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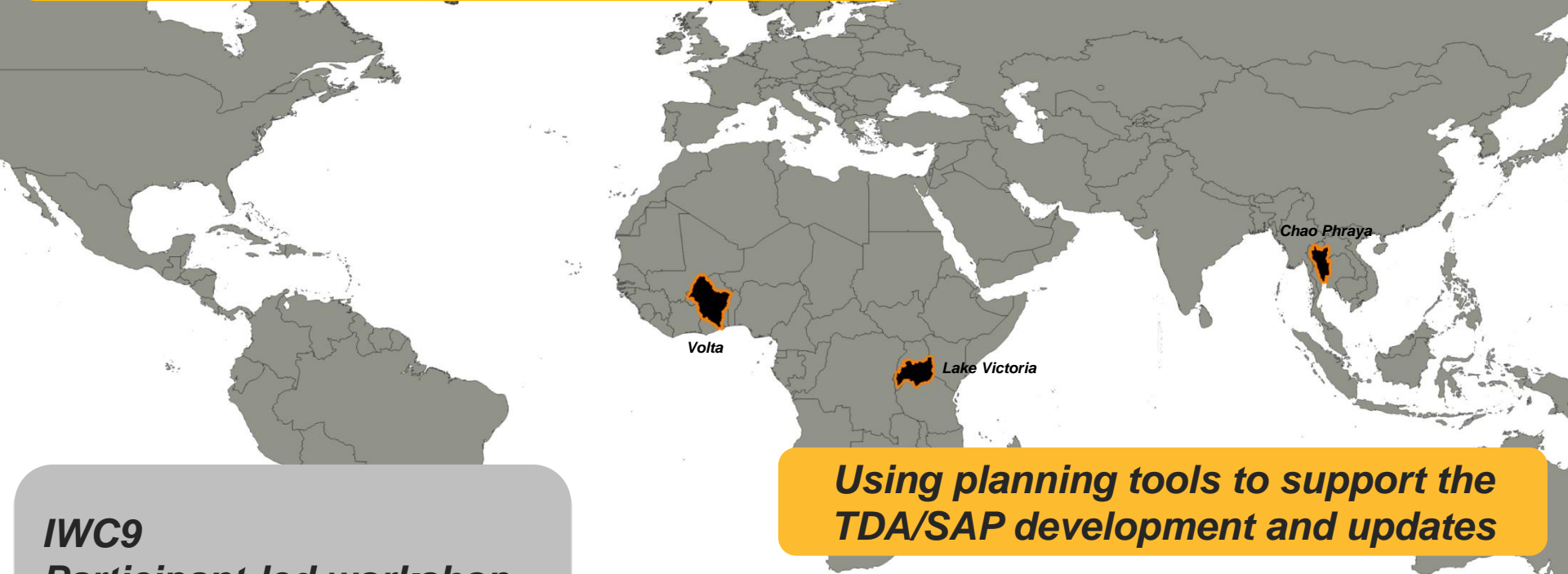
For more information contact:

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Katharine Cross – IWA: [katharine.cross@iwahq.org](mailto:katharine.cross@iwahq.org)

Design: [www.chris-wells.com](http://www.chris-wells.com)

# FLOOD & DROUGHT MANAGEMENT TOOLS



**IWC9**  
*Participant-led workshop*  
*Marrakech — 6 nov 2018*

*Using planning tools to support the  
TDA/SAP development and updates*



**Introduction** | Peter Bjørnsen, UNEP-DHI

**Overview of the portal** | Bertrand Richaud, DHI

**Roundtable discussions** *(with guided questions)*

**Highlights from roundtable discussions** | Katharine Cross, IWA *(facilitator)*

**Strategic recommendations** | Per B. Hansen, DHI

# Rationale

- Frequency, unpredictability and severity of flood and drought events
- Improvements needed in our ability to recognise and address the risks
- Identified need for tools that can provide flood and drought information into planning:
  - GEF Transboundary Basins - Transboundary Diagnostic Analysis (TDA) and Strategic Action Programme (SAP)
  - Basin plans – IWRM plans, basin investment plans
  - Water utility plans – water safety planning

Objective 3: Enhance water security in freshwater ecosystems

### Strategic Action 3.1: Advance information exchange and early warning

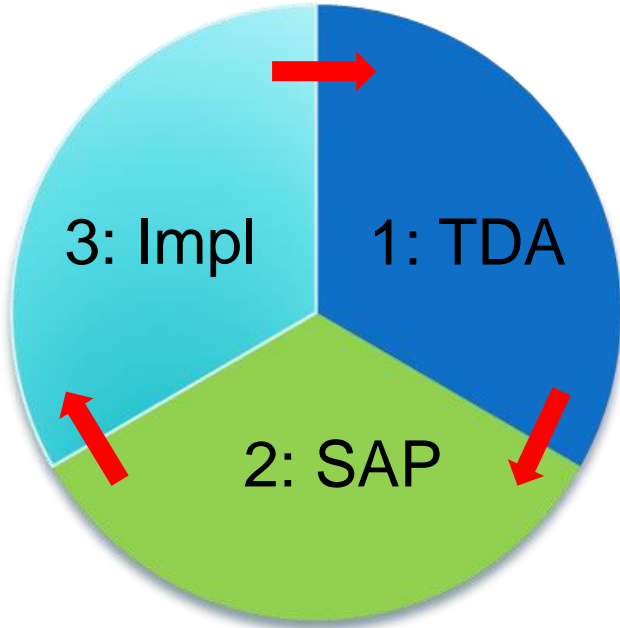
- Flood and drought early warning systems and disaster risk management plans;
- Nature based efforts for disaster risk management, including floods, droughts, and coastline protection;
- Enhanced quality, coverage and availability of information on surface and groundwater availability and use;
- Increased capacity to gather, distill and process data sources into policy relevant analysis;
- Enhanced capacity on national and regional dialogues to support decision making and identify joint action.

### Strategic Action 3.2: Enhance regional and national cooperation on shared freshwater surface and groundwater basins

- Common, participatory fact-finding and agreement on cooperative opportunities incl. the formulation of TDA/SAP
- Capacity building efforts to level the playing field across countries, including negotiation skills and int. water law;
- Processes to formulate and formalize cooperative legal and institutional frameworks;
- Identify and leverage resources for investments addressing SAP identified priorities;
- National reform of policies, strategies and regulations in accordance with regional agreements and MEA commitments;
- Improved policy formulation processes and conjunctive management of surface and groundwater resources;
- Periodical update of existing Transboundary Diagnostic and Strategic Action Programs - or their equivalents;
- Engagement with national, regional and global stakeholders to increase collaboration through IW-LEARN.

### Strategic Action 3.3: Investments in water, food, energy and environmental security

- Supply chain approaches for increased water efficiency and reduction of ecosystems pressures;
- Increase water efficiency, reuse, and reduce point and non-point sources of pollution addressing both primary and emerging pollutants, along the S2S continuum;
- De-risk innovation in development through piloting of innovative technologies;
- Nature based approaches to improve infiltration, avoid sedimentation and erosion through IWRM and SLM;
- Protect and rehabilitate aquatic ecosystems, especially wetland areas, river banks, mangroves, and other key habitats;
- Establish minimum environmental flows to maintain healthy ecosystems and aquatic biodiversity;
- Sustain freshwater fisheries and aquaculture via improved management strategies and policy formulation processes;
- Support fragile and/or conflict affected countries, via a country based pilot to fully engage in the transboundary process



