ROYAL IRRIGATION DEPARTMENT
THAILAND

Dr. THANET SOMBOON
Director of Water Watch and Monitoring System For Warning Center
IRRIGATION WATER MANAGEMENT

- Overview of Irrigation Systems in Thailand
- Water Management in Dry Season
- Water Management in Rainy Season
- Outcomes and performance of irrigation system modernization
- Joint Management Committee for Irrigation (JMC)
- Participatory Irrigation Management (PIM) Project

SMART WATER OPERATION CENTER : SWOC
Overview of Irrigation Systems in Thailand
Thailand is located in Southeast Asia region

- Country area 51,312,000 hectares
- Agriculture area base on land-use data 23,877,800 hectares (46.5% of country area)
- Paddy field area 8,930,066 hectares (37.4% of agricultural land area)
- Irrigated paddy field area 2,792,000 hectares (31.3% of paddy field area)

Source: Office of Agricultural Economics
Main River Basins of Thailand

1. Mae Nam Salawin
2. Mae Nam Khong
3. Mae Nam Kok
4. Mae Nam Chi
5. Mae Nam Mun
6. Mae Nam Ping
7. Mae Nam Wang
8. Mae Nam Yom
9. Mae Nam Nan
10. Mae Nam Chao Phraya
11. Mae Nam Sakae Krang
12. Mae Nam Pasak
13. Mae Nam Thachin
14. Mae Nam Mae Klong
15. Mae Nam Prachin Buri
16. Mae Nam Bang Pra Kong
17. Tonle Sap
18. East-Coast Gulf
19. Mae Nam Petchaburi
20. West Coast Gulf
21. Peninsula-East coast
22. Mae Nam Tapi
23. Thale sap Songkhla
24. Mae Nam Pattani
25. Peninsula-West coast
## Irrigation Facilities in Thailand

<table>
<thead>
<tr>
<th>Project</th>
<th>Number of Project</th>
<th>Capacity (MCM)</th>
<th>Irrigable Area (M.ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large scale</td>
<td>94</td>
<td>73,217</td>
<td>2.87</td>
</tr>
<tr>
<td>Medium Scale</td>
<td>671</td>
<td>4,219</td>
<td>1.05</td>
</tr>
<tr>
<td>Small Scale</td>
<td>13,842</td>
<td>1,790</td>
<td>0.18</td>
</tr>
<tr>
<td>Pumping station</td>
<td>2,557</td>
<td>1</td>
<td>0.72</td>
</tr>
<tr>
<td>Monkey cheek</td>
<td>223</td>
<td>451</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17,387</strong></td>
<td><strong>79,677</strong></td>
<td><strong>4.84</strong></td>
</tr>
</tbody>
</table>

Source: 2014 Annual Irrigation Project Report, Royal Irrigation Department
Usage of water in Thailand

Purpose of water usage
20,566 MCM

Irrigated water
12,654 MCM (62%)

Industrial water
242 MCM (1%)

Ecology system
5,749 MCM (28%)

Living (drinking) water
1,921 MCM (9%)

Note: Base year is dry season 2013
Mission of Royal Irrigation Department

1. Manage water resources in response to the potential of each river basin and to be ecological balanced

2. Manage water allocation to every stakeholder in equitable and sustainable manners

3. Encourage people to intensively participate in water management and development at all levels

4. Prevent and mitigate water hazards
Water Management in Dry Season

1. Estimate supplies water and water demands

2. The priority of water allocation for different sectors

   1) For consumption, water works
   2) For conservation of ecology system; for example pushing salt water away, driving waste water out
   3) For agriculture
   4) For industries
(3) Formulate the water allocation plan for dry-season crop cultivation base on the water demand, the efficiency of irrigation system and the supplies water

(4) Prepare the supplementary support (water pumping and trucks)

(5) Cooperate with other government agencies to disseminate the water allocation plan to water users in every sectors to implement the water allocation plan
Rainy Season Water Management Plan

(1) for wet-season crop cultivation

(2) for flood prevention and mitigation
Water Management for flood control

**Upstream** - Store the water
- Manage the water in reservoirs

**Midstream** - Retard the water
- Manage the water in rivers and flood plains

**Downstream** - Speed up the drainage of water to the sea
- Manage the water in downstream area
Management of Water in reservoirs
Management of Water in Rivers and Flood Plains

