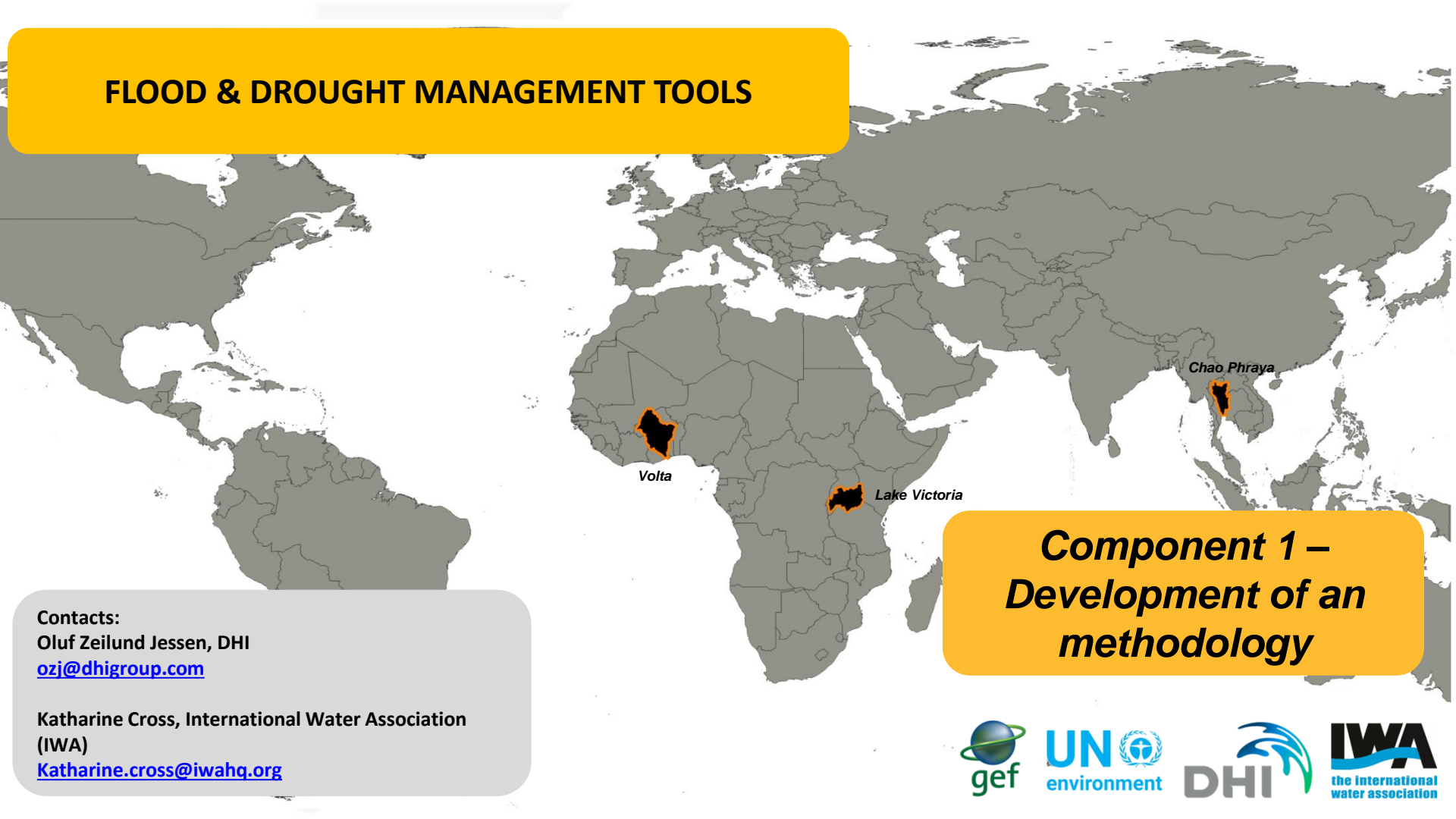


FLOOD & DROUGHT MANAGEMENT TOOLS



Component 1 – Development of an methodology

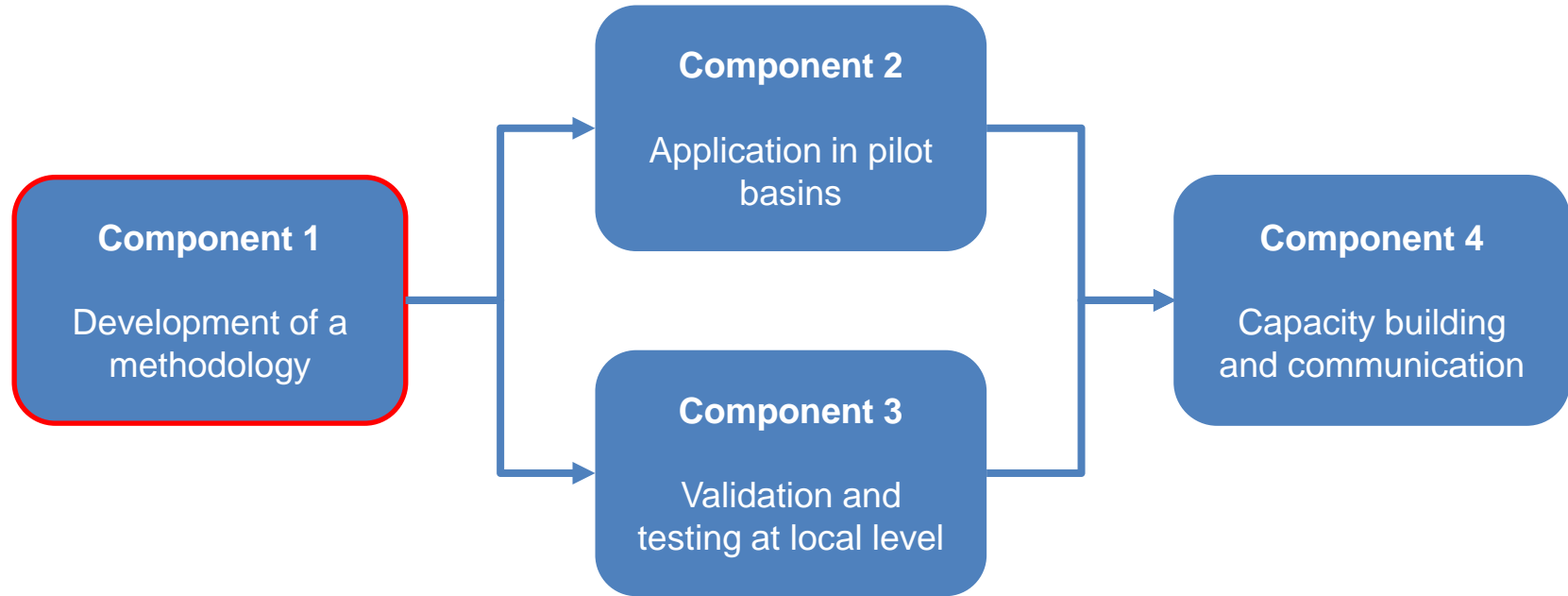
Contacts:

Oluf Zeilund Jessen, DHI
ozj@dhigroup.com

Katharine Cross, International Water Association
(IWA)
Katharine.cross@iwahq.org



Components



Outcomes – Component 1

Outcome 1.1: Methodologies with tools aimed at increasing understanding of flood and drought dynamics and impacts at transboundary and local levels and including enhancement of commonly used decision support systems, fully developed jointly with pilot basins stakeholders.

How do we design the functionality of the project outputs so it assists decision makers in incorporating flood and drought issues into planning?

Output 1.1.1: Methodologies using tools adopting a basin and local approach, including enhancements for a decision support system, that would allow the integration of flood and drought issues into (i) the TDA-SAP GEF IW or equivalent processes, and (ii) IWRM plans and Water Safety plans

Background

- Facilitating a scientific approach to decision-making (TDA/SAP, WSP etc.)
- Support decision processes at basin and local level
- Technical tools supporting the inclusion of flood and drought issues into existing planning processes

Implemented by UNEP

Executed by IWA and DHI

2014 to 2018



Types of planning supported

Operational planning



Short-term and seasonal management
Climate variability and water management
National, basin or catchment planning

Strategic planning



Long-term investments
Climate change and population growth
TDA/SAP, IWRM

Steps for designing the functionality of the project outputs:

1. Need assessment based on 50+ stakeholder meetings, workshops etc.
2. Awareness workshops bringing key stakeholders together
3. First round of technical training in all pilot basins
4. Development of specific applications based on user feedback
5. Testing and validation through a number of specific use cases
6. Technical training within the pilot basins during 2017 and 2018

User oriented development!

Flood and Drought Management Tools Project

Project methodology – web based portal

The screenshot displays the 'Flood and Drought Portal' interface. At the top, logos for gef, UN environment, IWA, and DHI are visible. The main header reads 'Flood and Drought Portal' with a 'MIKE' logo on the right. Below the header, a navigation bar shows 'User: oiz', 'Workgroup: Public', and 'Area: Thailand'. The main content area is divided into two columns. The left column contains text about the portal's purpose and links to a user guide, knowledge portal, and video tutorials. The right column features ten tool icons with descriptions: Issue Analysis, Water Indicator, Data and Information, Drought Assessment, Crop Application, Flood Assessment, Basin Planning, Water Safety Planning, RDM Tool, and Reporting. Below the main content, several smaller screenshots show the portal's interactive features, including maps of Thailand, data tables, and various tool interfaces.