## Operational planning



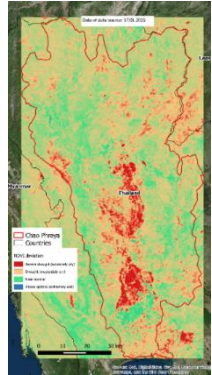
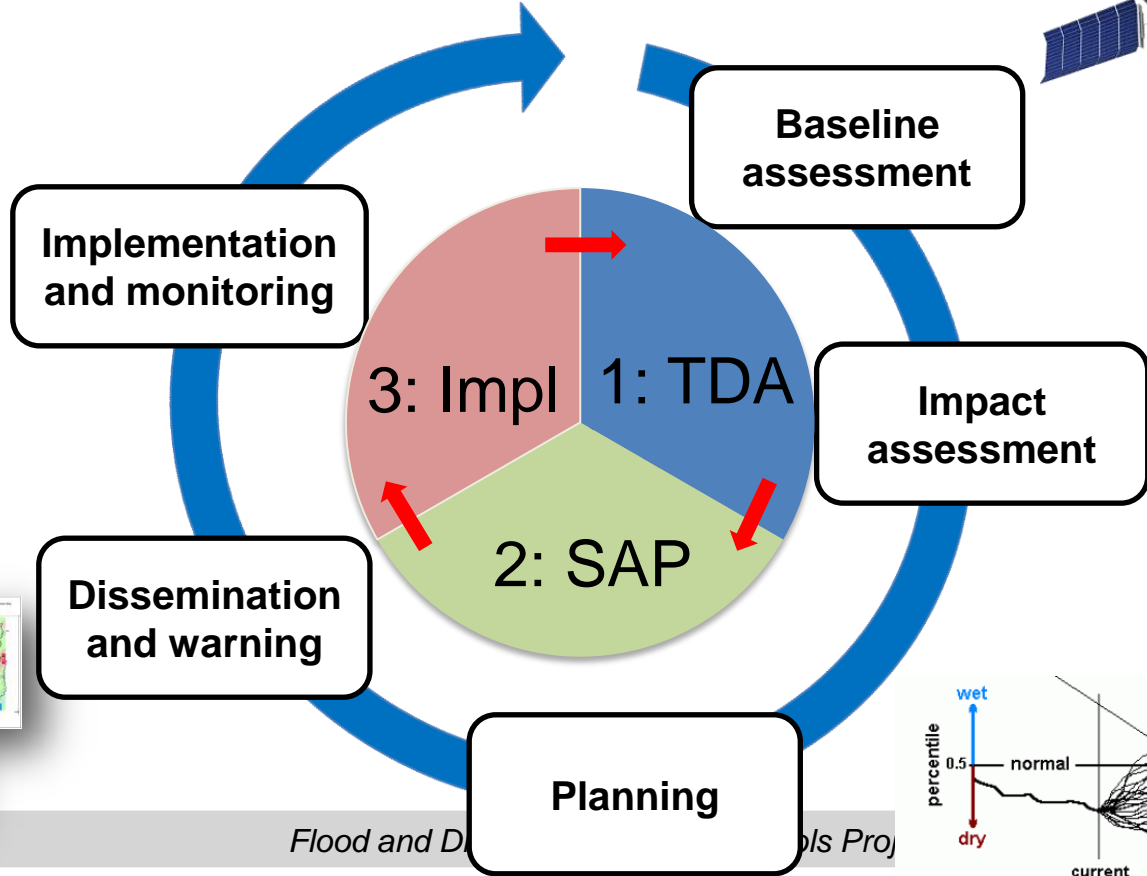
Short-term and seasonal management

## Strategic planning

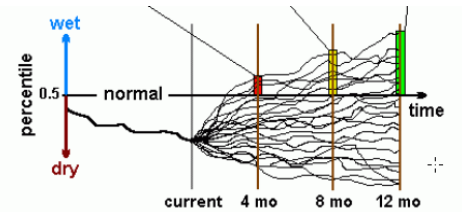


Long-term investments

# Planning - workflow



Indicator	Value	Unit
Population	4.1	B
Population density	114	people/km <sup>2</sup>
Urban population	1.1	B
Urban population density	114	people/km <sup>2</sup>
Rural population	3.0	B
Rural population density	114	people/km <sup>2</sup>
Total population	4.1	B
Total population density	114	people/km <sup>2</sup>



Flood and Drought Management Tools Proj



# Pilot Basins - Testing the project outputs

The project is working with three pilot basins for development and testing of the project outputs before it can be promoted for wider use.



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**Roundtable discussions** *(with guided questions)*

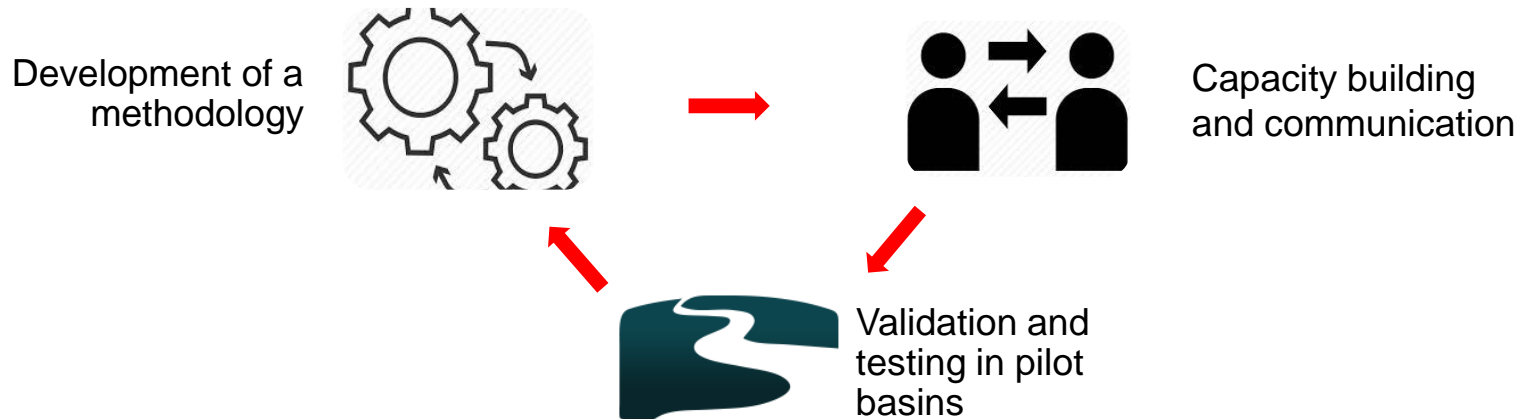
**Highlights from roundtable discussions** | Katharine Cross, IWA *(facilitator)*

**Strategic recommendations** | Per B. Hansen, DHI

Video removed

# Project objective

To improve the ability of land, water and urban area managers across scales to address floods and droughts in their planning processes by developing technical software tools which can be applied to address these challenges



# Flood and Drought web based portal

The screenshot shows the homepage of the Flood and Drought Portal. At the top, there are logos for gef, UN environment, IWA, and DHI. The title "Flood and Drought Portal" is centered, with "MIKE Powered by DHI" on the right. Below the title, there is a navigation bar with "HOME", "User: oaj", "Workgroup: Public", and "Area: Thailand".

**About the DataPortal**

The Flood & Drought portal is developed as part of the Flood and Drought Management Tools project. For more information on the project please visit the project home page at: <http://fomt.lwlearn.org/en>

The Flood & Drought portal provides access to a number of apps supporting decision makers at basin and local level. The aim is to support existing planning processes as TDA/SAP and IWRM at basin scale and Water Safety Planning at local scale through the technical apps. The apps could be used individually or in connection.

Please visit the [user guide](#) for more indepth information on the use of the apps and their intended support for the different stages within basin and local level planning.

Knowledge portal with discussion forum and upcoming online courses: Select the "Knowledge portal" in the ? menu or use the link - [KnowledgePortal](#)

For video tutorials and overview: [YouTube](#)

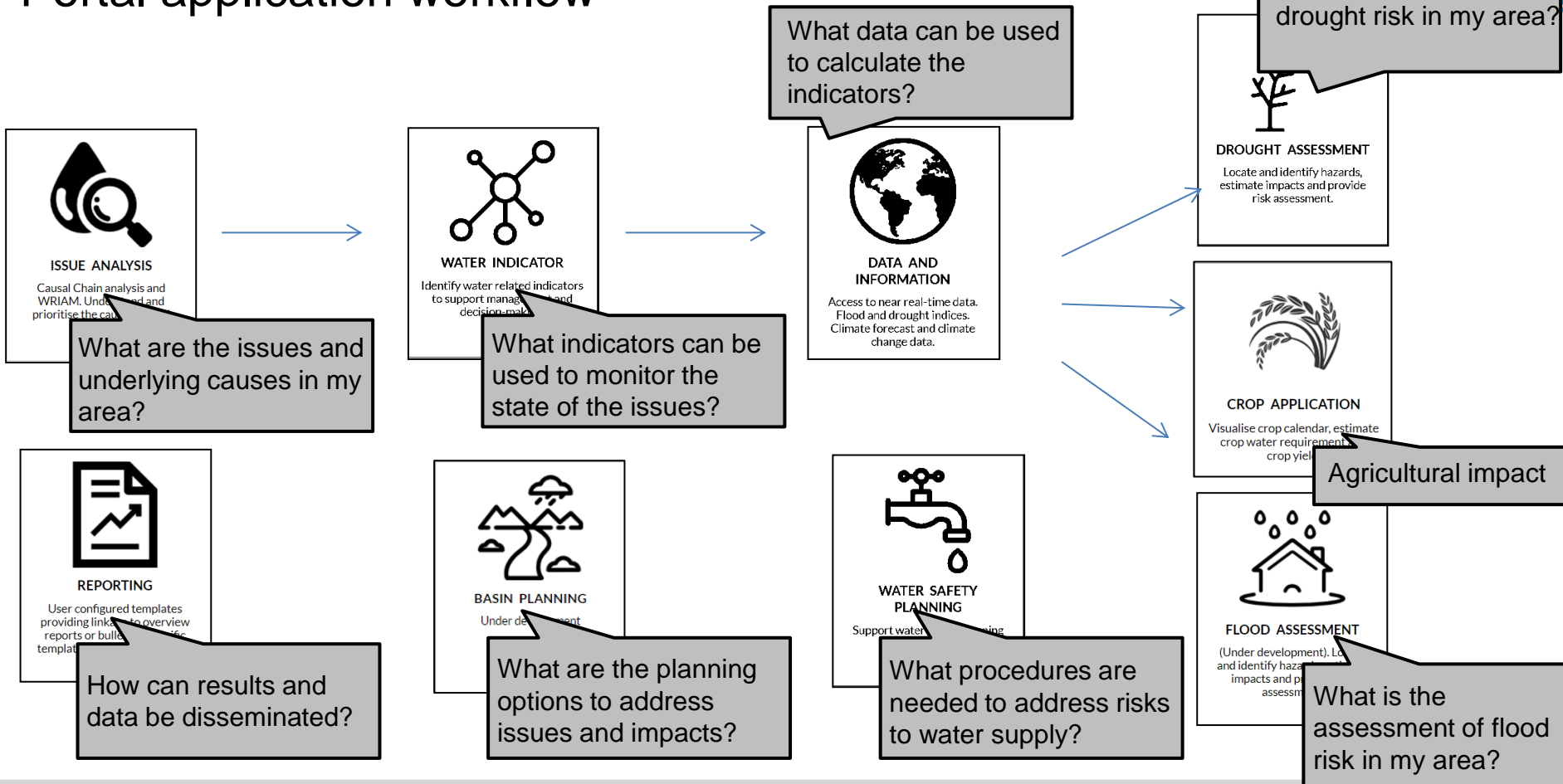
The main content area features ten icons representing different tools:

- ISSUE ANALYSIS**: Causal Chain analysis and WRIAM. Understand and prioritise the causes behind issues.
- WATER INDICATOR**: Identify water related indicators to support management and decision-making.
- DATA AND INFORMATION**: Access to near real-time data. Flood and drought indices. Climate forecast and climate change data.
- DROUGHT ASSESSMENT**: Locate and identify hazards, estimate impacts and provide risk assessment.
- CROP APPLICATION**: Visualise crop calendar, estimate crop water requirement and crop yield.
- FLOOD ASSESSMENT**: (Under development). Locate and identify hazards, estimate impacts and provide risk
- BASIN PLANNING**: Create and evaluate basin plans.
- WATER SAFETY PLANNING**
- RDM TOOL**: Robust Decision Making Tool
- REPORTING**: User configured templates



[www.floordroughtmonitor.com](http://www.floordroughtmonitor.com)

# Portal application workflow



# Flood and Drought web based portal

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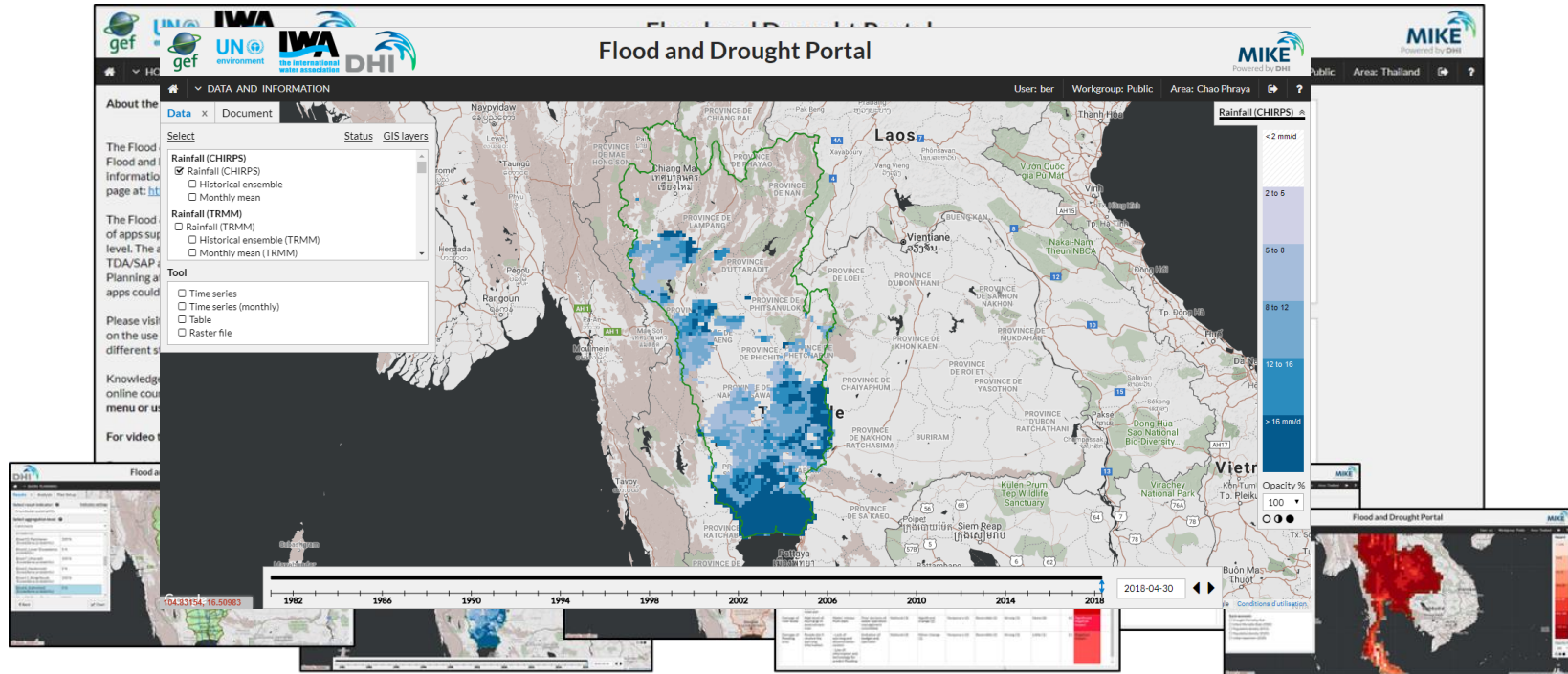
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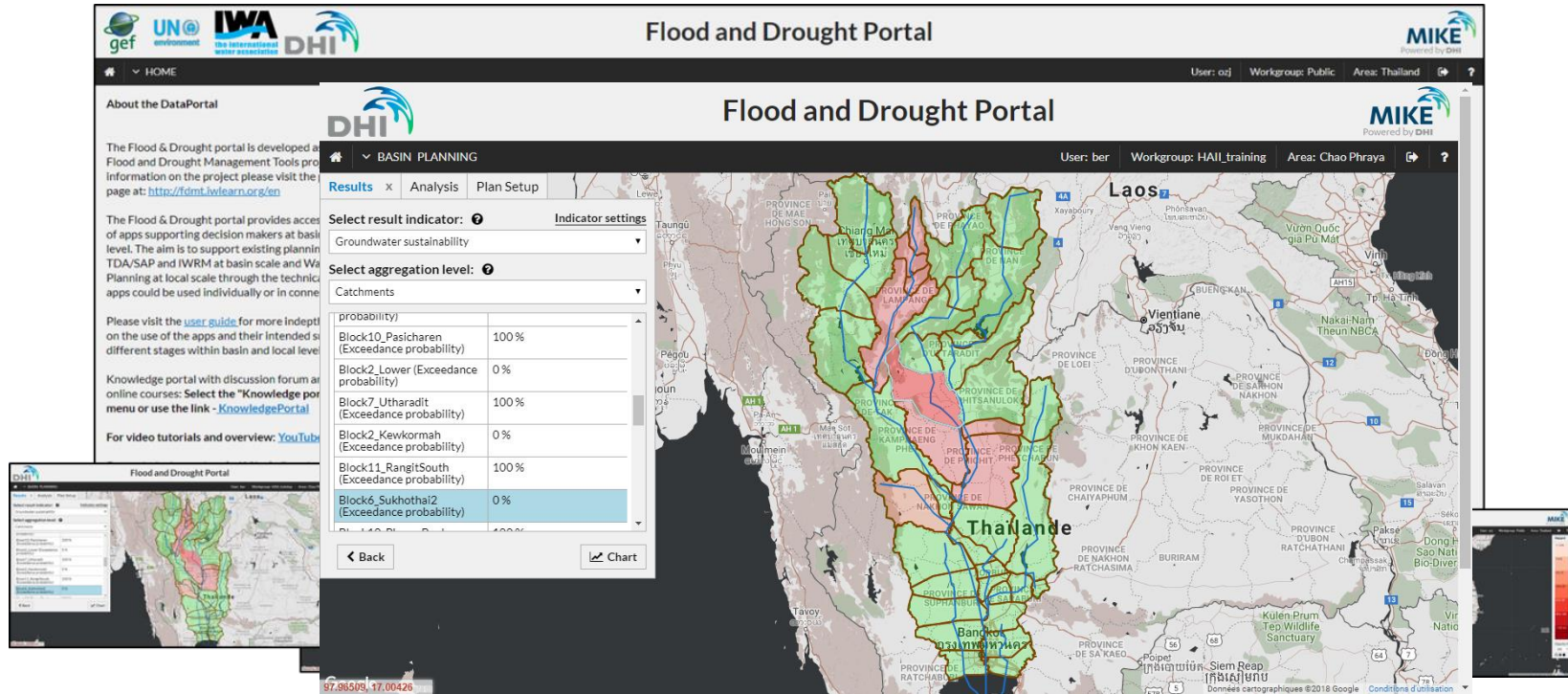
# Flood and Drought web based portal