Midstream Area

- Control the discharge in rivers
- Flood Observation and Forecasting
- Adjustment of cropping pattern and water allocation plan for agricultural sector
### Discharge Capacity of Rivers in Chao Phraya Basin

<table>
<thead>
<tr>
<th>River</th>
<th>Discharge Capacity (m³/s)</th>
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<tbody>
<tr>
<td>440</td>
<td>3,590</td>
</tr>
<tr>
<td>640</td>
<td>1,000</td>
</tr>
<tr>
<td>1,800</td>
<td>1,815</td>
</tr>
<tr>
<td>2,324</td>
<td>300</td>
</tr>
<tr>
<td>4,230</td>
<td>2,524</td>
</tr>
<tr>
<td>1,198</td>
<td>2,055</td>
</tr>
<tr>
<td>563</td>
<td>100</td>
</tr>
</tbody>
</table>

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**Legend:**
- **Discharge Capacity:** The discharge capacity of the river at various points.
- **River Names:** The names of the rivers are indicated in Thai.
- **Map:** A map of the Chao Phraya Basin showing the discharge capacities at different points along the river. The map includes various water bodies and points of interest along the river's course.
Roles of JMC

- **To operate and maintenance an irrigation system**
  - To schedule water delivery plan and maintenance
  - To identify water delivery pattern and maintenance
  - To distribute water information regarding water allocation and maintenance

- **To run any related activities**, i.e. agricultural extension promotion, agricultural credit, and marketing of agricultural products
Committee for Dry Season Crop Planning

To promote efficiency in crop-areas during dry season through integrated information among all agencies related to agriculture water sector

The Roles:

- Set up the plan, target area, and measures for dry season crop.
- Observe and report the actual dry season crop planting.
- Monitor, evaluate, and control the actual dry season crop planting to be in accordance with the plan.
- Announce the related information in dry season to concerned officers, farmers and public.
- Periodically report the actual situation of dry season crop planting to the committee members until the end of dry season crop harvesting.
Outcomes and performance of irrigation system modernization

Upstream - Store the water
  Manage the water in reservoirs

Midstream - Retard the water
  Manage the water in rivers and flood plains

Downstream - Speed up the drainage of water to the sea
  Manage the water in downstream area
The Flap Gate Weir Type II for Flood Problem Solution

Located: Ban Ton Pao, San Kamphaeng district, Chaing Mai province.
Developed by Mae Kung Operation and Maintenance Office, Chaing Mai Province

Air Vent-Staff Gauge

Flap Gate Weir Control system

Control room

Hydraulic tank

Infrastructure Project
Weed problems is an over abundance of nutrients in our waters. Office of Research and Development of Royal Irrigation Department of Thailand has been developed Mini-Aquatic Weed Harvester for control this problem.

Mini-Aquatic Weed Harvester has been harvesting at a rate of 1.3 Rai/hour and the cost per Rai was 154 Baht.

* 1 hectare = 6.25 rai
Agricultural Map for Adaptive Management: Agri-Map

**Agri-Map**

- Type of plant
- Soil/Water resources/plant suitability map for cropping
- Production Factor
- Irrigated area/ Non-Irrigated area
- Surface/groundwater resources
- Cropping Pattern
- Cropping Requirement
- Others

**Marketing Plan**

- Balancing production of Province

**Logistic**

- Balancing demand of markets

**Balancing**

- Non-Infrastructure Project
Agricultural Map for Adaptive Management: Agri-Map Online

http://agri-map-online.moac.go.th/
There are 226 JMCs that have already been established.
Best Practice: The Krasiew Operation & Maintenance Project

Located in Suphan Buri province of Thailand
Retention capacity of 240 mcm

Photo source: http://pantip.com/topic/33809332
Problems of Krasiew Operation & Maintenance project in the past

Operation and maintenance of irrigation facilities were mainly done by irrigation officers
Irrigation facilities were destroyed due to the lacked senses of ownership of the irrigation system.