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://fdmt.iwlearn.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](#)

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.

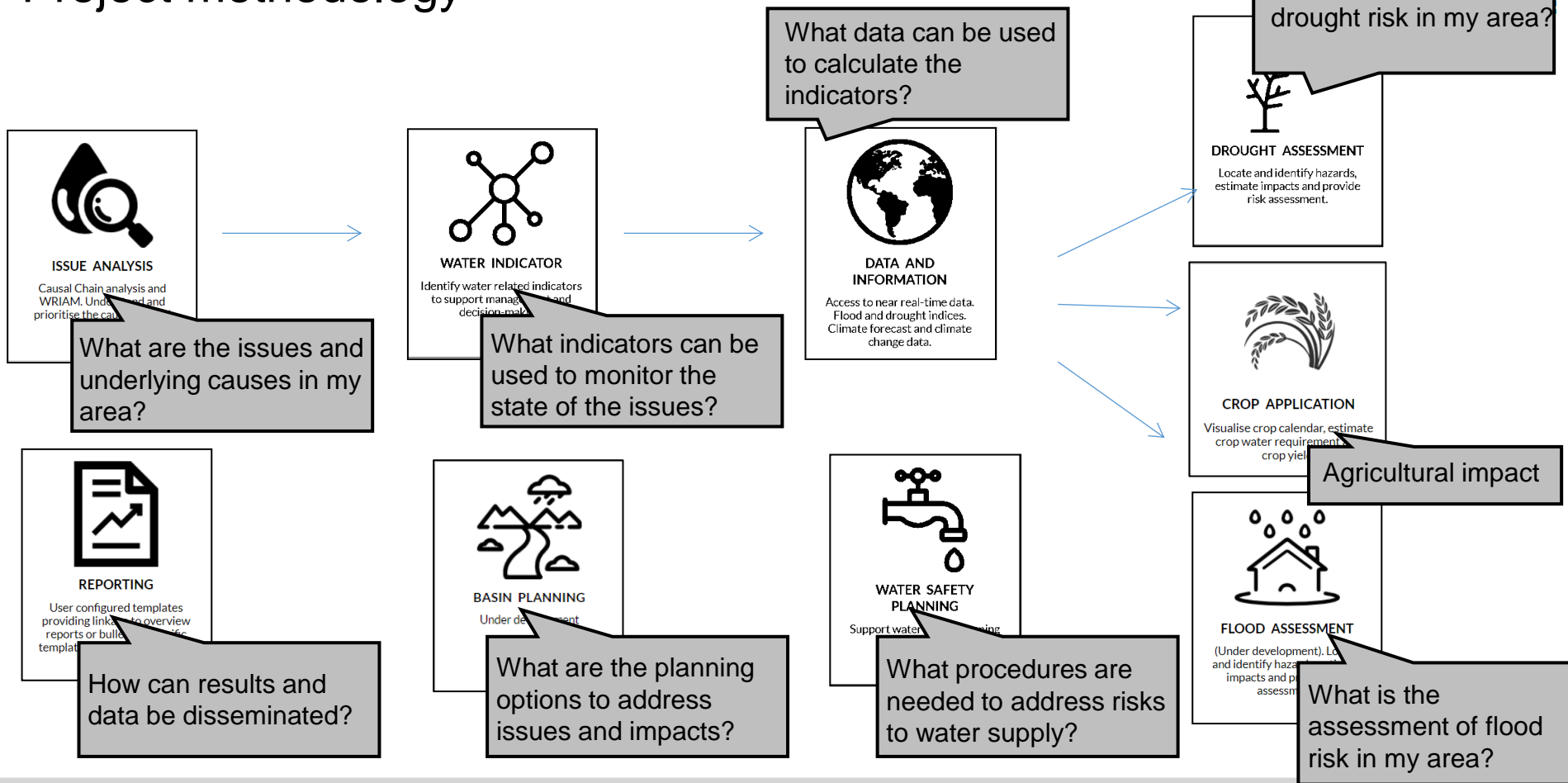
WATER SAFETY PLANNING

RDM TOOL
Robust Decision Making Tool

REPORTING
User configured templates

www.flooddroughtmonitor.com
Flood and Drought Management Tools Project

Project methodology



WEB based applications

- Finalise the development of web based applications supporting the planning processes

Technical workshops, trainings and webinars within the pilot basins

- User feedback used for further improvements

Specific and targeted apps

- Number of very specific apps each targeting a technical area
- Simplified functionality within each app
- Each app works as a stand alone and supports the overall methodology

WEB based platform

- Bug fixing and improvements are available for all users at the same time
- No local installations
- Internet access required

Project methodology – web based portal

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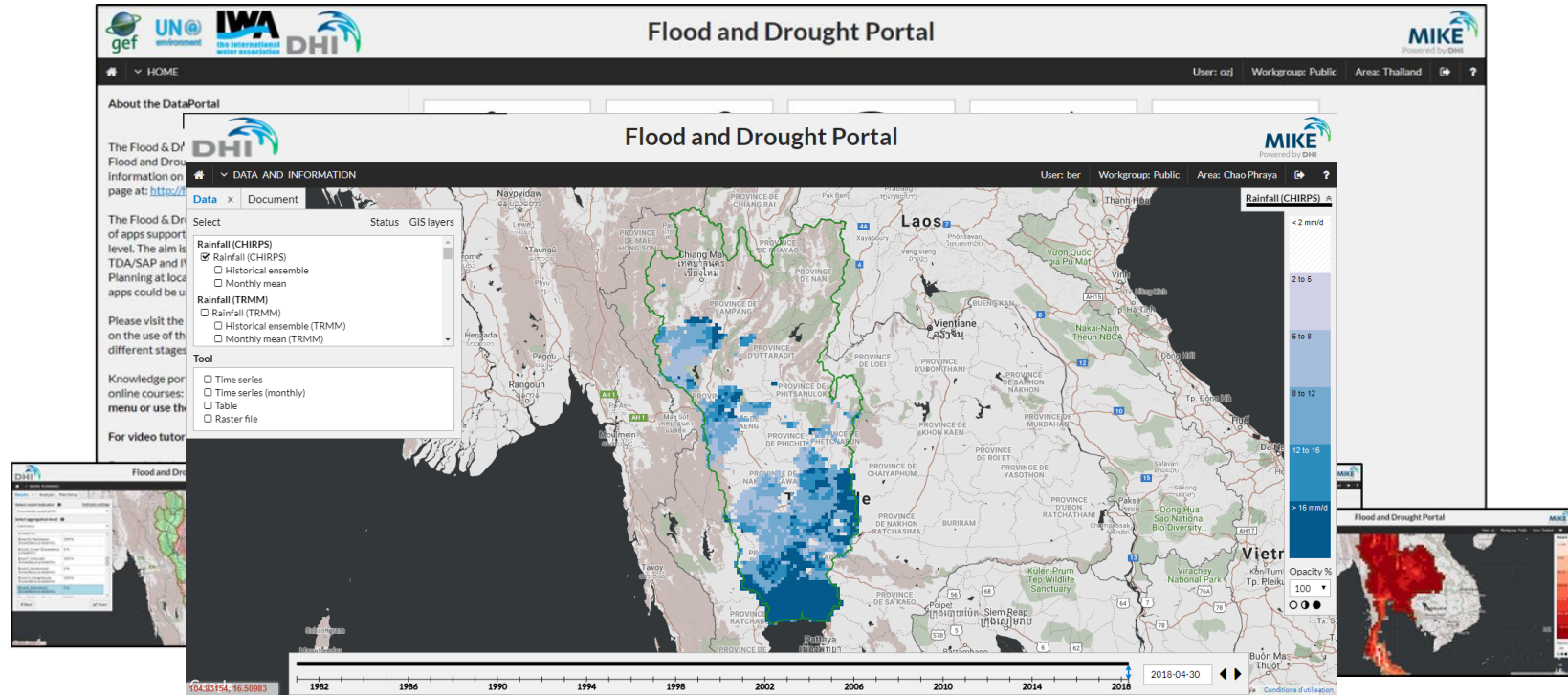
Water Safety Planning