[www.floordroughtmonitor.com](http://www.floordroughtmonitor.com)



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**Flood and Drought Portal**

**Basin Planning**

Results x Analysis Plan Setup

Select result indicator: **Indicator settings**  
Groundwater sustainability

Select aggregation level: **Catchments**

Block	Exceedance probability
Block10_Pasicharen	100%
Block2_Lower	0%
Block7_Utharadit	100%
Block2_Kewkormah	0%
Block11_RangitSouth	100%
Block6_Sukhothal2	0%

97.96509, 17.00426

[www.floordroughtmonitor.com](http://www.floordroughtmonitor.com)

# Flood and Drought web based portal

The screenshot displays the 'Flood and Drought Portal' interface. The main header includes logos for gef, UN environment, IWA, and DHI, along with the text 'Flood and Drought Portal' and 'MIKE Powered by DHI'. The user interface shows a navigation menu with 'HOME' and a user profile section for 'User: oaj', 'Workgroup: Public', and 'Area: Thailand'. The main content area is titled 'About the DataPortal' and contains text describing the portal's purpose and access to various decision-making tools. A 'CROP APPLICATION' window is open, showing a 'Crop calendar' for the area 'Subarea: Block2-Kewkormah'. The calendar table lists crop activities from February to September 2014:

Crop Activity	Feb 2014	Mar	Apr	May	Jun	Jul	Aug	Sep
Potatoes_Plant								
Potatoes_Growing								
Potatoes_Harvest								
Rice_Plant								
Rice_Growing								
Rice_Harvest								

The application also includes a 'List of crops in the area' with checkboxes for Oats, Potatoes, Pulses, Rapeseed, Rice, Rye, and Soybeans. Below the calendar, there are buttons for 'Update Calendar with selected Crops' and 'Add selected Crops to Yield Estimates'. A map of Thailand is visible in the background, with major cities like Bangkok and provinces labeled. The bottom of the screenshot shows a small inset of the portal's home page and a coordinate string '102.38696, 16.86763'.

[www.flooddroughtmonitor.com](http://www.flooddroughtmonitor.com)

# Project methodology – Issue Analysis



## ISSUE ANALYSIS

Causal Chain analysis and  
WRIAM. Understand and  
prioritise the causes

What are the issues and  
underlying causes in my  
area?

# Project methodology – Issue Analysis

The screenshot shows the 'ISSUE ANALYSIS' web application interface. At the top, there are navigation tabs: 'Overview', 'New', 'Clone', 'Edit', and 'Delete'. Below the tabs, the current issue is displayed: 'Issue: Water quantity and seasonal flows', 'User: admin', 'Last change: 2017-03-21 09:10:29', and 'Description: Relates to the availability of water across the basin for socio-economic and cultural uses.' Below the description, there is an 'Issue analysis' section with a legend for impact levels: No importance, Slight negative impact, Moderate negative impact, Negative impact, Significant negative impact, and Major negative impact. A table follows, listing various causes and their impacts. Callout boxes with red arrows point to specific features: 'Overview and switch between issues' points to the 'Overview' tab; 'Create new issue for analysis' points to the 'New' button; 'Clone current issue' points to the 'Clone' button; 'Edit current issue' points to the 'Edit' button; 'Delete current issue' points to the 'Delete' button; 'User information' points to the 'User: ozj' text; and 'Workgroup management' points to the 'Workgroup: Public' text.

Overview and switch between issues

Create new issue for analysis

Clone current issue

Edit current issue

Delete current issue

User information

Workgroup management

ISSUE ANALYSIS

User: ozj Workgroup: Public Area: Volta

Overview New Clone Edit Delete

Issue: Water quantity and seasonal flows  
User: admin  
Last change: 2017-03-21 09:10:29  
Description: Relates to the availability of water across the basin for socio-economic and cultural uses.

Issue analysis Add

No importance  Slight negative impact  Moderate negative impact  Negative impact  Significant negative impact  Major negative impact

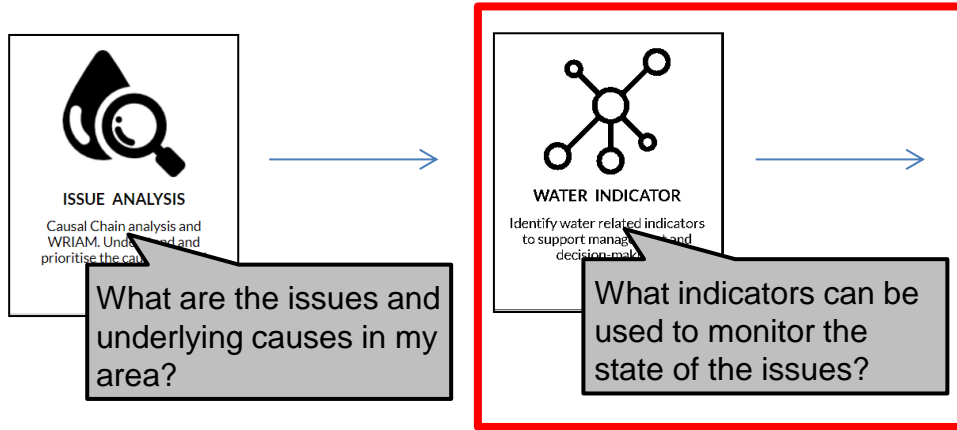
Immediate impact	Immediate cause	Underlying cause	Root cause	Extent	Seriousness	Permanence	Irreversibility	Cumulative character	Level of documentation	Score	Assessment	
Loss of biodiversity	Creation of dams and impoundments	Unsustainable practices	Migration from rural to urban - urban growth	Regional/national	Significant change	Permanent	Irreversible	Moderate	Some	30	Negative impact	<input type="checkbox"/> <input type="checkbox"/>
Water	Damming of the	Poor agricultural	Low level of	Regional/national	Significant change	Temporary	Reversible	Moderate	Some	18	Moderate	<input type="checkbox"/> <input type="checkbox"/>

## Objectives:

- Identify the key environmental issues
- Understand the causes behind the issues

***Stakeholder facilitation tool used in the early planning stages***

# Project methodology – Water Indicators



# Project methodology – Water Indicators

Issue tab

Framework view

New indicator

Agricultural Stress Index

Agriculture Withdrawals

Area Irrigated by Groundwater

**Climate > Climate Vulnerability** X

**Indicator**  
Climate Vulnerability Index

**Description**  
The Climate Vulnerability Index (CVI) is used as an integrated assessment of local vulnerability to water-related risks. It is a composite indicator, determined as a function of climate exposure, resilience and adaptability. The CVI takes into account a wide range of relevant factors to capture the key drivers of human vulnerability to climate related impacts on water resources.

