam
48	Lerkhotpin Dam	145	Pho ni Dam
49	Nyaung gone Dam	146	Ye boke Dam
50	Phaunggataw Dam	147	Nga chin Dam
51	Nahtaw Dam	148	Wun chung Dam
52	Myehta Dam	149	Wun ya Dam
53	Khetlan Dam	150	Ta ma Dam
54	Kanna Dam	151	Te gyi Dam
55	Myaingtha Dam	152	Tagan Dam
56	Pyaungya Dam	153	Wun lo Dam
57	Sunlan Dam	154	Thu dat Dam
58	Sintewa Dam	155	Taung khin van Dam
59	Taungpote Dam	156	Than oot chauk Dam
60	Myaokpinle Dam		
61	Nyaungbintha Tank		
62	Pyayar Tank		
63	Pyokan Tank		
64	Kyauktalone Dam		
65	Wellauing Dam		
66	Taungtha Dam		
67	Kyauktalone Modulating Dam		
68	Taungpya Dam		
69	Pimchaung Dam		
70	Kyatmauktaung Dam		
71	Yagi Modulating Dam		
72	Ngahtayak Dam		
73	Yadanaabomi Tank		
74	Kangyigone Tank		
75	Hieppa Tank		
76	Thitson Dam		
77	Chaunggaug Dam		
78	Nattagar Sakyin Dam		
79	Nahce Tank		
80	Tharait Weir		
81	Tartaling Tank		
82	Thintant Tank		
83	Kyini Tank		
84	Kadin Tank		
85	Gwetant Tank		
86	Lezha Retention Dam		
87	Chaungmagyi Dam		
88	Naukar Dam		
89	Thaphan chung Dam		
90	Ngant zin Tank		
91	Kyaukse Tank		
92	Yintaw Tank		
93	Mintshay Tank		
94	Yeogyi Tank		
95	Khetkha Weir		
96	Yonang Tank		
97	Lunngyin Dam		



Completed Pump Irrigation Project

Sr	State/ Division	Completed	
		No	Ha
1	Kachin	5	850
2	Kayah	3	1916
3	Kayin	7	3684
4	Sagaing	56	55528
5	Taninthari	11	850
6	Bago	56	22143
7	Magway	53	36926
8	Mandalay	73	47578
9	Mon	5	1579
10	Rakhine	4	324
11	Yangon	24	13342
12	Shan	5	1954
13	Ayeyarwaddy	26	16043
14	Nay Pyi Taw	4	1981
	<u>Total</u>	<u>332</u>	<u>204698</u>

River side View of Shwe Hlan Bo Pump Irrigation Project



Irrigating from Shwe Hlan Bo Pump Irrigation Project and Nat Ye Kan Weir



GROUNDWATER IRRIGATION FACILITIES INSTALLED BY WRUD

Sr.	Regional/State	Groundwater Irrigation Systems			
		Nos. of Tube Well	Cluster/ Shallow	Total	Total Irrigable Area (Ha)
1	Nay Pyi Taw	119	40	159	517.4
2	Mandalay	1230	635	1865	7193.92
3	Sagaing	880	1968	2848	21008.1
4	Magway	1298		1298	4272.5
5	Bago	600	112	712	3383.4
6	Yangon	476	90	566	1672
7	Ayeyarwaddy	618	186	804	3492.3
8	Kachin	8	36	44	107.7
9	Kayah	5		5	15
10	Shan	14		14	31.4
Total		5248	3067	8315	41693.72

Two Types of Water Management

- ❖ Low Water Management
- ❖ High Water Management

Low Water Management

- Irrigation Water Distribution Management
 - Supply Management
 - Demand Management

Supply Management

**Present Myanmar
Irrigation
Water
Management**



**Dual Water Management
controlled with guidance rules and
regulations between
Supplying authorities (ID)
and
recipient users (farmers)**

Note:

If either organization or both failed to follow the rules and regulations, the system will fail.

Demand Management

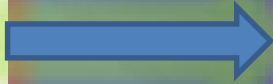
Water User

- Order for his requirement of water according to his need.

Supplier

- Responsible for equitable water supply.

**Better
Management**




**Minimum
losses**



**Higher unit return
of Water**

High Water Management

Flood protection of the irrigable area
And
land along the rivers



Responsibility of the Irrigation Department by building embankments along the rivers and installing sluice gates and construction of drainage canals in the low land area for evacuation of flood water and building sluices for controlling and releasing flood water

Flood Protected Area in Ayeyarwaddy Delta (2002-2003) (in thousands)



Protected Areas by Embankments

Location	Hectare	Acre	% of Myanmar
Myanmar	1212	2995	100%
Delta	1144	2827	94%

Delta

Division	Hectare	Acre	% of Delta
Bago	244	603	21%
Yangon	140	346	12%
Ayeyarwaddy	760	1878	67%

