Introduction and update information on Downstream Response to Imposed Flow Transformation (DRIFT) and its applications

by

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Department of Water Resources

Thai National Mekong Committee Secretariat
Question?

- DRIFT คือ อะไร?
- ทำไมต้องใช้ DRIFT?
- DRIFT ตอบโจทย์อะไรบ้าง?
- DRIFT มีหน้าตาเป็นอย่างไร?
- ฯลฯ
Assessment Models and Tools

- DSF-DSS
- DRIFT-DSS

Climate Change Models

Results

- Environmental, Social and Economic Impacts

Water Resources Development Scenarios

- Irrigation
- Agriculture/Land Use
- Hydro-power
- Flood Protection
- Navigation

Cumulative/All Thematic Areas

- Hydrologic Assessment
- Biological Resources Assessment
- Socio-Economic Assessment
- Macro-Economic Assessment

Climate Change Impact Assessment

14/05/2016

14/05/2016
Decision Support System

Why use DRIFT?

DSF-DSS

Water-resource options per scenario

Water-resource supply for scenario

Hydrological Model

Water-Resource Model

Hydrodynamics Model

WQ Model

Sediment Model

WQ and Sediment time-series data

A decision support system for managing water resources in the Mekong River Basin.

Hydrological Model

WQ Model

Sediment Model

WQ and sediment time-series data

DSF-DSS

SET-UP

PROJECT DESCRIPTION

SYSTEM DESCRIPTION

SCENARIO SPECIFICATION

INDICATOR SELECTION

DRIFT DSS

KNOWLEDGE CAPTURE

HYDROLOGY & HYDRAULICS

WQ & SEDIMENTS

CONNECTIVITY

RESPONSE CURVES

WEIGHTS

ANALYSIS

MODEL

SCENARIO OUTCOMES

Macro-economic Model

Resource Economic Impacts

Social Impacts

Direct Economic Impacts

Sectorial water/energy supply for scenarios

Macro-economic outcomes for scenarios

Present-day daily hydrology

Future flow regimes (daily or hourly)

Hydraulic relationships

Resource Economic Impacts

Hydrological Model

Water-Resource Model

Hydrodynamics Model

WQ Model

Sediment Model

WQ and Sediment time-series data

Set-up knowledge capture analysis

Macroeconomic outcomes for scenarios

Social Impacts

Why use DRIFT?
Step 1: Select scenarios

Step 2: Select focus areas

Baseline

Step 3: Model hydrology, hydraulics, sediments, WQ

Step 4: DRIFT Indicators

Step 5: Assign Baseline Status and trends

Step 6: Knowledge capture
Set up DRIFT all sites
Create response curves

Step 7: Calibration

Step 8: Analysis
Run DRIFT for all scenarios and generate prediction of change

Scenarios
Data flow and Linkage

Six Thematic Teams PLUS Climate Change

1. Hydrology
2. Water Balance
3. Hydraulics
4. Sediment
5. Water quality
6. DSF/Toolbox
7. Social
8. Economics and resource economics

DRIFT

Biological resource

ECONOMIC

INDIRECT SOCIAL

ENVIRONMENTAL
DRIFT User Interface

DRIFT

Downstream Response to Imposed Flow Transformations

version: v2.54

1. SETUP
2. Knowledge Capture
3. Analysis

PROJECT DESCRIPTION
- Project details
- Client and Consultants

SYSTEM DESCRIPTION
- Photos
- Delineation
- Site specification
- Water resource developments
- Ecosystem targets

SCENARIO SPECIFICATION
- General description
- Specifications

INDICATOR SELECTION
- Project indicators
- Site indicators
- Composite indicators
- Links

DRIFT, v2.54
Server: Embedded, Database: C:\DRIFT\Data\MekongCouncilStudy\DB\ User:
3 Components of DRIFT

1. SETUP

- PROJECT DESCRIPTION
  - Project details
  - Client and Consultants

- SYSTEM DESCRIPTION
  - Photos
  - Delineation
  - Site specification
  - Water resource developments
  - Ecosystem targets

- SCENARIO SPECIFICATION
  - General description
  - Specifications

- INDICATOR SELECTION
  - Project indicators
  - Site indicators
  - Composite indicators
  - Links

2. KNOWLEDGE CAPTURE

- HYDROLOGY & HYDRAULICS
  - Parameters & time-series data
  - Delineate flood events
  - Site calibration
  - Calc flow indicators
  - Indicator charts

- WATER QUALITY
  - Water quality fitness for use
  - Calc water quality indicators

- SEDIMENT
  - Sediment indicators
  - Calc sediment indicators

- EXTERNAL INDICATORS
  - External indicators
  - Calc external indicators

- CONNECTIVITY
  - Water Resource Dev, Effects

- RESPONSE CURVES
  - Habitat & biota
  - Socio-economic
  - Export / Import

- INTEGRITY
  - Discipline integrity weights
  - Site integrity weights
  - Present Ecological Status

3. ANALYSIS

- INTEGRITY LINKED FLOWS
  - Synthetic Flow Regimes
  - Run Synthetic Flows
  - Category plots

- SCENARIO OUTCOMES
  - Run model
  - Charts
  - Integrity maps
  - Integrity charts
Scenarios Specification

Scenario specification / Water resource developments & Ecosystem targets

Legend:
- Include in scenario (I)
- Exclude (E)