**Keyword**

climate change adaptation   freshwater availability   water scarcity   water stress


natural resource management   sustainable livelihoods   irrigation   agricultural development

water related hazards   disaster planning   disaster management   disaster preparedness   health

vulnerability

**Metadata sheet**

Page: 1 of 4   Automatic Zoom


**Water Indicator Builder**  
Indicator metadata sheet

**Climate Vulnerability Index**

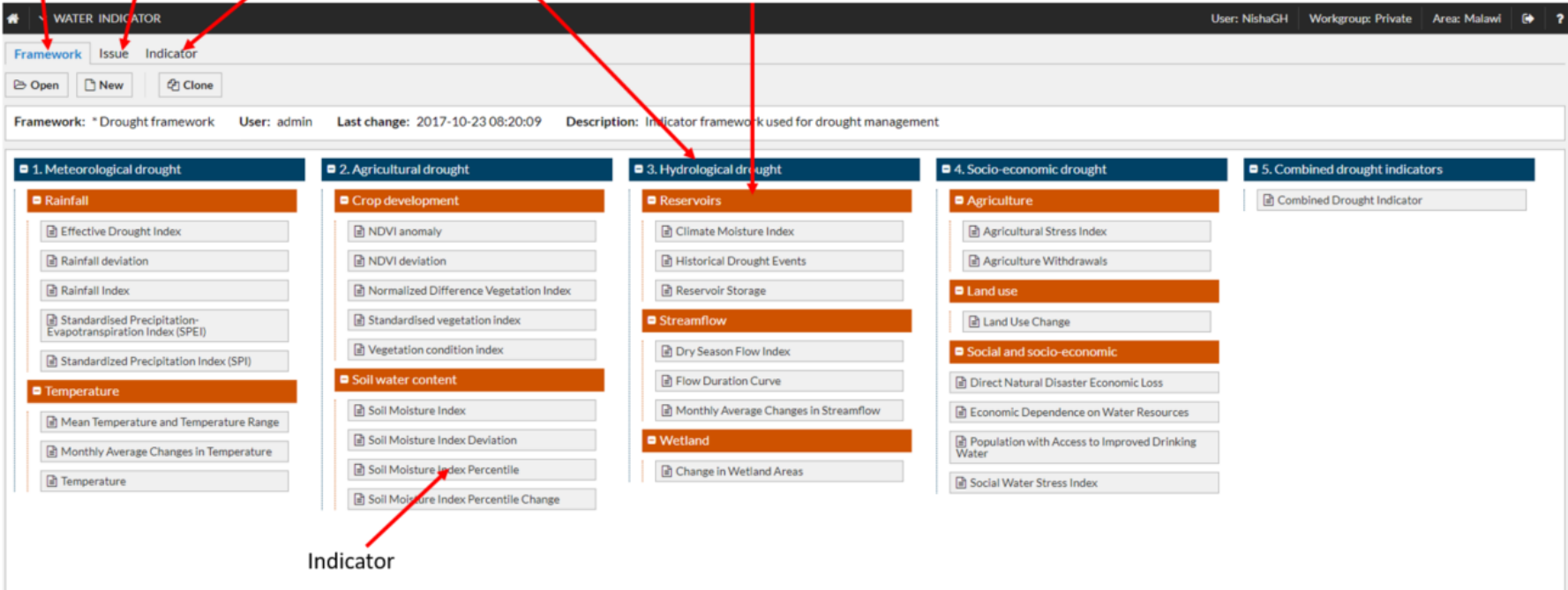
GENERAL INFORMATION	
Title	Climate Vulnerability Index
Category	Climate   Subcategory   Climate Vulnerability
Purpose	The Climate Vulnerability Index (CVI) is used as an integrated assessment of local vulnerability to water-related risks. It is a composite indicator, determined as a function of climate exposure, resilience and adaptability. The CVI takes into account a wide range of relevant factors to capture the key drivers of human vulnerability to climate related impacts on water resources.
POLICY RELEVANCE	
Policy Relevance	This indicator is relevant for identifying regions or populations that are vulnerable to climate change impacts in relation to water resources. It can be useful in prioritizing policy actions related to disaster planning and preparedness, as well as natural resource allocation. When combined with socioeconomic or demographic variables, the CVI may help to identify trends in equity and may contribute to poverty reduction efforts. Reporting on this indicator supports ongoing assessment of climate related risks and strategic action to combat human vulnerability to climate change.

User: NishaGH   Workgroup: Private   Area: Malawi

View only approved indicators   **All**   **Q Search**

Keyword	Metadata sheet
aptation   water scarcity   water stress	ASI.pdf
gricultural development   food security	
r stress   rural livelihoods	
arly warning systems   land degradation	
gation water demand   livestock watering	Agriculture water withdrawals_Aug2016pdf.pdf
water scarcity   climate change vulnerability	
lanning   drought preparedness   food security	
oods   water allocation	
water demand   water stress: water scarcity	Area Irrigated by Groundwater_Aug2016.pdf
n water efficiency   soil moisture   soil quality	
nt   rural livelihoods	
water pollution   groundwater depletion	

# Project methodology – Water Indicators



The screenshot displays a web application interface for 'WATER INDICATOR'. At the top, there are navigation tabs: 'Framework', 'Issue', and 'Indicator'. Below these are buttons for 'Open', 'New', and 'Clone'. The main content area shows a framework titled '\* Drought framework' with a description: 'Indicator framework used for drought management'. The framework is organized into five main groups:

- 1. Meteorological drought**
  - Rainfall
    - Effective Drought Index
    - Rainfall deviation
    - Rainfall Index
    - Standardised Precipitation-Evapotranspiration Index (SPEI)
    - Standardized Precipitation Index (SPI)
  - Temperature
    - Mean Temperature and Temperature Range
    - Monthly Average Changes in Temperature
    - Temperature
- 2. Agricultural drought**
  - Crop development
    - NDVI anomaly
    - NDVI deviation
    - Normalized Difference Vegetation Index
    - Standardised vegetation index
    - Vegetation condition index
  - Soil water content
    - Soil Moisture Index
    - Soil Moisture Index Deviation
    - Soil Moisture Index Percentile
    - Soil Moisture Index Percentile Change
- 3. Hydrological drought**
  - Reservoirs
    - Climate Moisture Index
    - Historical Drought Events
    - Reservoir Storage
  - Streamflow
    - Dry Season Flow Index
    - Flow Duration Curve
    - Monthly Average Changes in Streamflow
  - Wetland
    - Change in Wetland Areas
- 4. Socio-economic drought**
  - Agriculture
    - Agricultural Stress Index
    - Agriculture Withdrawals
  - Land use
    - Land Use Change
  - Social and socio-economic
    - Direct Natural Disaster Economic Loss
    - Economic Dependence on Water Resources
    - Population with Access to Improved Drinking Water
    - Social Water Stress Index
- 5. Combined drought indicators**
  - Combined Drought Indicator

Annotations with red arrows point to various elements: 'Framework view' points to the 'Framework' tab; 'Issue tab' points to the 'Issue' tab; 'Indicator view' points to the 'Indicator' tab; 'Indicator main group' points to the '3. Hydrological drought' group; 'Indicator subgroup' points to the 'Reservoirs' subgroup; and 'Indicator' points to the 'Soil Moisture Index' indicator.

# Project methodology – Water Indicators

Framework **Issue** Indicator

Open

Issue: Drought Thailand User: ozj Last change: 2018-06-09 17:46:13 Description: Thailand drought

Immediate impact  Immediate Cause  Underlying Cause  Root Cause  Related Indicator

Score	Category	Indicators
42	Significant negative impact	water quality impact (tap water) Land Use Change Population with Access to Improved Drinking Water salinity intrusion
36	Significant negative impact	water shortage Population with Access to Improved Drinking Water lack of rainfall Standardized Precipitation Index (SPI)
12	Moderate negative impact	Low agriculture productivity Agricultural Stress Index lack of good quality of water irrigation Social Water Stress Index

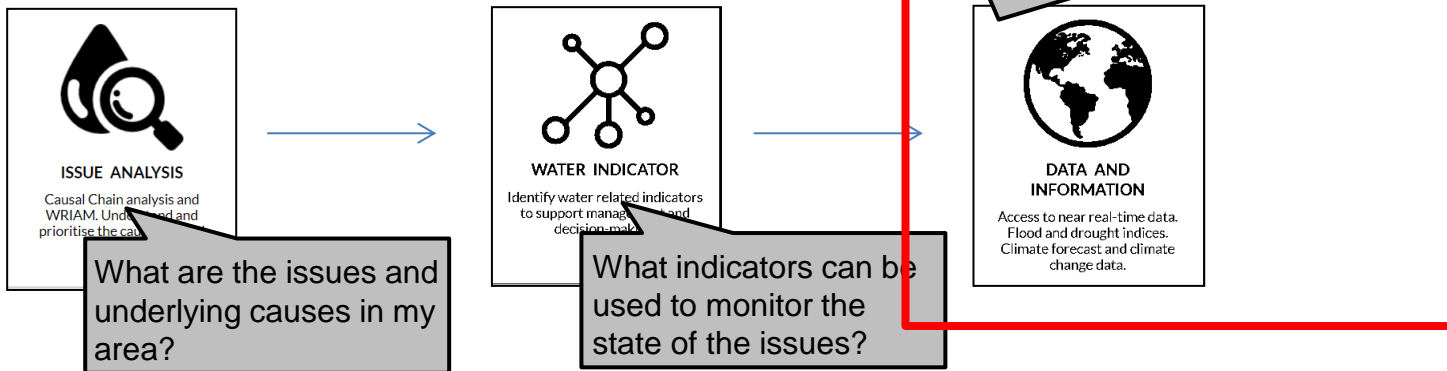
## Objectives:

- Identify the relevant water indicators for the key environmental issues
- Facilitate stakeholder agreement on monitoring and evaluation indicators

***Selection of few relevant water indicators for monitoring and evaluation***



# Project methodology – Data and Information

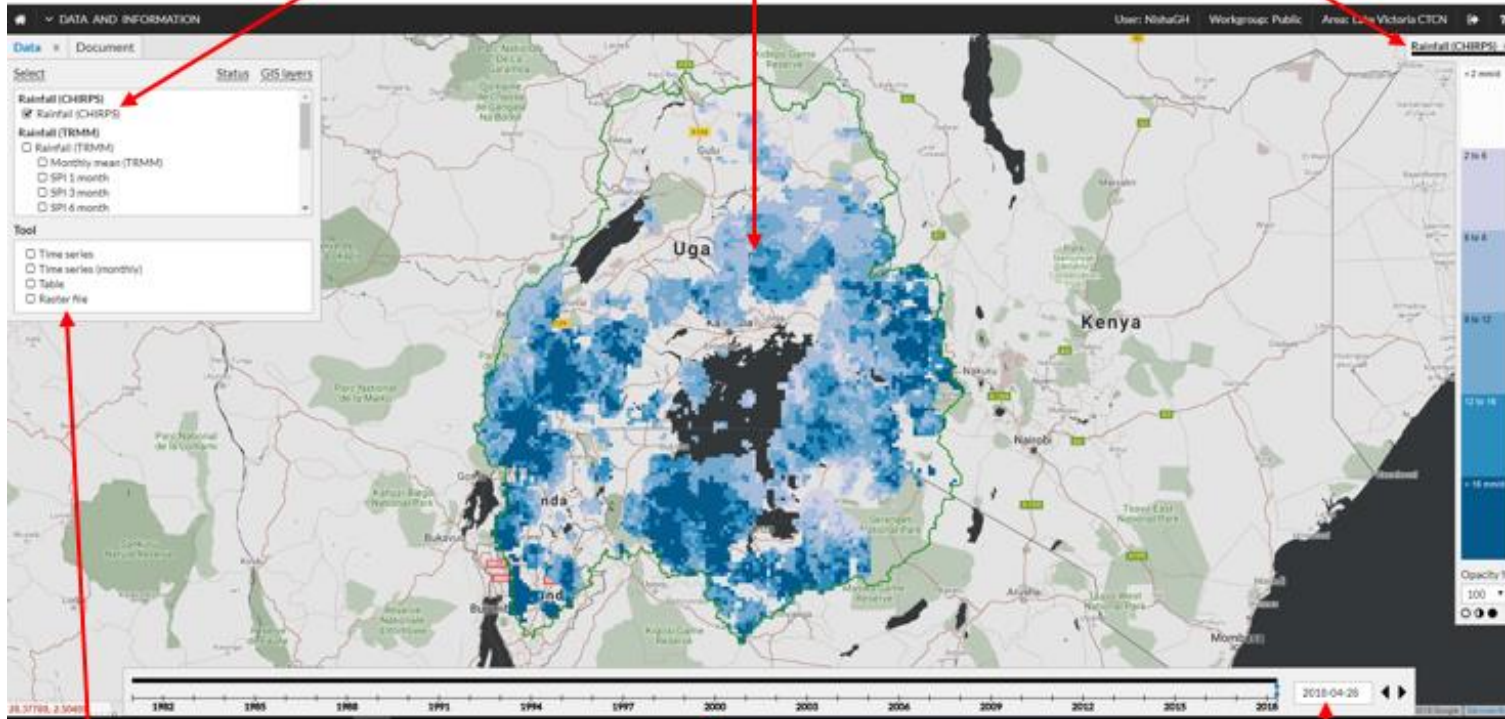


# Project methodology – Data and Information

*Select/unselect the available data types*

*Data*

*Legend for selected data types*

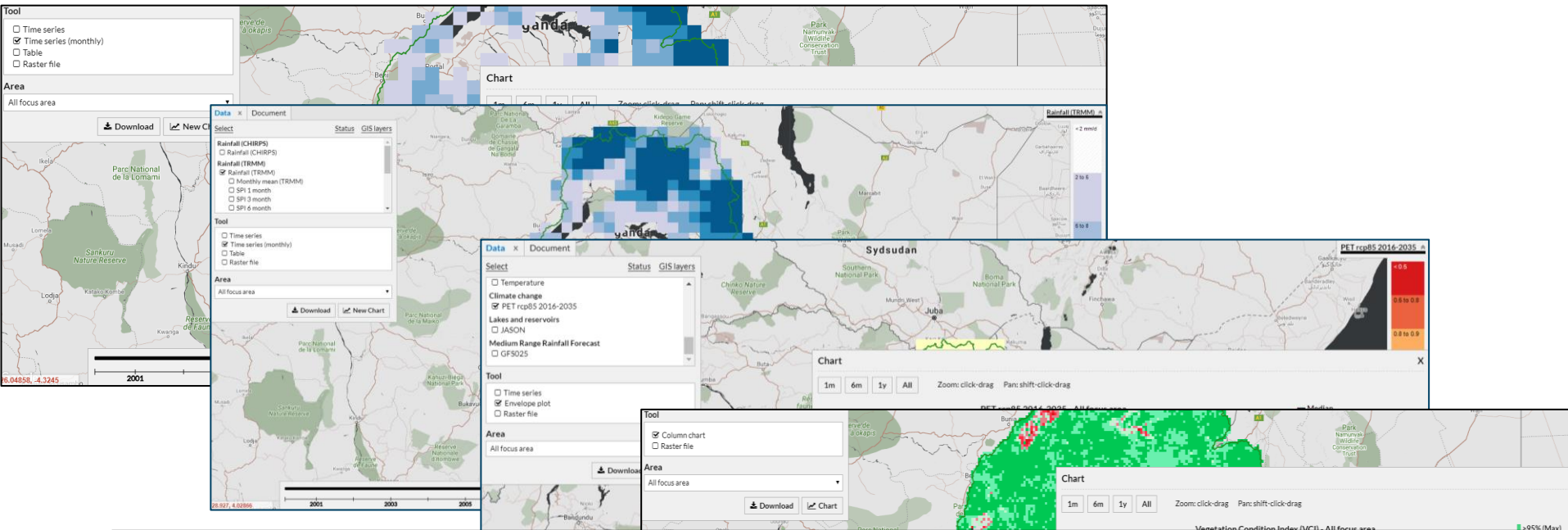


*Tools*

*Data availability*

*Current time step*

# Project methodology – Data and Information

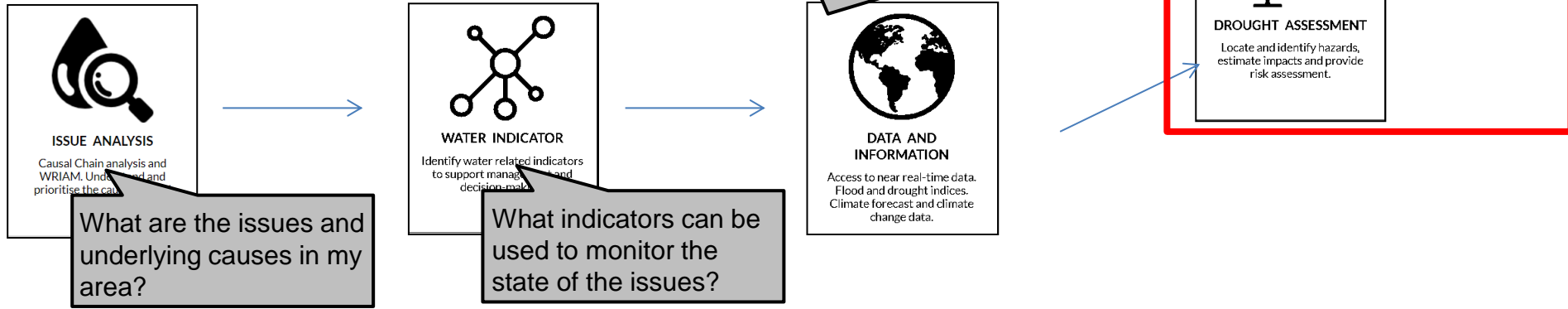


## Objectives:

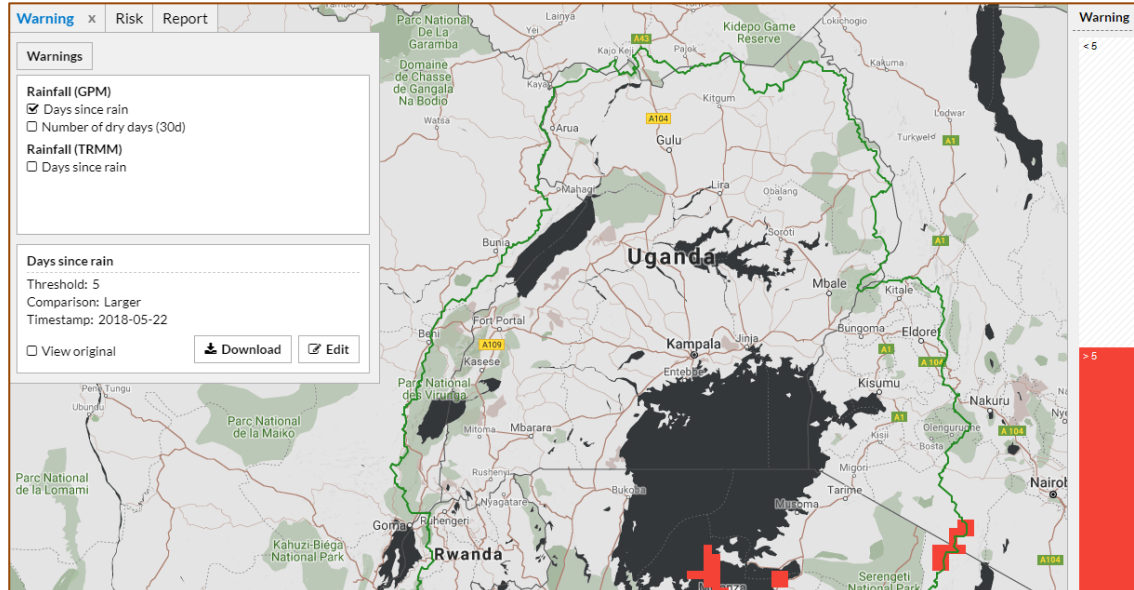
- Data availability – historic, near-real time, forecast and projected
- Free access to basic dataset for water related planning

***Facilitate improved decision making***

# Project methodology – Drought



# Project methodology – Drought

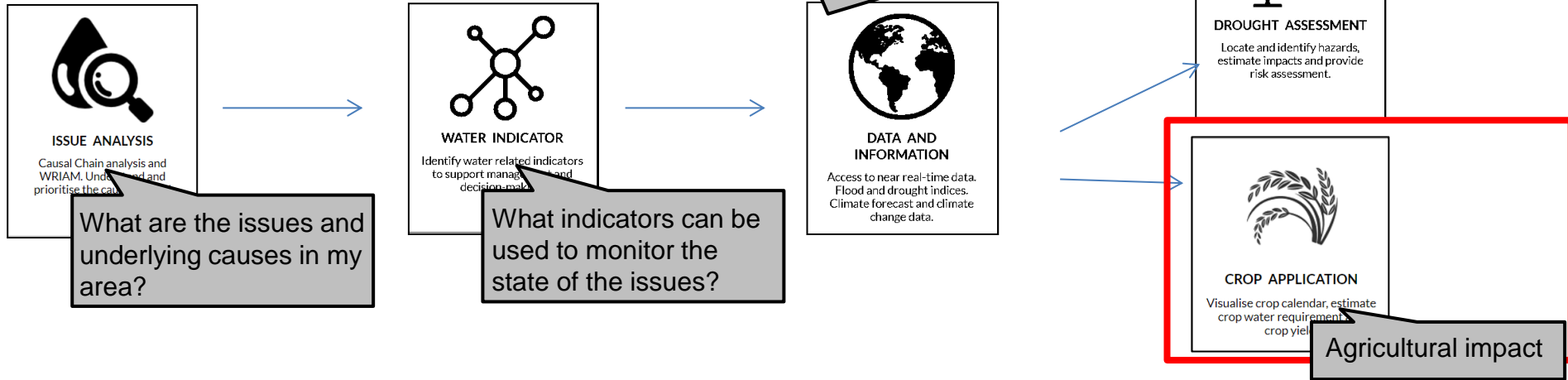


## Objectives:

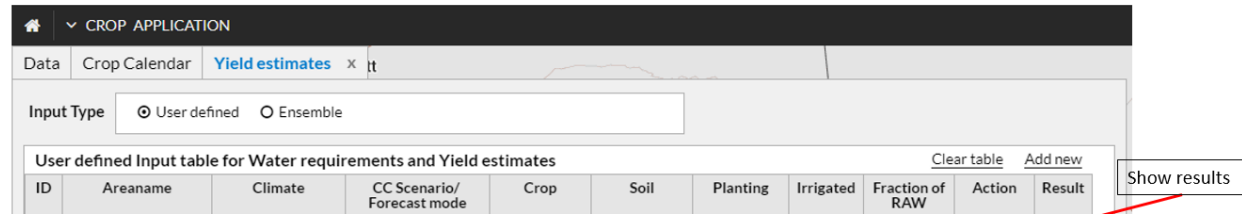
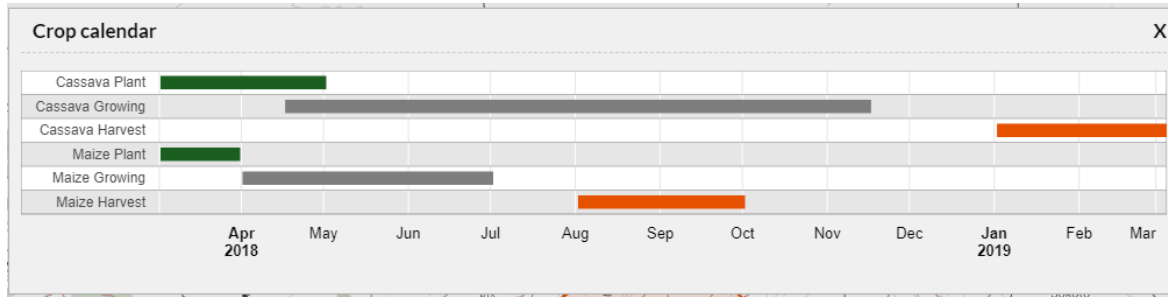
- Drought hazard identification and early warning
- Drought risk assessment

***Drought assessment and early warning***

# Project methodology - Crop



# Project methodology – Crop



The screenshot shows the 'CROP APPLICATION' interface with the 'Yield estimates' tab selected. Below the 'Input Type' dropdown, there is a table for user-defined input.

ID	Areaname	Climate	CC Scenario/ Forecast mode	Crop	Soil	Planting	Irrigated	Fraction of RAW	Action	Result
----	----------	---------	-------------------------------	------	------	----------	-----------	--------------------	--------	--------


A 'Show results' button is visible to the right of the table.

## Objectives:

- Crop related information source
- Assessment of crop water requirement and crop yield (current and future)


***Impact assessment on agricultural sector***

# Project methodology - Flood



**ISSUE ANALYSIS**  
Causal Chain analysis and  
