WATER MANAGEMENT FOR AGRIBUSINESS DEVELOPMENT IN MYANMAR

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Irrigation Department
Myanmar, Its Water Potential and Water Resources Status
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
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

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

### Major River System

1. Ayeyarwady River
2. Chindwin River
3. Sittaung River
4. Thanlwin River
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
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.
Irrigation Department
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:

<table>
<thead>
<tr>
<th>No.</th>
<th>Department</th>
<th>Main Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Department of Agricultural Planning</td>
<td>Formulation of various Agricultural plan</td>
</tr>
<tr>
<td>2</td>
<td>Department of Agriculture</td>
<td>Production of good quality seed varieties for main crops</td>
</tr>
<tr>
<td>3</td>
<td>Irrigation Department</td>
<td>Planning and implementation of new irrigation projects and O&amp;M works</td>
</tr>
<tr>
<td></td>
<td><strong>Department</strong></td>
<td><strong>Services/Activities</strong></td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>4</td>
<td>Agricultural Mechanization Department</td>
<td>Provision of farm mechanization services on land preparation, harvesting and threshing</td>
</tr>
<tr>
<td>5</td>
<td>Settlement and Land Records Department</td>
<td>Updating land maps and registers</td>
</tr>
<tr>
<td>6</td>
<td>Water Resources Utilization Department</td>
<td>To supply irrigation water by pumping water from river and streams and also utilization of groundwater</td>
</tr>
<tr>
<td>7</td>
<td>Myanmar Agricultural Development Bank</td>
<td>Lending seasonal, short, medium and long term loans to farmers</td>
</tr>
<tr>
<td>8</td>
<td>Department of Agricultural Research</td>
<td>Research development on high yielding crop varieties</td>
</tr>
<tr>
<td>9</td>
<td>Yezin Agricultural University</td>
<td>To produce high qualified agriculturalists needed for the development of the agriculture sector</td>
</tr>
<tr>
<td>10</td>
<td>Department of Industrial crops Development</td>
<td>To produce high-yield and qualified seeds for industrial crops</td>
</tr>
</tbody>
</table>
Irrigation Works in Myanmar

- Irrigation works in Myanmar started since Myanmar King era.
- Completed Tanks / Reservoirs before 1988 is 138 no and storage capacity about 2333.7 MCM and effected area is 540,753 ha.
- Completed Tanks / Reservoirs between 1988 and 2013 is 240 no and storage capacity about 16905.16 MCM and effected area is 1,154,899 ha.
- Construction works stated for completion by 2013 – 2014 is 8 no and expected increasing of storage capacity is about 163.08 MCM.

Total number of facility to be completed in 2013: 386 no.

Total storage capacity: 19401.94 MCM

MCM – million cubic meters
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
Aerial View of a Typical Regulating Sluice for Irrigation & Drainage works in Ayeyarwady Delta of Myanmar
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
<table>
<thead>
<tr>
<th>Year</th>
<th>Total Irrigated area (Million-ha)</th>
<th>Multiple crop Irrigated area (Million-ha)</th>
<th>% of Total Irrigated area</th>
<th>% of multiple crop Irrigated area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988-89</td>
<td>1.02</td>
<td>0.15</td>
<td>12.70</td>
<td>14.70</td>
</tr>
<tr>
<td>1998-99</td>
<td>1.69</td>
<td>0.39</td>
<td>17.50</td>
<td>23.10</td>
</tr>
<tr>
<td>2008-09</td>
<td>2.27</td>
<td>0.55</td>
<td>16.86</td>
<td>23.98</td>
</tr>
<tr>
<td>2011-12</td>
<td>2.12</td>
<td>0.59</td>
<td>15.60</td>
<td>27.70</td>
</tr>
<tr>
<td>2012-13</td>
<td>2.12</td>
<td>0.48</td>
<td>15.90</td>
<td>22.80</td>
</tr>
</tbody>
</table>
## Cropping Intensity

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

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)