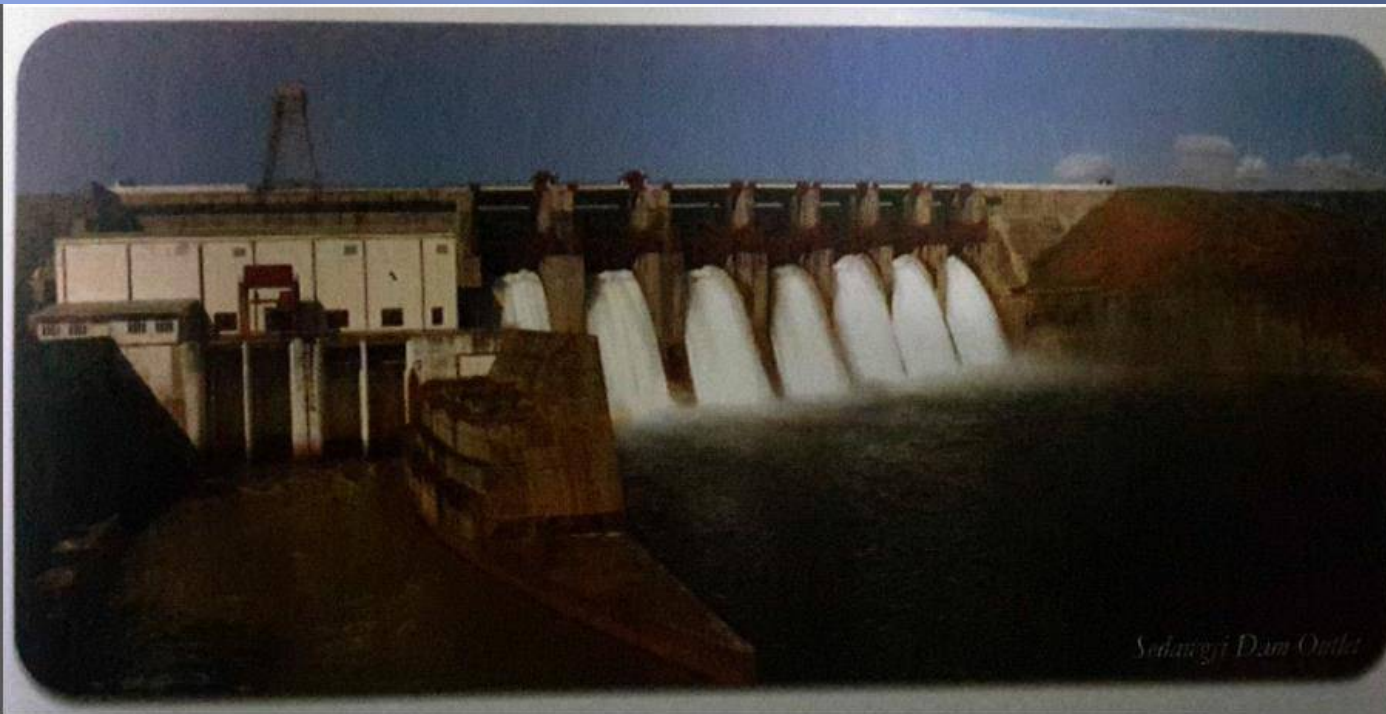
Construction of embankments for flood control in Ayeyarwaddy delta through the Ages

Periods	Year	Major Works Numbers	Lengths in km	%Total	Protected Area in (Ha)	% Total
Colonial	1948	10	673.5	31	453967	68
Palimentary	1948-62	14	315.8	15	69393	10
Socialist	1962-88	43	1074.4	50	134575	20
SPDC	1988-2010	2	95.4	4	10688	2
TOTAL		69	2159.1	100	668623	100