RDM TOOL
Robust Decision Making Tool

REPORTING
User configured templates

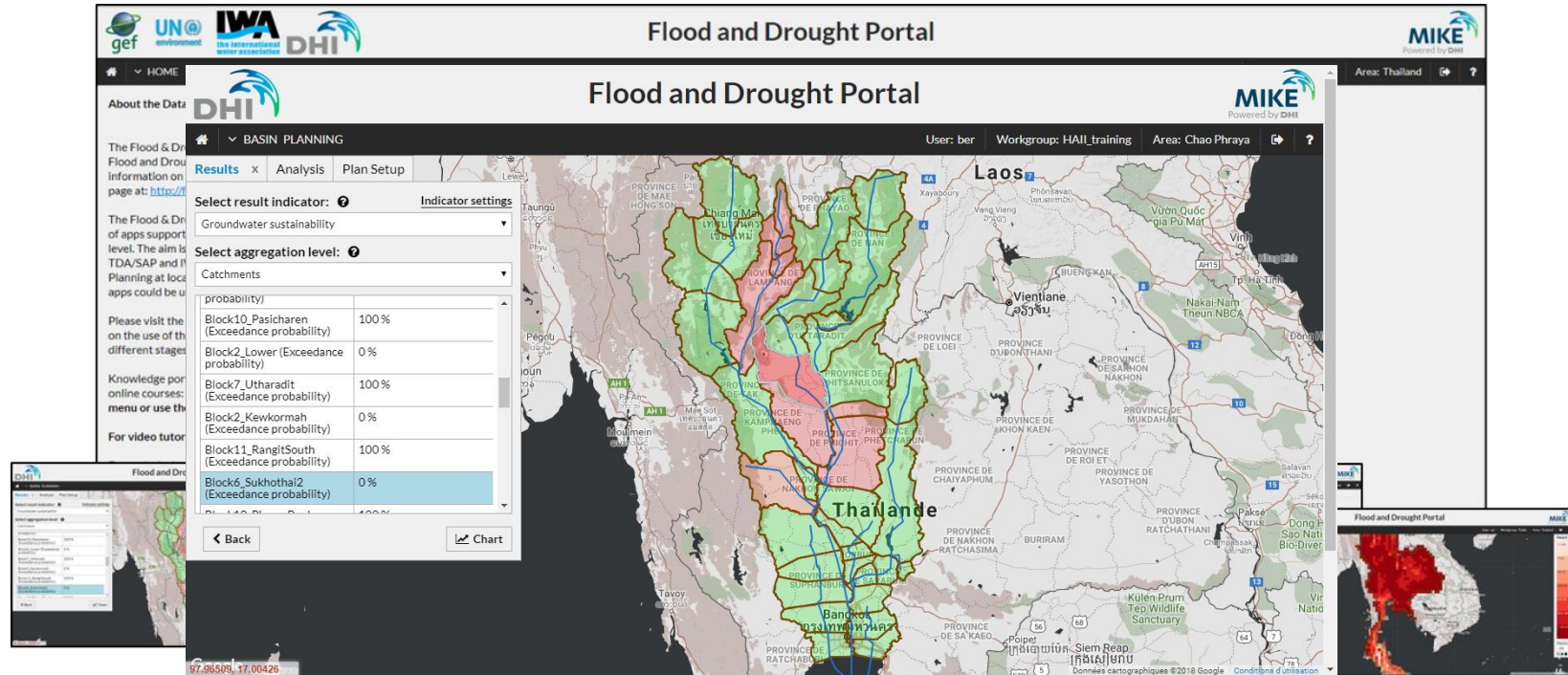
www.flooddroughtmonitor.com
Flood and Drought Management Tools Project

Project methodology – web based portal

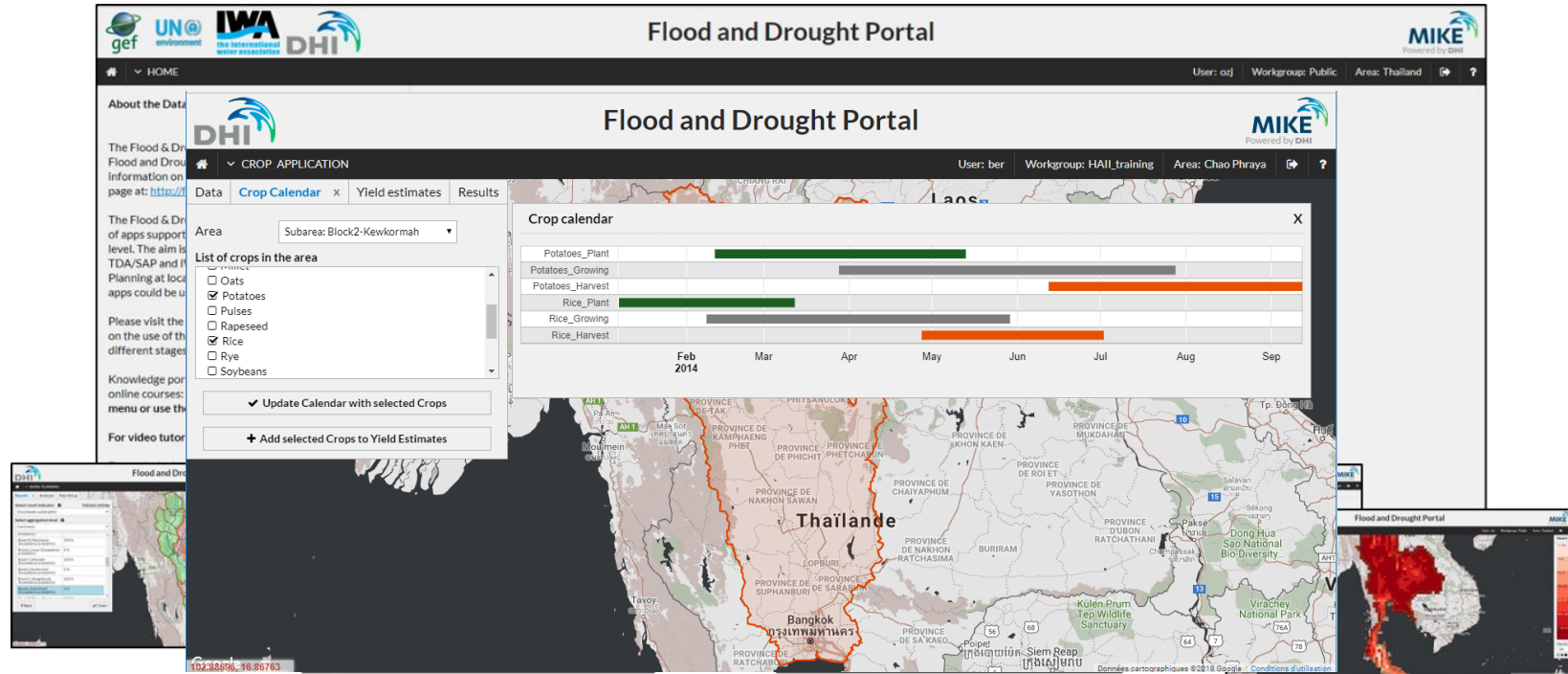


www.flooddroughtmonitor.com
Flood and Drought Management Tools Project

Project methodology – web based portal



Project methodology – web based portal



www.flooddroughtmonitor.com
Flood and Drought Management Tools Project

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

Overview and switch between issues

Create new issue for analysis

Clone current issue

Edit current issue

Delete current issue

User information

Workgroup management

The screenshot shows the 'ISSUE ANALYSIS' tool interface. At the top, there's a navigation bar with a home icon, a dropdown menu, and user/workgroup information (User: ozj, Workgroup: Public, Area: Volta). Below this is a toolbar with buttons for Overview, New, Clone, Edit, and Delete. The main content area displays details for a selected issue: 'Water quantity and seasonal flows', created by 'admin' on '2017-03-21 09:10:29'. The description is 'Relates to the availability of water across the basin for socio-economic and cultural uses.' Below this is the 'Issue analysis' section, which includes a legend for impact levels (No importance to Major negative impact) and a table of analysis results.

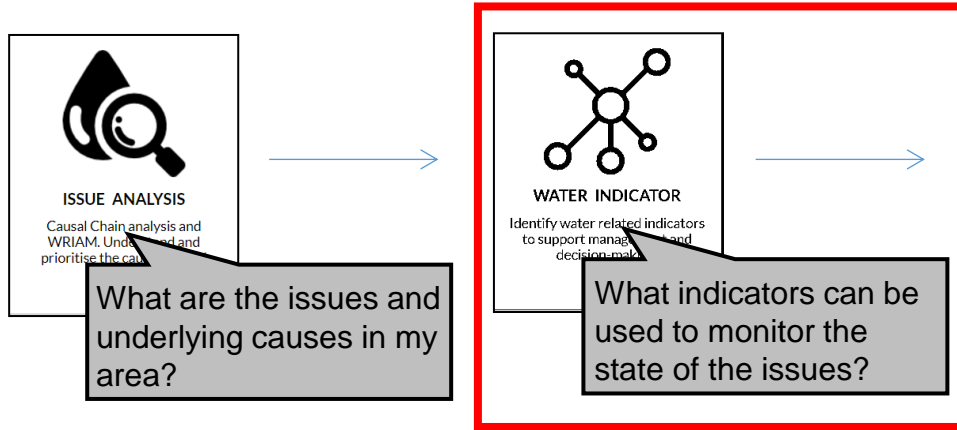
Immediate impact	Immediate cause	Underlying cause	Root cause	Extent	Seriousness	Permanence	Irreversibility	Cumulative character	Level of documentation	Score	Assessment	
Loss of biodiversity	Creation of dams and impoundments	Unsustainable practices	Migration from rural to urban - urban growth	Regional/national	Significant change	Permanent	Irreversible	Moderate	Some	30	Negative impact	

Objectives:

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

Stakeholder facilitation tool used in the early planning stages

Project methodology – Water Indicator



Project methodology – Water Indicators

Issue tab
Framework view

New indicator

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

UNEP-DHI PARTNERSHIP
Centre on Water and Environment

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.