<table>
<thead>
<tr>
<th>Year</th>
<th>Current</th>
<th>Capital</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989-90</td>
<td>295.79</td>
<td>334.06</td>
<td>629.85</td>
</tr>
<tr>
<td>2000-01</td>
<td>3,168.81</td>
<td>9,474.04</td>
<td>12,642.85</td>
</tr>
<tr>
<td>2010-11</td>
<td>59,697.31</td>
<td>97,389.69</td>
<td>157,087.00</td>
</tr>
<tr>
<td>2012-13</td>
<td>92,775.68</td>
<td>195,425.23</td>
<td>288,200.91</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Activities</th>
<th>Irrigation office</th>
<th>Farmers (water users)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operation &amp; Maintenance</strong></td>
<td>MC ✴ DY ✴ M</td>
<td>WC ✴ farm ditches ✴ farm plots</td>
</tr>
<tr>
<td><strong>Work load</strong></td>
<td>▶ Civil works</td>
<td>▶ Continuous crop production</td>
</tr>
<tr>
<td></td>
<td>▶ Administration works</td>
<td>▶ Village activities</td>
</tr>
<tr>
<td><strong>Water distribution</strong></td>
<td>▶ 12mm/d (design standard)</td>
<td>▶ No standard</td>
</tr>
<tr>
<td></td>
<td>▶ Water control;</td>
<td>▶ Secure/sufficient water</td>
</tr>
<tr>
<td></td>
<td>- WL in reservoirs</td>
<td>▶ free/uncontrollable</td>
</tr>
<tr>
<td></td>
<td>- WL in MCs</td>
<td></td>
</tr>
<tr>
<td><strong>Priority</strong></td>
<td>▶ MC &amp; DY canals</td>
<td>▶ Water, beneficial crops</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Much depend on ID in irrigation activities</td>
</tr>
</tbody>
</table>
➤ 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

➤ 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

<table>
<thead>
<tr>
<th>No.</th>
<th>Projects</th>
<th>Total Projects (No.)</th>
<th>Installed Electricity Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Large scale projects</td>
<td>11</td>
<td>609.2 M Watts</td>
</tr>
<tr>
<td>2.</td>
<td>Medium &amp; Small scale</td>
<td>70</td>
<td>2077.000 K Watts</td>
</tr>
<tr>
<td></td>
<td>Hydropower Projects</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MULTIPURPOSED DAM PROJECT

THAPHANSEIK MULTIPURPOSED DAM

Storage Capacity - 3,552,480 x 10^3 m³
Extent of Hydropower - 3 x 10 MW
Irrigable Area - 202,350 hectares

KINDA MULTIPURPOSED DAM

Storage Capacity - 1,077,561 x 10^3 m³
Extent of Hydropower - 2 x 28 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

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Location</th>
<th>Implemented Mechanized farm (hectares)</th>
<th>Irrigation System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Naypyitaw</td>
<td>1444</td>
<td>Ngaleik</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>Yezin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>258</td>
<td>Yanaungmyin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>364</td>
<td>SetSetYo</td>
</tr>
<tr>
<td>2</td>
<td>Leway</td>
<td>81</td>
<td>Chaugmange</td>
</tr>
<tr>
<td></td>
<td></td>
<td>202</td>
<td>Madan</td>
</tr>
<tr>
<td>3</td>
<td>Pyinmana</td>
<td>178</td>
<td>Ngaleik</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>2548</strong></td>
<td></td>
</tr>
</tbody>
</table>

Implemented Land Reform Project in Naypyitaw on 17 January 2014.
# Utilization of Tractors and Power Tillers

<table>
<thead>
<tr>
<th>Particular</th>
<th>Unit</th>
<th>2000/01</th>
<th>2011/12 (prov)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tractors</td>
<td>Number</td>
<td>8,687</td>
<td>11,232</td>
</tr>
<tr>
<td>Power Tillers</td>
<td>Number</td>
<td>49,473</td>
<td>164,054</td>
</tr>
</tbody>
</table>

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