Frequently demonstration of farmers.
Operation and maintenance of irrigation facilities are based on the collaboration between irrigation officers and water users.
• The Excellence Award, the 2010 Thailand Quality Public Service Awards by OPDC
  • Category: Innovative public service
  • The 2nd Place Winner, the 2011 United Nations Public Service Awards by UN, “Participatory Irrigation Management by Civil Society Committee and WUO: The Krasiew O&M Office”
  • Category 3: Fostering participation in policy-making decisions through innovative mechanisms
Best Practice: The Mae Yom Operation & Maintenance Project

Located in Yom River, Phrae province of Thailand
Problems of Mae Yom Operation & Maintenance project in the past

Water shortage in dry season

Conflict over water resource

Frequently demonstration of farmers

Irrigation facilities were destroyed
The three-coherent task mechanisms was employed

3rd Task: Acting upon agreement and supervision
- RID
- LAOs
- Provincial agricultural Officers
- Farmers & WUGs

1st Task: Water subsidy for agriculture
- RID (The Royal Irrigation Department)
- LAOs (Local administrative organizations)
- PPDRC (Phrae Province Disaster Relief Committee)
- Provincial agricultural Officers

2nd Task: Participatory irrigation management
- RID
- LAOs
- Provincial agricultural Officers
- Farmers & WUGs
• The Excellence Award, the 2011 Thailand Quality Public Service Awards by OPDC

• Category: Innovative public service

• The 1st Place Winner, the 2012 United Nations Public Service Awards by UN, “Integrated Drought Prevention and Mitigation”

• Category 3: Fostering participation in policy-making decisions through innovative mechanisms
SWOC (Smart Water Operation Center) is responded from the government policy 4.0 (Thailand 4.0) which going to be the (RID 4.0). It purposes to be the Single Command for monitoring the Weather and Rainfall, Analyzing the water situation, Watch and monitoring for warning the water situation, and then Public relations with speedy process. SWOC can support the Decision Making to government official with accuracy, quickly and sharply update.
SLOGAN OF SWOC “FAST”

F : Fusion Database
Data center integration from various department

A : Accurate Technique
Correct according to academic principles

S : Speedy Process
Fast process

T : Targeted Solution
Achieve targeted results.
ROLE OF SMART WATER OPERATION CENTER

- Monitor
- Evaluate
- Make Decision
- Analysis
- Forecasting
- Warning
Sub-Committee To Monitor and Analyze Water Situation Trends

- Department of Water Resources
- Royal Irrigation Department
- Office of the Royal Development projects Board
- Meteorological Department
- Department of Disaster Prevention and Mitigation
- Department of Public Works and Town & Country Planning
- Electricity Generating Authority of Thailand
- Hydro and Agro informatics Institute
- Hydrographics Department

Bangkok
PROCESSING OF SWOC

Single Command

Report

Warning

Integretion

Ministry of Defense

Ministry of Interior
Data linkage

DATA INTEGRATION

Climate And Rainfall

Reservoir / Dam

Water Level

Public Relations And Alert

Water Quality
Data linkage

CLIMATE AND RAINFALL

RESERVOIR/DAM

WATER WAY

AGRI-MAP
Water Situation Analysis and Forecasting

Using Mathematical model/artificial neural network
Water Situation Analysis and Forecasting

Flood Risk Information System (JICA)

Flood Map

NARK4.0
Water Situation Analysis and Forecasting
Data Warehouse

Data Processing
- Data warehouse
- Analytics
- BI/Dashboard

Applications
- Operator/War Room
- Mobile Apps

Web Public
Command Center

RID Telemetry Database
Small Telemetry DB
RID Gate Control
DAM Safety Database
CCTV Database

Disaster Management System

Network
RID INTERNAL

Public Network

Agent

Data Processing
- Forecast Software
- DSS Software
- Big Data Analytics
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<th>อุทยานประทวน</th>
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<td>ประตูระบายน้ำโพธิ์พระยา</td>
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</table>
Tool for monitoring water situation

swoc.rid.go.th

wmsc.rid.go.th
FLOWTO Application

THIS TOOL

[Image of a tool interface]

[Map image]
The WMSC is the applications for show the daily water situation report and collect database. This applications is easy to use by everyone for decision-making of water management by themself. Then we can use this App like sharply update for preparing from flood and drought.
CPY Monitor Application
Water SMART Application
The end.

Royal Irrigation Department