Show all indicators

Indicator search

User: NishaGH Workgroup: Private Area: Malawi

View only approved indicators All Q Search

Metadata sheet

water scarcity water stress	ASI.pdf
water demand livestock watering	Agriculture water withdrawals_Aug2016pdf.pdf
water allocation	Area Irrigated by Groundwater_Aug2016.pdf

Project methodology – Water Indicators

Framework view Issue tab Indicator view

Indicator main group Indicator subgroup

Indicator

The screenshot shows the 'WATER INDICATOR' web application interface. At the top, there is a navigation bar with tabs for 'Framework', 'Issue', and 'Indicator'. Below the tabs are buttons for 'Open', 'New', and 'Clone'. The main content area displays a list of drought frameworks. The first framework, '1. Meteorological drought', is expanded, showing subgroups like 'Rainfall' and 'Temperature'. Each subgroup contains a list of specific indicators, such as 'Effective Drought Index' and 'Mean Temperature and Temperature Range'. Red arrows point from labels to various parts of the interface: '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' framework, 'Indicator subgroup' points to the 'Reservoirs' subgroup, and 'Indicator' points to a specific indicator within the 'Soil water content' subgroup.

Framework: * Drought framework User: admin Last change: 2017-10-23 08:20:09 Description: Indicator framework used for drought management

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

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

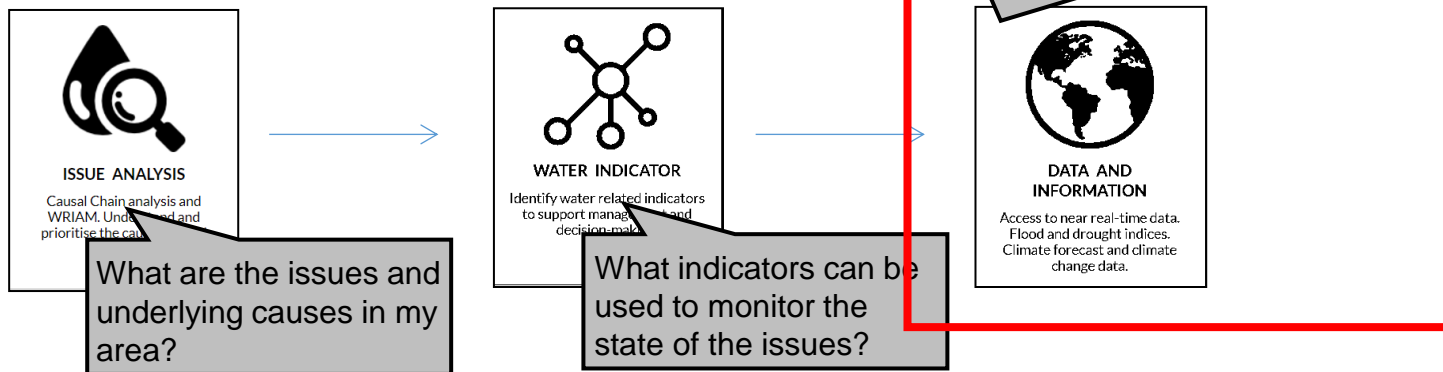
Significant negative impact, Score:42	Significant negative impact, Score:36	Moderate negative impact, Score:12
water quality impact (tap water)	water shortage	Low agriculture productivity
<input type="checkbox"/> Land Use Change	<input type="checkbox"/> Population with Access to Improved Drinking Water	<input type="checkbox"/> Agricultural Stress Index
<input type="checkbox"/> Population with Access to Improved Drinking Water	lack of rainfall	lack of good quality of water irrigation
salinity intrusion	<input type="checkbox"/> Standardized Precipitation Index (SPI)	<input type="checkbox"/> Social Water Stress Index

Objectives:

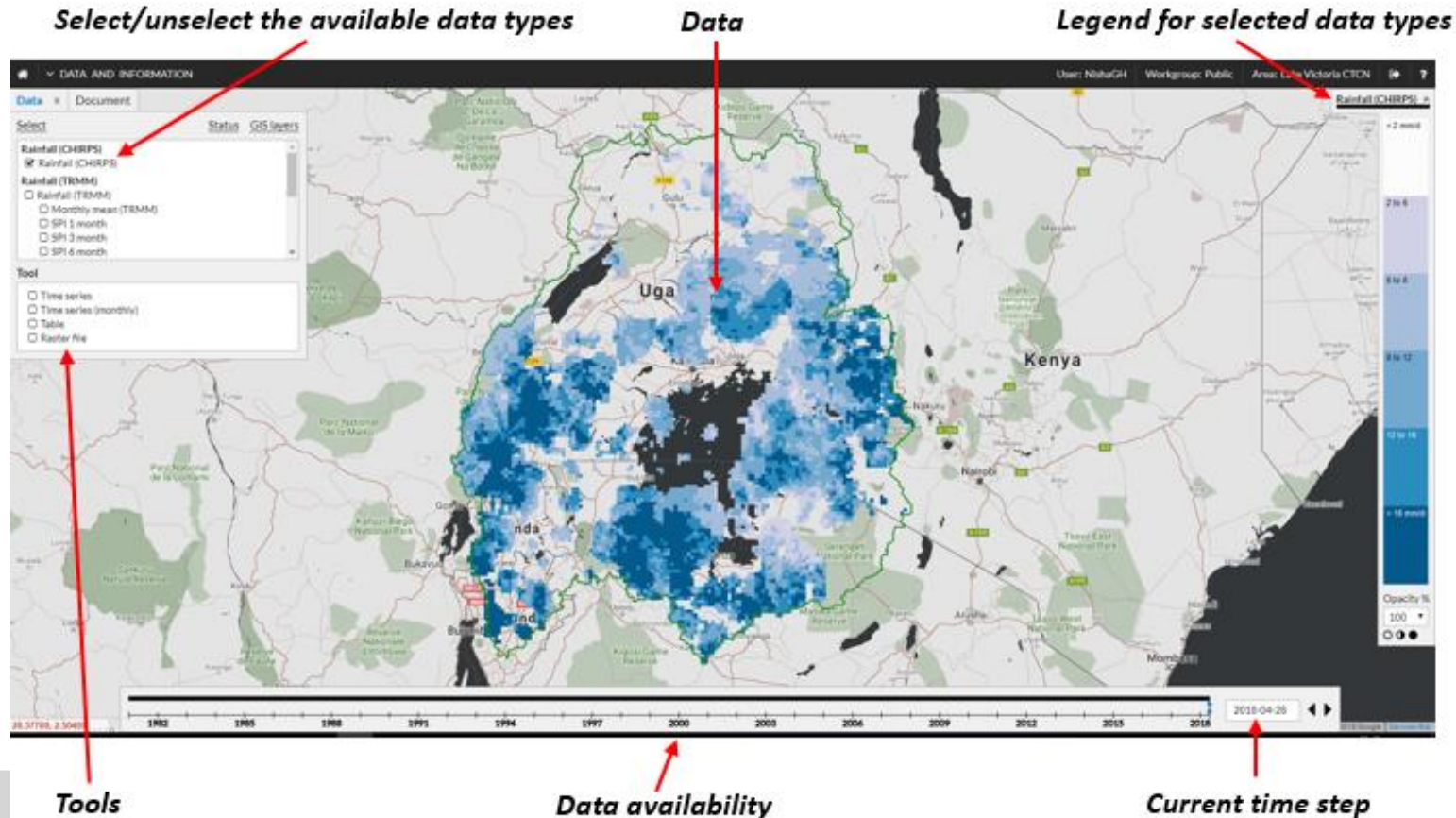
- Identify the relevant water indicators for the key environmental issues
- Facilitate stakeholder agreement on monitoring and evaluation indicators

Selection of few relevant water indicators for monitoring and evaluation

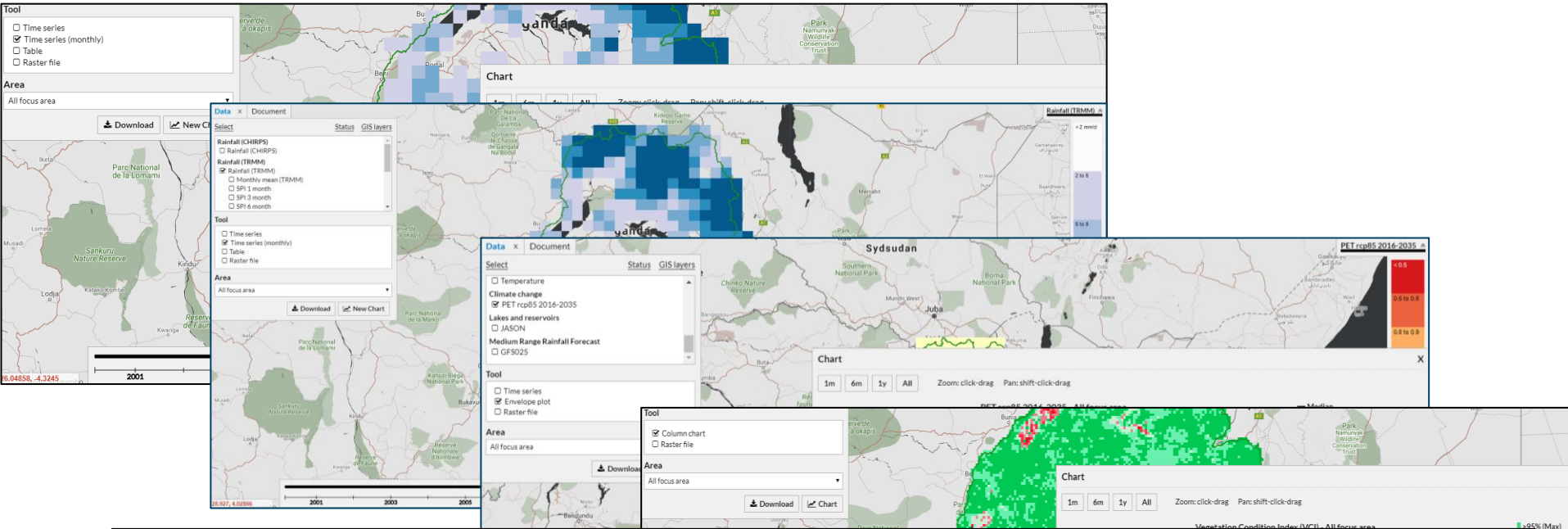
Project methodology – Data and Information