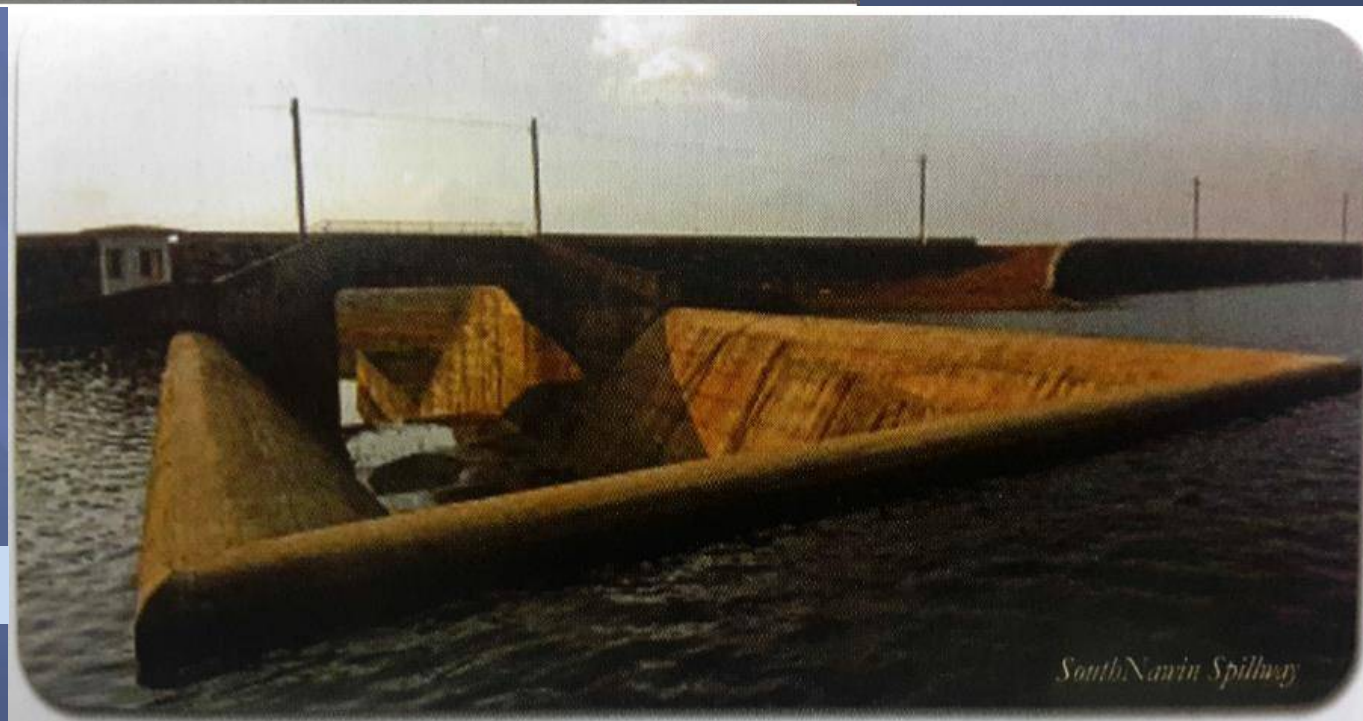
Sr. No	State/Region	Flood Protected Area (Ha '000)		
		Embankment	Drainage Canal	Total
1	Kachin	-	-	-
2	Kayah	-	5.48	5.48
3	Kayin	0.96	4.95	5.91
4	Chin	-	-	-
5	Sagaing	16.17	4.05	20.22
6	Tanintharyi	4.22	-	4.22
7	Bago	205.46	129.17	334.63
8	Magway	-	-	-
9	Mandalay	9.14	-	9.14
10	Mon	8.30	44.33	52.63
11	Rakhine	33.50	-	33.50
12	Yangon	139.20	144.76	283.96
13	Shan	-	-	-
14	Ayeyarwaddy	722.28	15.33	737.61
		1139.23	348.07	1487.30

Source: Outline of the Irrigation Department October 2012

**Sedawgyi Dam
Outlet**



South Nawin Spillway



Contents of Presentation

Part IV

Conclusions

Conclusion

- In the **Burmese Kings Era** , it is very clear that, the irrigation system are well maintained to produce rice because of strict rules and regulations
- The irrigation during **the colonial period** still continuing to flourished and well maintained for food security due to adoption and some modifications of water distribution rules and regulations (Irrigation Act (1905), Irrigation Manual (1928)- revised (1945), Myanmar Embankment Act (1909)- revised (1928)
- These rules and regulations are strictly followed up to 1962 -1974 (Policing Act according to irrigation manual and Canal Act 1945 was vested in Irrigation Department) and these power were handed over to the Township and village council.
- **Socialist Era**, **69 schemes** is implemented. Irrigable (beneficial) area increased to **195433 ha.**

Conclusion cntd.

- ▣ Since then, Law Enforcement of water management become weak with inadequate maintenance fund.
- ▣ From **1988 to 2012**, beneficial area increased to **1,154,064 ha** , **232** projects had been implemented.
- ▣ Within 24 years, government policy moved forward quickly, complimised the quality and sustainability of projects.
- ▣ Project funds priority – short fall of operation, maintenance and management (OMM) fund.
- ▣ Focusing only on project - less attention for OMM
- ▣ For years of accumulative inadequate funds – deteriorated canal system beyond repair – resulted in uncontrollable water losses and irrigable area - lead ID to assess the irrigable area in 2012.

2012 ID Assessment

- ❖ 1,695,035 ha (100% irrigation area)
 - 508,511 ha (30%) loss – 70 % irrigable
 - 10% loss due to urbanization and industrialization
 - (unrecoverable)
 - 20 % Left – water Logging (recoverable)
- ❖ Out of 70% assess irrigable area
 - Only 40 % (actually irrigated)
 - 30 % Irrigation water not available (recoverable)
 - Total 50 % can be recovered by rehabilitation, modification, innovation and modernization.
 - Stopping new irrigation project and concentration on rehabilitation will be much beneficial for food security of Myanmar .



THANK YOU !