Scenarios:
- Reference
- Preliminary
- Reference
- 6 Dry/6 Wet

Zone Ecosystem targets: (Zone / Condition)
- Zone 1 /
- Zone 2 /
- Zone 3 /
- Zone 4 /
- Zone 5 /
- Zone 6 /
- Zone 7 /
- Zone 8 /

1 sediment still from observed (i.e. with trends)
6 wet, then 6 dry, 6 wet.
## Indicator selection / Project indicators

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<tr>
<th>Order</th>
<th>Code</th>
<th>Name</th>
<th>Units</th>
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<td>ppm</td>
<td>Flow</td>
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<td>2</td>
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<td>ppm</td>
<td>Flow</td>
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<td>ppm</td>
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<td>ppm</td>
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<td>ppm</td>
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<td>ppm</td>
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<td>ppm</td>
<td>Flow</td>
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<td>ppm</td>
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<td>ppm</td>
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<td>ppm</td>
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<td>27</td>
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<td>28</td>
<td>DXextV26_Max</td>
<td>Dry: max Ammonia</td>
<td>ppm</td>
<td>Flow</td>
<td></td>
</tr>
</tbody>
</table>
## Indicator selection / Site indicators

**Legend:**
- **Green:** Used
- **Yellow:** To be added, (A)dd
- **Red:** To be deleted, (D)elete / (U)ndelete

### Birds
- Medium/large ground-nesting chann %Base
- Tree-nesting large waterbirds  %Base
- Bank / hole nesting species  %Base
- Flocking non-aerial pass of graminoids  %Base
- Large ground-nesting spp: wetland  %Base
- Channel-using large spp: bankside f  %Base
- Natural rocky crevice nester in channel  %Base
- Dense woody vegetation / water int  %Base
- Small non-flocking landbird; seasonal  %Base

### Fish
- Rhithron resident  %Base
- Main channel resident (long distant  %Base
- Main channel spawner (short distant  %Base
- Floodplain spawner (grey)  %Base
- Eurytopic (generalist)  %Base
- Floodplain resident (black fish)  %Base
- Estuarine resident  %Base
- Anadromous  %Base
- Catadromous  %Base
- Marine visitor  %Base
- Non-native  %Base
- Fish Biomass  %Base

<table>
<thead>
<tr>
<th>Sites</th>
<th>FA1-Pak Beng</th>
<th>FA2-Vientiane</th>
<th>FA3-Se Bang Fai</th>
<th>FA4-Kampong Cha</th>
<th>FA5-Tonle Sap Riv</th>
<th>FA6-Tonle Sap Lak</th>
<th>FA8-Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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## Composite Indicators

### Table: Composite Indicators

<table>
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<tr>
<th>Link ID</th>
<th>Indicator</th>
<th>Site (Indicator)</th>
<th>Input</th>
<th>Site (Input)</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>621</td>
<td>Benthic Invertebrate biomass</td>
<td>FA1-Pak Beng</td>
<td>Eurytopic [generalist]</td>
<td>FA1-Pak Beng</td>
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<tr>
<td>729</td>
<td>Fish Biomass</td>
<td>FA2-Ventiane</td>
<td>Insects on sand</td>
<td>FA2-Ventiane</td>
<td>1</td>
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<tr>
<td>630</td>
<td>Benthic Invertebrate biomass</td>
<td>FA1-Pak Beng</td>
<td>Insects on stones</td>
<td>FA1-Pak Beng</td>
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<tr>
<td>631</td>
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<td>FA1-Pak Beng</td>
<td>Non-native</td>
<td>FA1-Pak Beng</td>
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<td>Benthic Invertebrate biomass</td>
<td>FA1-Pak Beng</td>
<td>Eurytopic [generalist]</td>
<td>FA1-Pak Beng</td>
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<tr>
<td>628</td>
<td>Fish Biomass</td>
<td>FA1-Pak Beng</td>
<td>Floodplain spawner (grey)</td>
<td>FA1-Pak Beng</td>
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<tr>
<td>627</td>
<td>Fish Biomass</td>
<td>FA1-Pak Beng</td>
<td>Main channel spawner (short distance white)</td>
<td>FA1-Pak Beng</td>
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<td>626</td>
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<td>FA1-Pak Beng</td>
<td>Rhithron resident</td>
<td>FA1-Pak Beng</td>
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<td>625</td>
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<td>FA1-Pak Beng</td>
<td>Shrimps and crabs</td>
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<td>624</td>
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<td>FA1-Pak Beng</td>
<td>Bivalves abundance</td>
<td>FA1-Pak Beng</td>
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<tr>
<td>778</td>
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<td>FA2-Ventiane</td>
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<td>777</td>
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<td>Snail abundance</td>
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<td>771</td>
<td>Benthic Invertebrate biomass</td>
<td>FA2-Ventiane</td>
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<td>775</td>
<td>Benthic Invertebrate biomass</td>
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<td>Shrimps and crabs</td>
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<td>770</td>
<td>Benthic Invertebrate biomass</td>
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<td>781</td>
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</tbody>
</table>
Link Indicators
Next STEP

2. Knowledge Capture

3. Analysis

Demonstration
DRIFT-Demonstration
Reference

http://www.southernwaters.co.za/drift.html