Project methodology – Data and Information



Project methodology – Data and Information

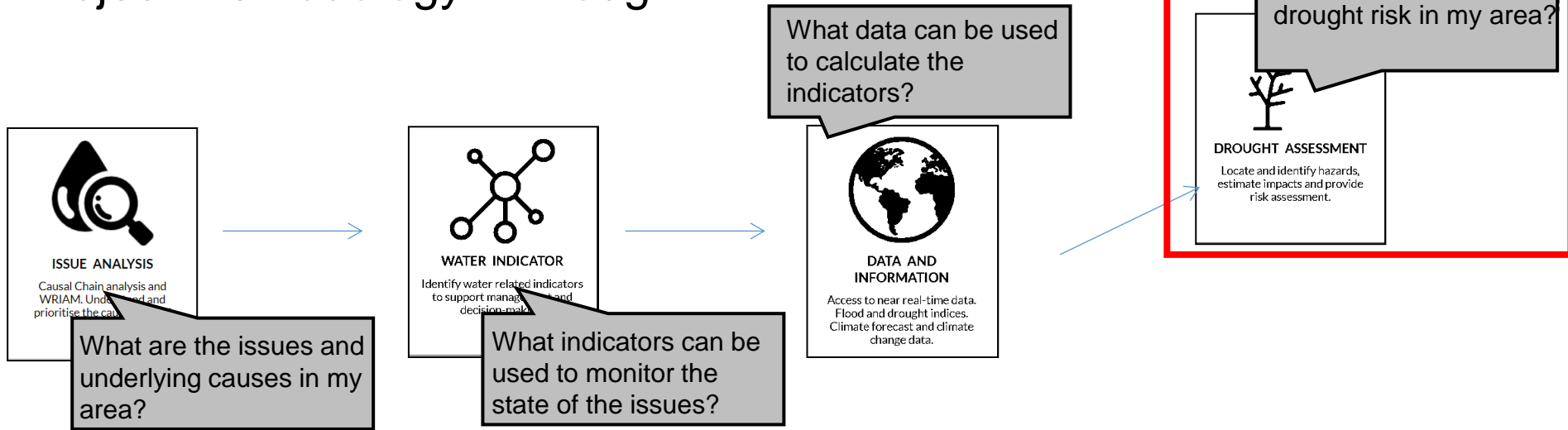


Objectives:

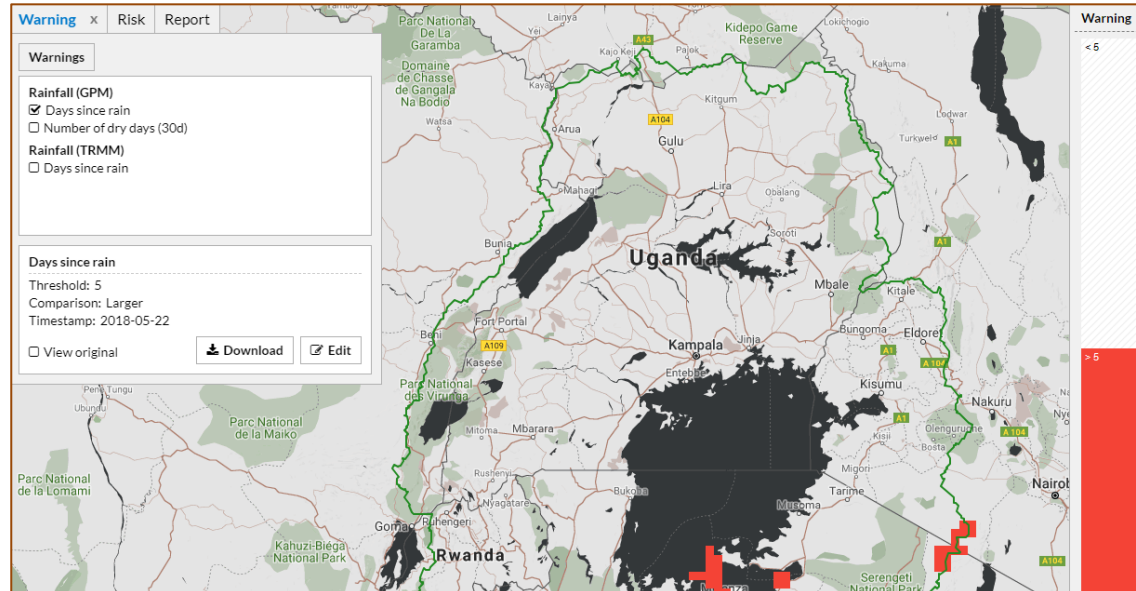
- Data availability – historic, near-real time, forecast and projected
- Free access to basic dataset for water related planning

Facilitate improved decision making

Project methodology – Drought



Project methodology – Drought

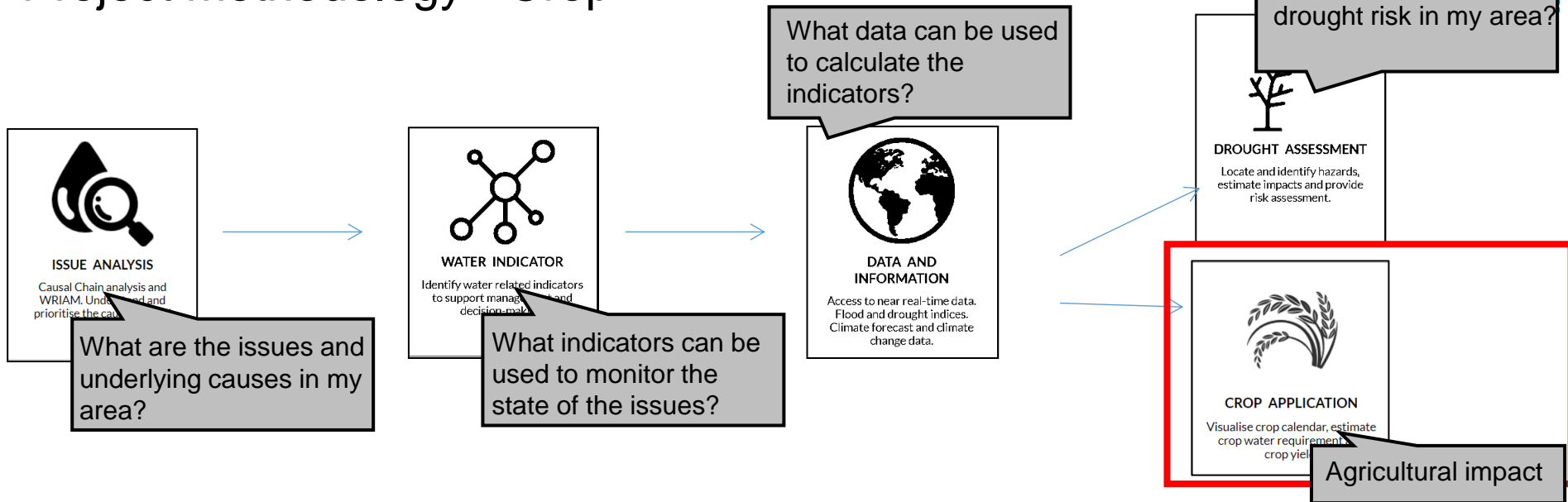


Objectives:

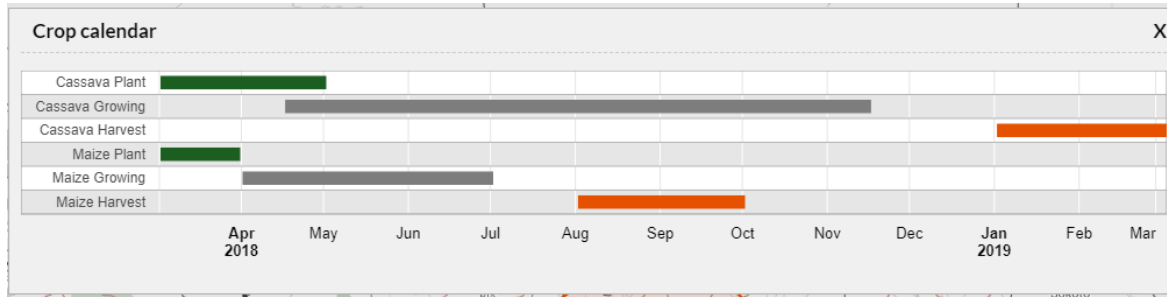
- Drought hazard identification and early warning
- Drought risk assessment