WRIAM. Understand and  
prioritise the causes.


What are the issues and underlying causes in my area?




**WATER INDICATOR**  
Identify water related indicators  
to support management and  
decision making.

What indicators can be used to monitor the state of the issues?

What data can be used to calculate the indicators?




**DATA AND INFORMATION**  
Access to near real-time data.  
Flood and drought indices.  
Climate forecast and climate  
change data.




**DROUGHT ASSESSMENT**  
Locate and identify hazards,  
estimate impacts and provide  
risk assessment.

What is the level of drought risk in my area?



**CROP APPLICATION**  
Visualise crop calendar, estimate  
crop water requirements,  
crop yield.

Agricultural impact



**FLOOD ASSESSMENT**  
(Under development). Locate  
and identify hazards,  
estimate impacts and provide  
risk assessment.

What is the assessment of flood risk in my area?



# Project methodology – Flood


The screenshot shows the MIKE Flood Drought Monitor web application. The interface includes a navigation menu with 'DATA AND INFORMATION', a search bar, and user information (User: ber, Workgroup: Public, Area: Volta). The main content area is divided into a control panel on the left and a data visualization area on the right. The control panel has sections for 'Tool' (Rainfall runoff (NAM)), 'Parameters and calibration' (Options), and 'Result' (Runoff Acc.). The data visualization area shows a map of the region and a hydrograph titled 'Historic - Subarea: White Volta - Runoff -'. The hydrograph displays runoff in m<sup>3</sup>/s from 2000 to 2015, with peaks reaching up to 30,000.00. Callout boxes point to various features: '3 time horizons (linking to climate data in data portal)' points to the 'Historic', 'Forecast', and 'Climate change' radio buttons; 'Rainfall products' points to the 'Rainfall' dropdown menu; 'Model parameters' points to the 'Options' link; and 'Run the model...' points to the 'Execute' button.