Drought assessment and early warning

Project methodology - Crop



Project methodology – Crop



HOME CROP APPLICATION

Data Crop Calendar Yield estimates x tt

Input Type ☒ User defined ☐ Ensemble

User defined Input table for Water requirements and Yield estimates [Clear table](#) [Add new](#)

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

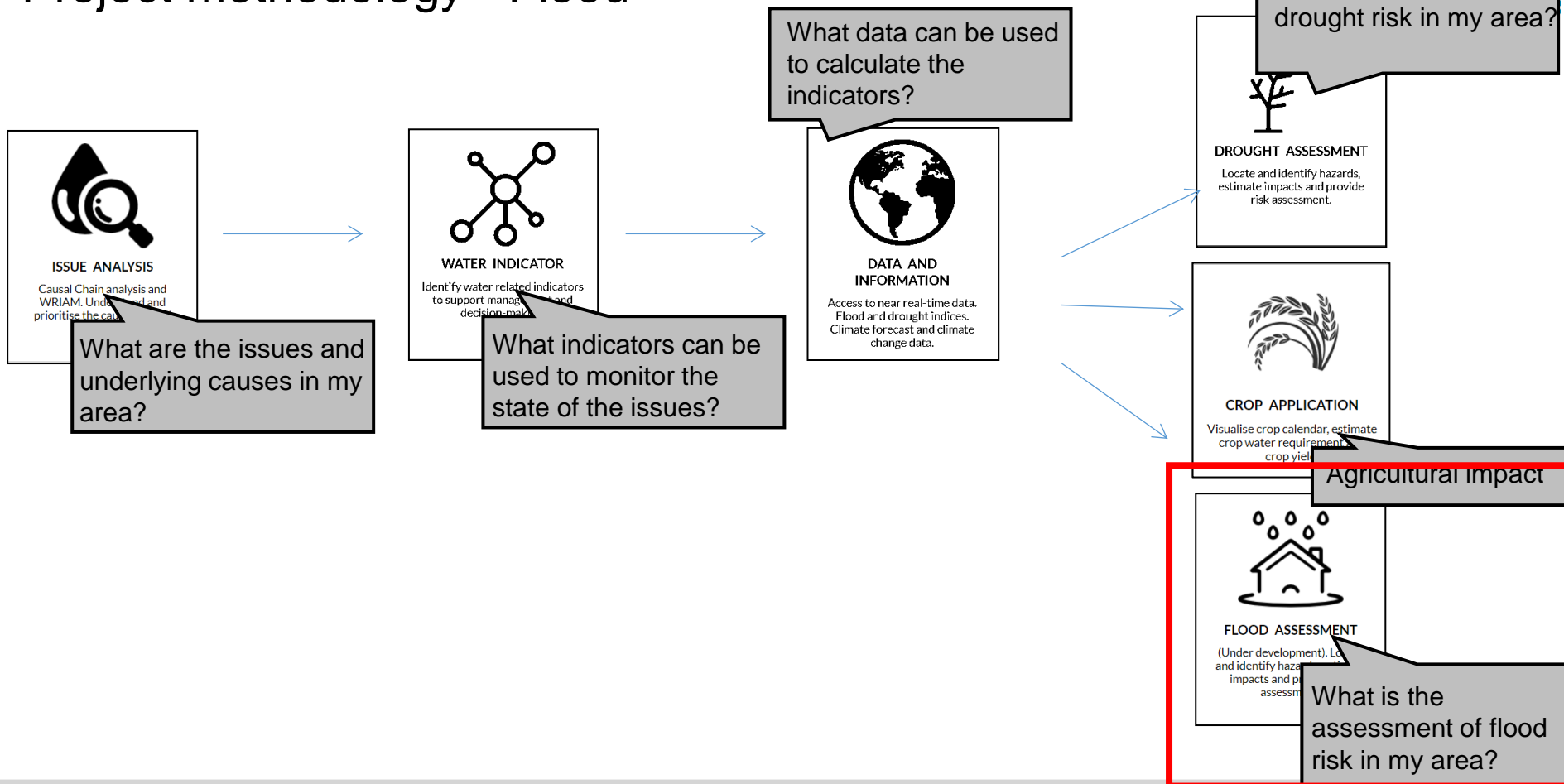
[Show results](#)

Objectives:

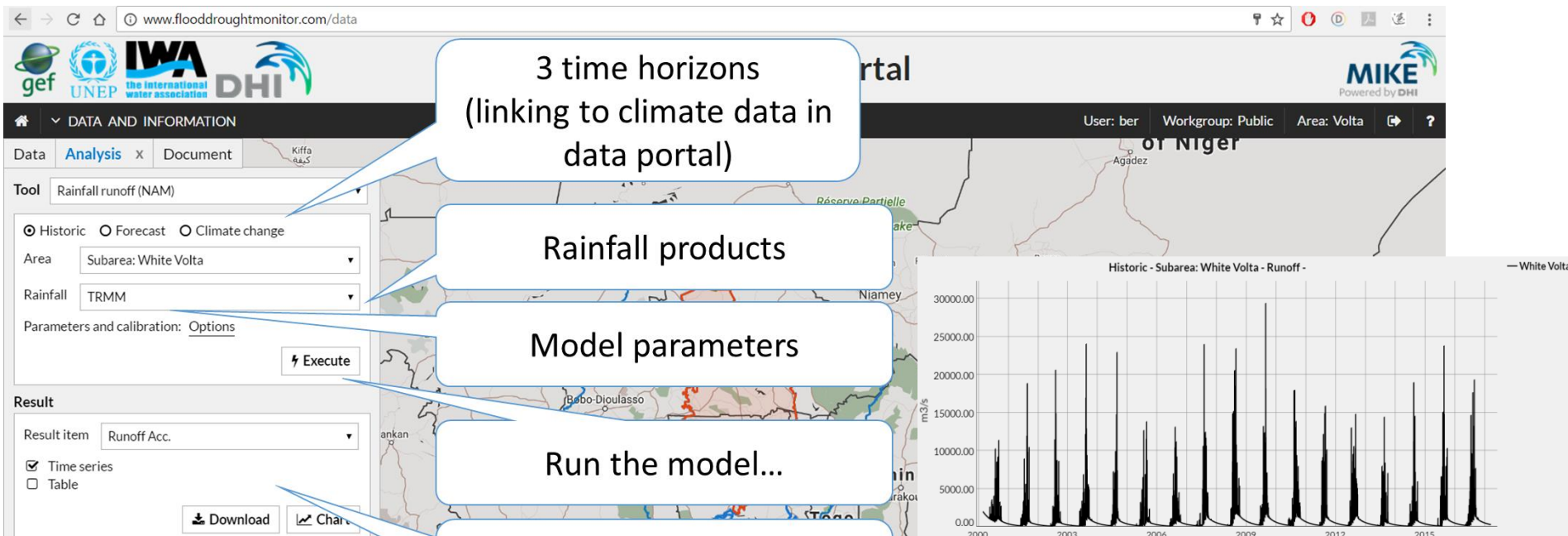
- Crop related information source
- Assessment of crop water requirement and crop yield (current and future)

Impact assessment on agricultural sector

Project methodology - Flood



Project methodology – Flood

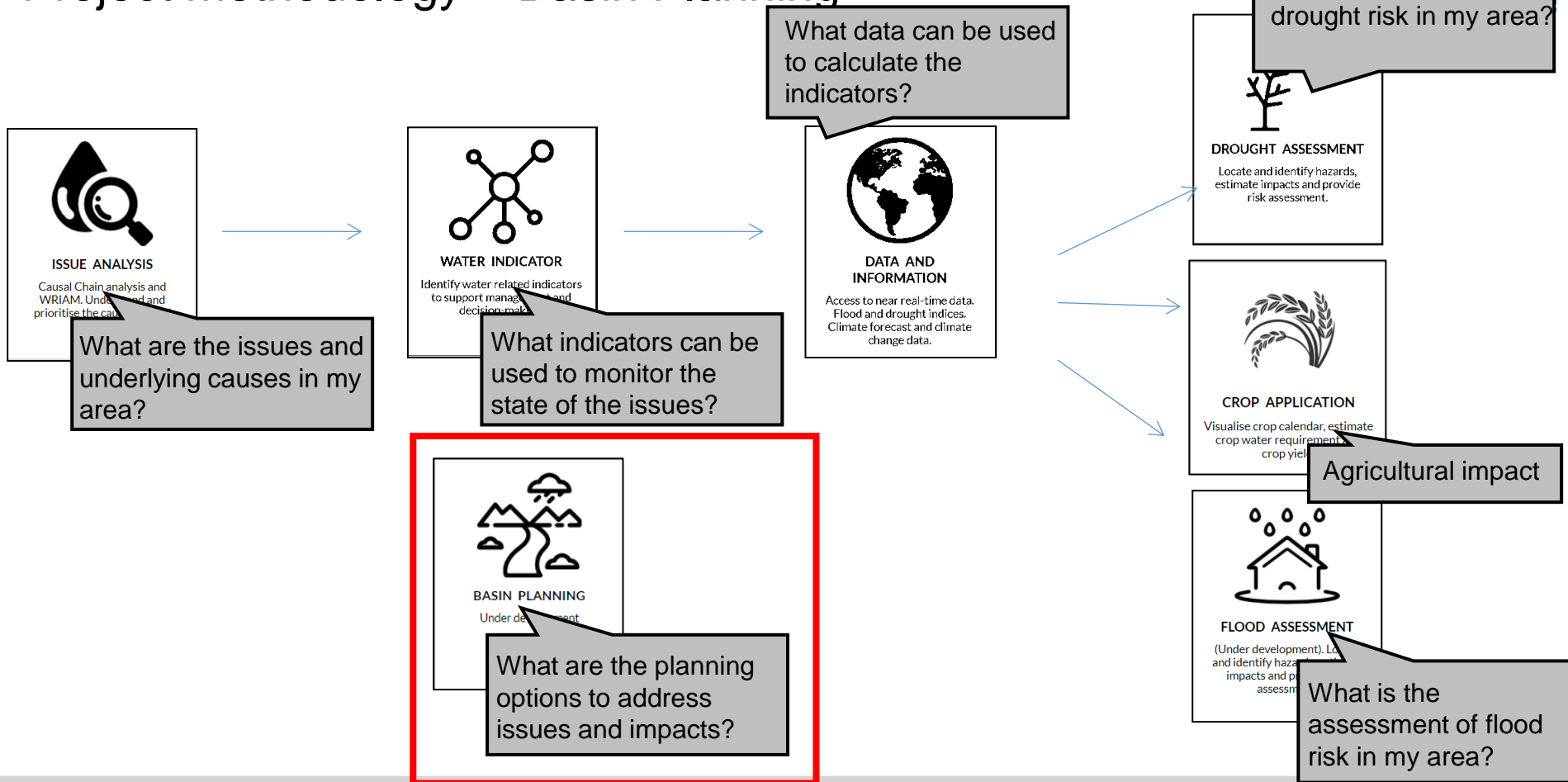


Objectives:

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

Flood information and assessment

Project methodology – Basin Planning

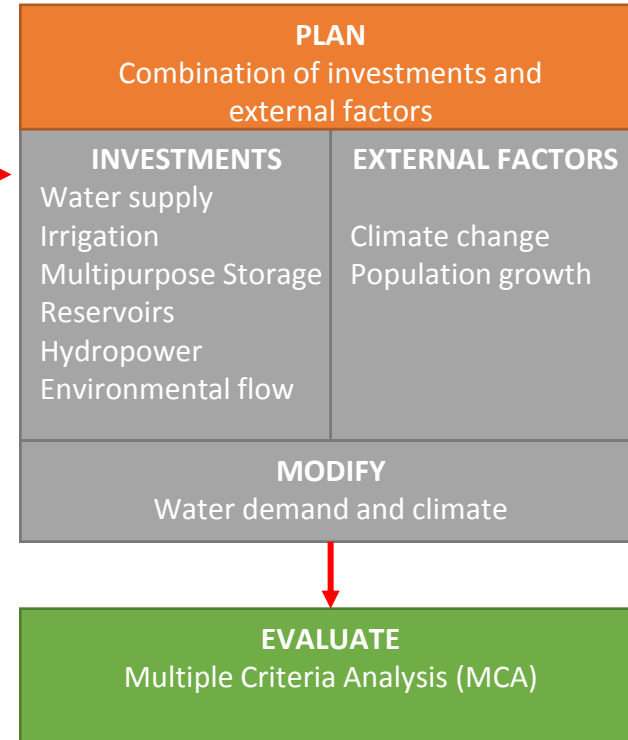
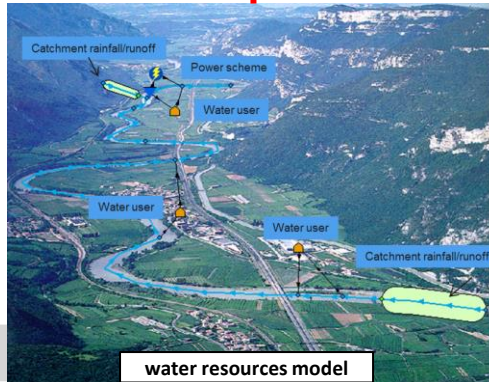


Project methodology – Basin Planning

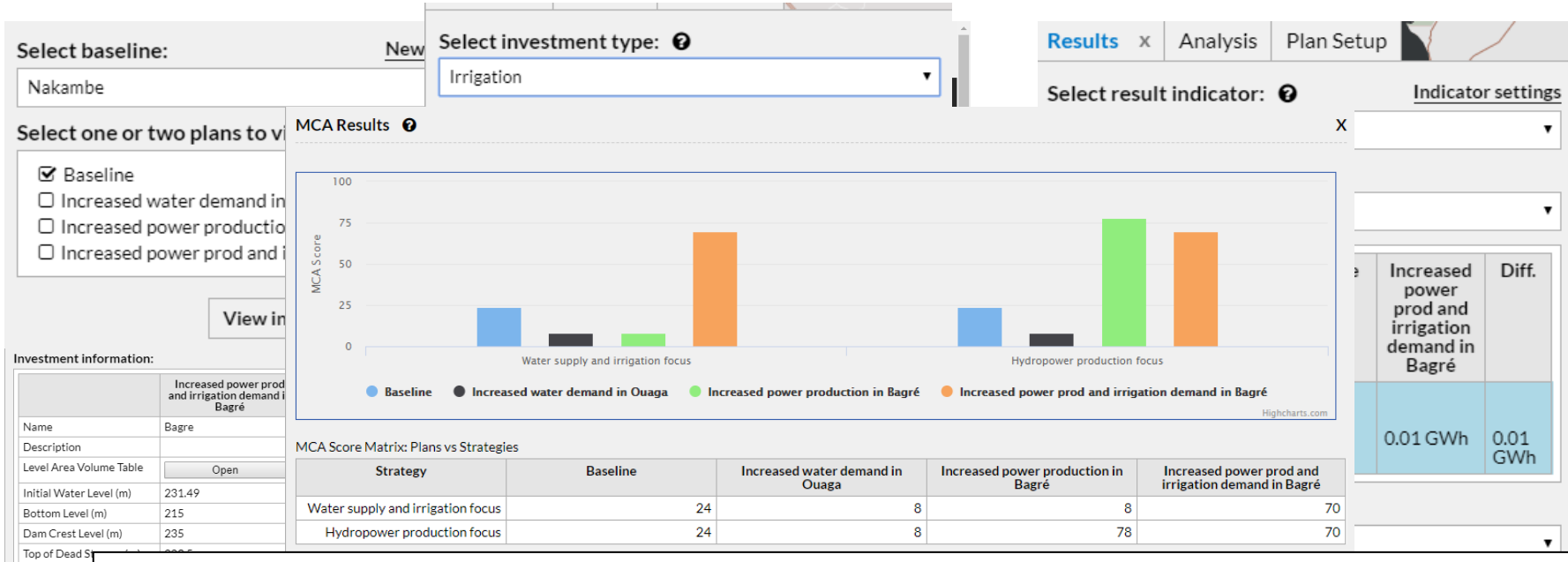


*A baseline plan is established by the tool.
New plans created will incur in alterations to the baseline model.*