## Objectives:

- Flood related information base (flood maps, flood indicators...)
- Hydrograph calculation and evaluation (rainfall runoff)


***Flood information and assessment***

# Project methodology – Basin Planning




**ISSUE ANALYSIS**  
Causal Chain analysis and  
WRIAM. Understand and  
prioritise the causes.

What are the issues and underlying causes in my area?




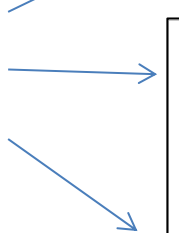
**WATER INDICATOR**  
Identify water related indicators  
to support management and  
decision making.

What indicators can be used to monitor the state of the issues?




**DATA AND INFORMATION**  
Access to near real-time data.  
Flood and drought indices.  
Climate forecast and climate  
change data.

What data can be used to calculate the indicators?




**BASIN PLANNING**  
Under development.

What are the planning options to address issues and impacts?




**DROUGHT ASSESSMENT**  
Locate and identify hazards,  
estimate impacts and provide  
risk assessment.

What is the level of drought risk in my area?



**CROP APPLICATION**  
Visualise crop calendar, estimate  
crop water requirements,  
crop yield.

Agricultural impact



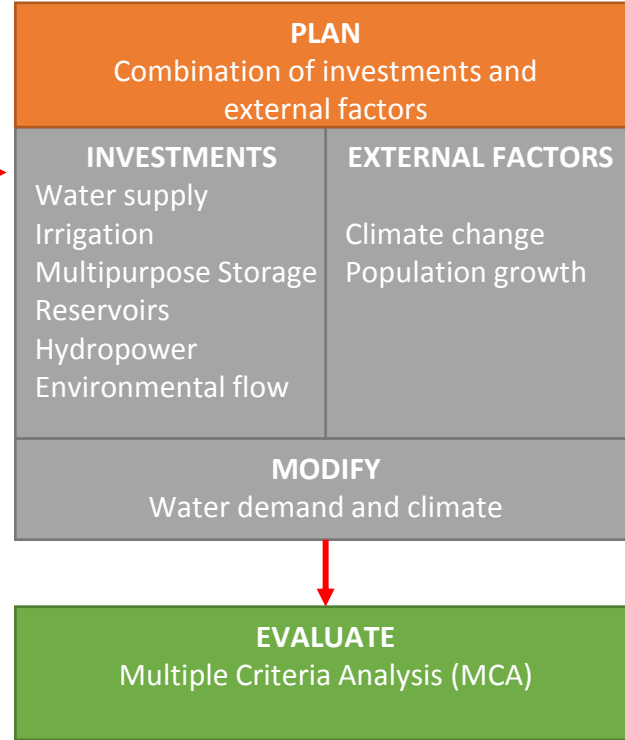
**FLOOD ASSESSMENT**  
(Under development). Locate  
and identify hazards, estimate  
impacts and provide  
assessment.

What is the assessment of flood risk in my area?

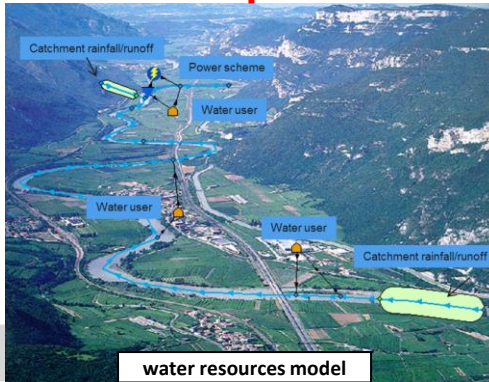
# Project methodology – Basin Planning



*A baseline plan is established by the tool. New plans created will incur in alterations to the baseline model.*



*A user uploads the baseline model to the application*



# Project methodology – Basin Planning

Select baseline: **New Edit Delete t Portal** **MIKE** Powered by DHI

Nakambe 2018-09-24 User: ber Workgroup: Public Area: Volta

Select one or two plans to view

- Baseline
- Increased water demand in Ouaga
- Increased power production in Bagré
- Increased power prod and irrigation demand in Bagré

View in

Investment information:

Name	Bagré
Description	
Level Area Volume Table	Open
Initial Water Level (m)	231.49
Bottom Level (m)	215
Dam Crest Level (m)	235
Top of Dead Storage	235

MCA Results

Strategy	Baseline	Increased water demand in Ouaga	Increased power production in Bagré	Increased power prod and irrigation demand in Bagré
Water supply and irrigation focus	24	8	8	70
Hydropower production focus	24	8	78	70

MCA Score Matrix: Plans vs Strategies

Strategy	Baseline	Increased water demand in Ouaga	Increased power production in Bagré	Increased power prod and irrigation demand in Bagré
Water supply and irrigation focus	24	8	8	70
Hydropower production focus	24	8	78	70

Select result indicator: ? Indicator settings


Increased power prod and irrigation demand in Bagré	Diff.
0.01 GWh	0.01 GWh

## Objectives:

- Evaluate existing plans (basin, catchment, local...)
- Create new plans and evaluate using Multi-criteria approach (MCA)


***Facilitating basin planning for decision makers (non model experts)***

# Project methodology – Reporting




**ISSUE ANALYSIS**  
Causal Chain analysis and WRIAM. Understand and prioritise the causes.

What are the issues and underlying causes in my area?




**WATER INDICATOR**  
Identify water related indicators to support management and decision making.

What indicators can be used to monitor the state of the issues?




**DATA AND INFORMATION**  
Access to near real-time data. Flood and drought indices. Climate forecast and climate change data.

What data can be used to calculate the indicators?




**BASIN PLANNING**  
Under development.

What are the planning options to address issues and impacts?




**WATER SAFETY PLANNING**  
Support water supply planning.

What procedures are needed to address risks to water supply?




**DROUGHT ASSESSMENT**  
Locate and identify hazards, estimate impacts and provide risk assessment.

What is the level of drought risk in my area?




**CROP APPLICATION**  
Visualise crop calendar, estimate crop water requirements, crop yield.

Agricultural impact



**FLOOD ASSESSMENT**  
(Under development). Locate and identify hazards, estimate impacts and provide risk assessment.

What is the assessment of flood risk in my area?



**REPORTING**  
User configured templates providing links to overview reports or bullet point templates.

How can results and data be disseminated?

# Project methodology – Reporting

**Flood and Drought Portal**

User: ber | Workgroup: Private | Area: Chao Phraya

Report: Clone by BER | User: ber | Last change: 2018-02-08 09:21:10 | Description:

Tag	Source	Type	Item	Setting
Image: Project logo	Data	Image	General\Project logo	imageWidth: imageHeight:
MAP: Overview map	data drought	Image	General\Basin overview	imageWidth: 500 imageHeight:
Chart: Historical rainfall as ensemble	Data	Chart	Rainfall Climate\Envelope TRMM	analysisArea: allArea
Table: rainfall historical data	Data			(logo)
Map: Spatial distribution of last month rainfall	data drought			
Map: SPI 3 month - 4 parts	data drought			
Map: temperature deviation map	data drought			

**Template report with tags**

**Final report with input**

## Objectives:

- Assist in generating user defined reports and bulletins
- Automated submission of reports and bulletins

***Facilitate automated reports and bulletins***

**Introduction** | Peter Bjørnsen, UNEP-DHI

**Overview of the portal** | Bertrand Richaud, DHI

**Roundtable discussions** *(with guided questions)*

**Highlights from roundtable discussions** | Katharine Cross, IWA *(facilitator)*

**Strategic recommendations** | Per B. Hansen, DHI

## Understanding your experience

1. Have you already done a TDA or SAP in your basin?
2. What planning approaches/tools do you use in your basin?
3. Do you use updated climate information to plan for floods and droughts in your current planning process (e.g. TDA/SAP)?
4. If so, where do you get this information from, and how do you use it?
5. How do you monitor progress of the implementation of the SAP in your basin?
6. Do you rely on earth observations when monitoring the progress of the implementation of the SAP in your basin?
7. Do you have access to frequently updated earth observation data/images? At what cost?

## Understanding your needs/gaps

8. What data and analysis are missing?

## Applying the Flood and Drought Portal

9. Do you see a potential for applying the tools presented to improve the stakeholder consultations and thus the planning in your basin? How?



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To get started with the tools right now, register for free by visiting

[www.flooddroughtmonitor.com](http://www.flooddroughtmonitor.com)



Learn more at [fdmt.iwlearn.org](http://fdmt.iwlearn.org)



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Design: [www.chris-wells.com](http://www.chris-wells.com)