*A user uploads the
baseline model to
the application*



Project methodology – Basin Planning

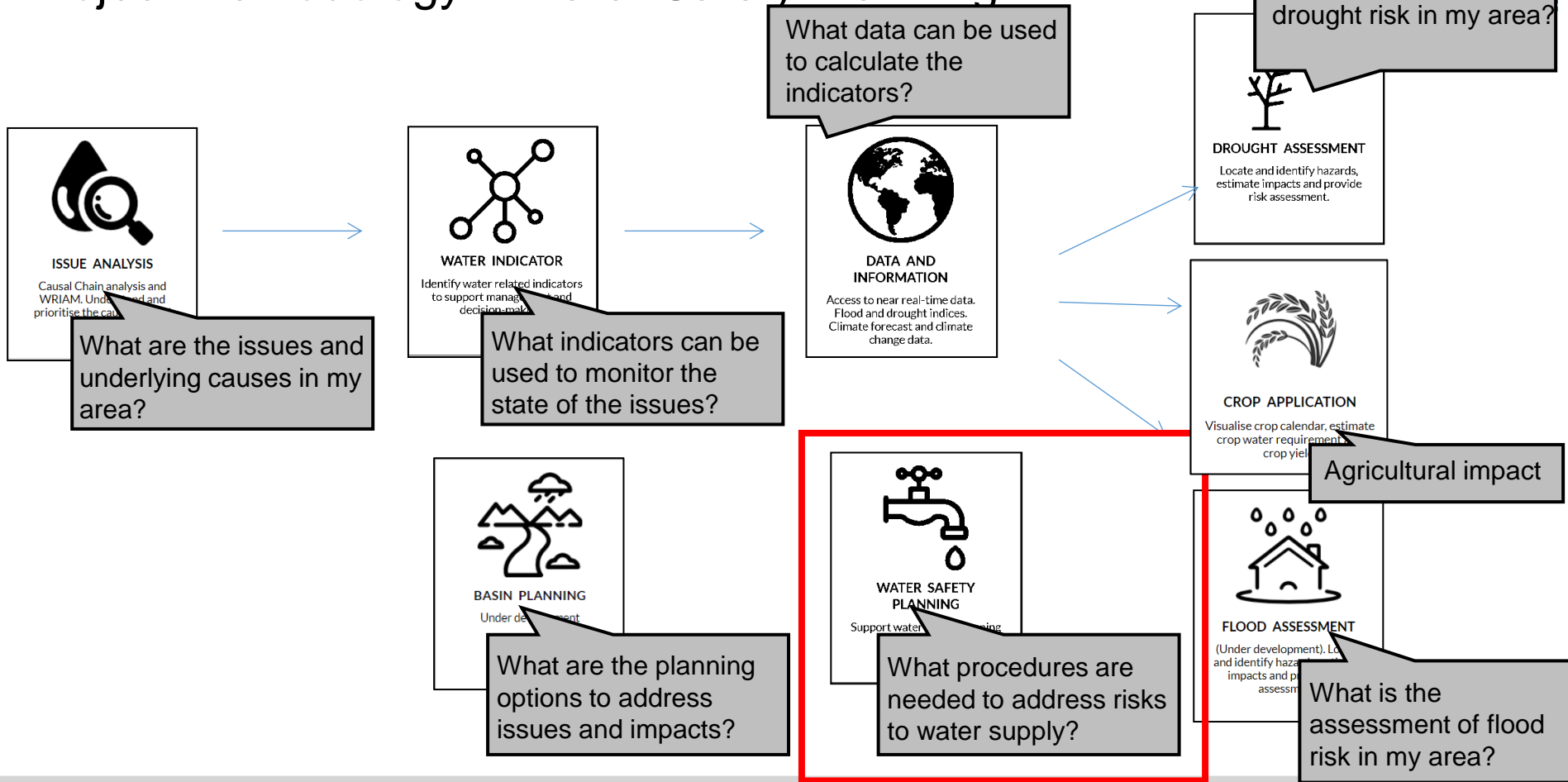


Objectives:

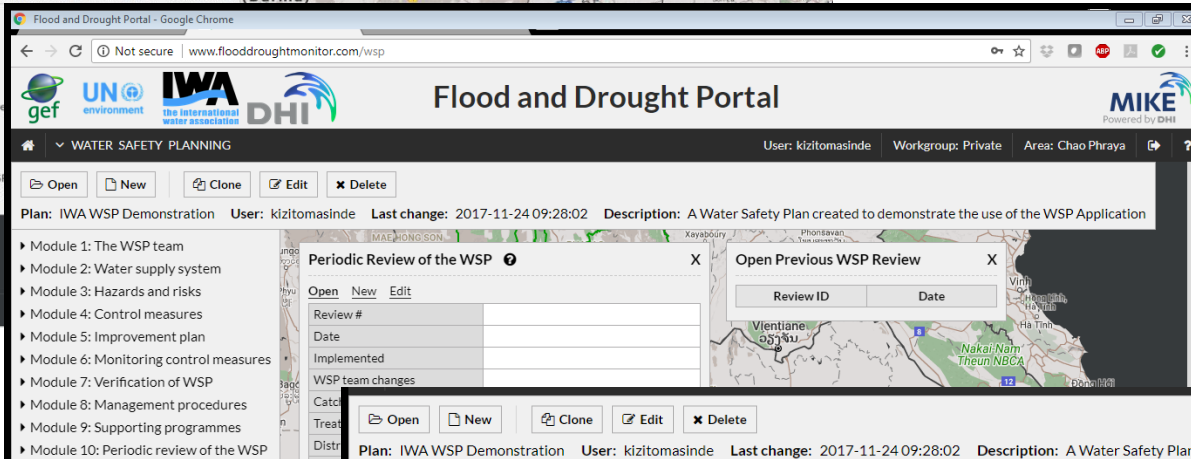
- Evaluate existing plans (basin, catchment, local...)
- Create new plans and evaluate

Facilitating basin planning for decision makers (non model experts)

Project methodology – Water Safety Planning



Project methodology – Water Safety Planning

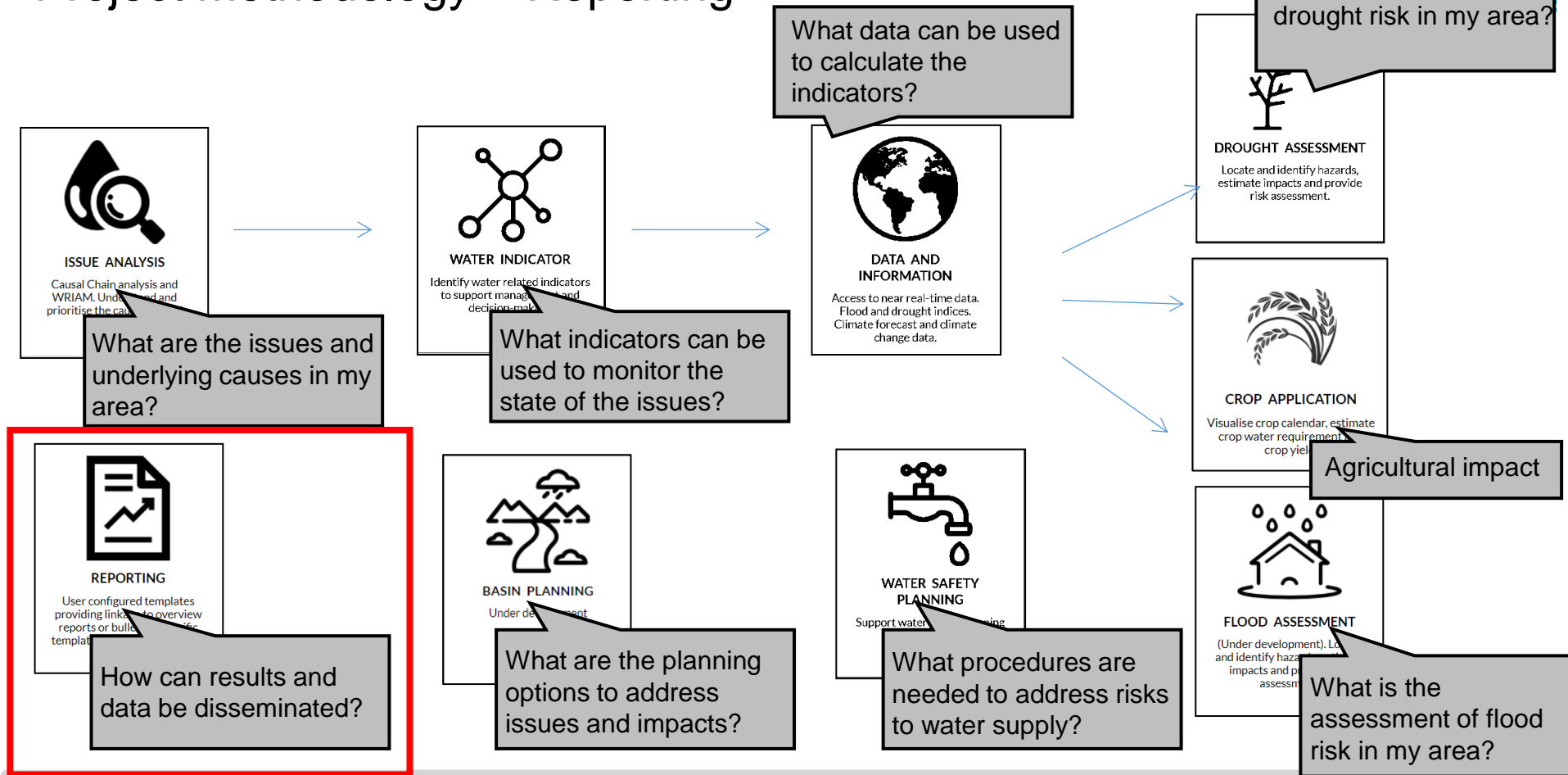


Objectives:

- Support the WSP modules
- Provide new approach for WSP

Risk assessment across a water utility scheme (catchment to tap)

Project methodology – Reporting



Project methodology – Reporting

Flood and Drought Portal

Report Upload

Open New Clone Edit Delete Preview Generate Download as Word Download as PDF Copy PDF link

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			
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

RAINFALL OVERVIEW BULLETIN

Background

This report addresses the rainfall conditions in the basin and aims at providing an overview based on the long-term statistics.

Basin overview

{Map: Basin overview}

Rainfall

Final report with input

RAINFALL OVERVIEW BULLETIN

Background

This report addresses the rainfall conditions in the basin and aims at providing an overview based on the long-term statistics.

Basin overview

Objectives:

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

Facilitate automated reports and bulletins

Status and next steps

- Development of all applications are finalized
 - Ongoing adjustments based on user feedback
 - Ongoing dissemination through webinars, workshops and training events
- Increased focus on dissemination and putting the project outcomes into context
 - Spin off projects and use of the web portal in a wide range of projects

www.flooddroughtmonitor.com

For more information, contact

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ozj@dhigroup.com

IWA, Katharine Cross
katharine.cross@iwahq.org

Or learn more at

fdmt.iwlearn.org

