



**ROYAL DANISH
CONSULATE GENERAL**
The Trade Council in Istanbul



**MARMARA
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Operational DSS – water planning and drought actions

New developments and experiences

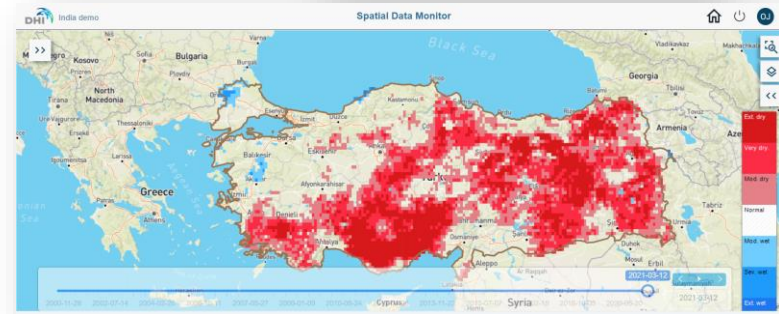
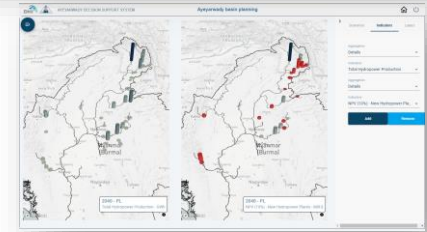
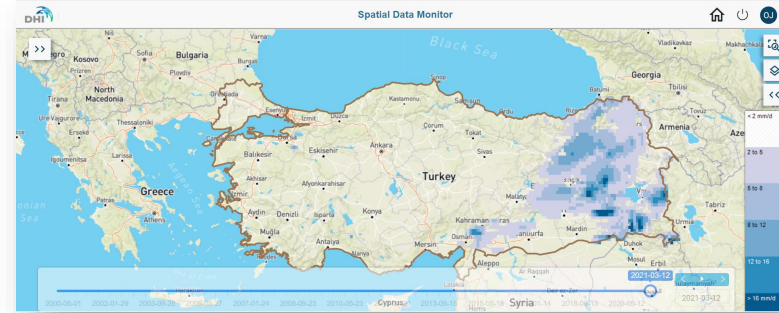


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Agenda

- DHI in short
- What is a Decision Support System (DSS)
- DSS Planning tool – web based DSS portal
- Drought management – operational tools



DHI in short



We're an independent, private and not-for-profit organisation



80% of our 1,050 employees hold an MSc or a PhD degree



Our knowledge represents over 50 years of dedicated research
20% of our resources are allocated to R&D



Network of offices in more than 30 countries



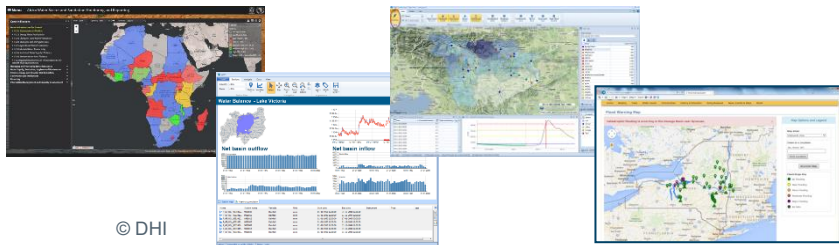
DHI - Global experience and local knowledge

Global experience

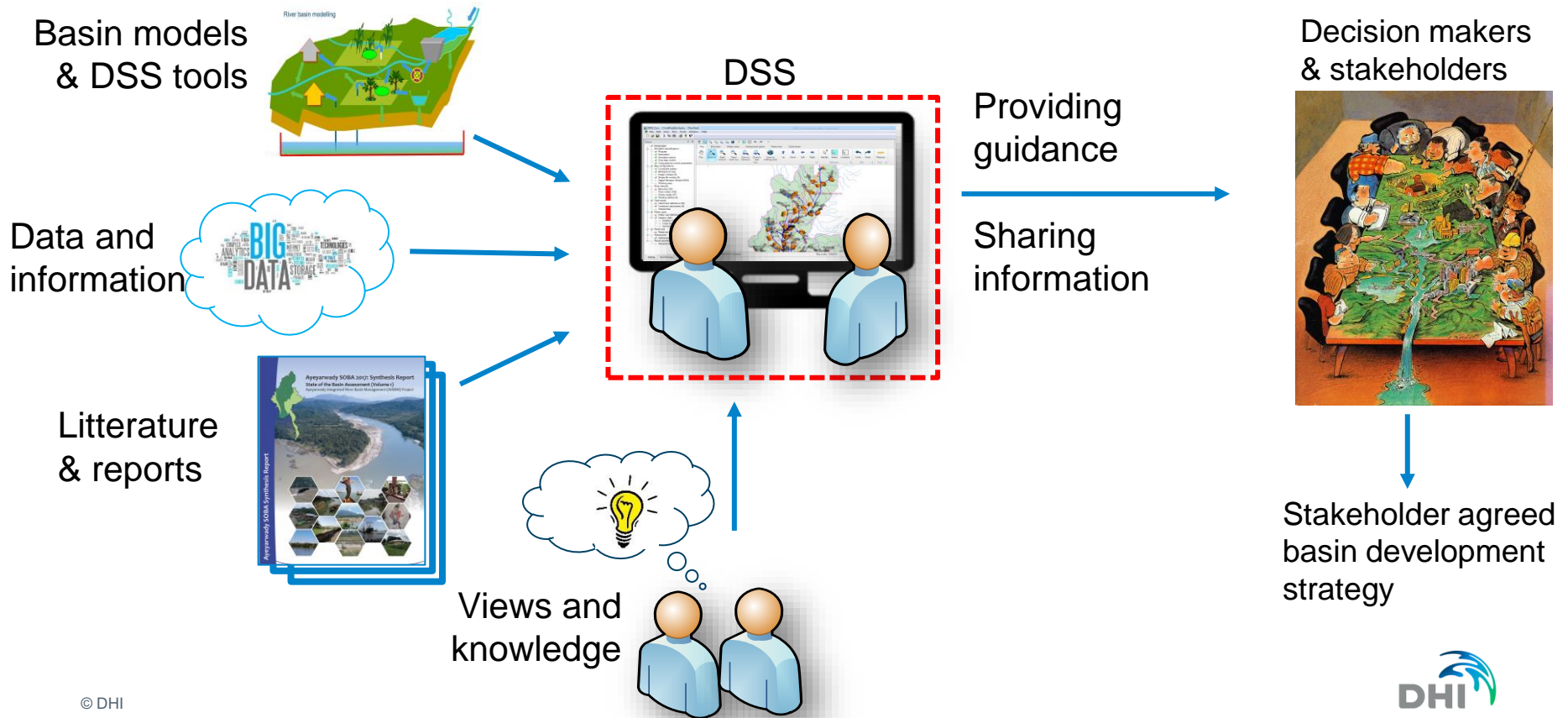
- River Basin Planning, Operational DSS for Flood & Flow Forecasting, Water Resources Information System...
- Combination of IT and domain expertise assisting decision makers with multi-level decision support
- Generic DSS IT framework with streamlined workflow processes and increased use of web-/cloud-based solutions



World Bank, UNEP and ADB projects within the last 10 years



What is a Decision Support System (DSS)?



DSS in integrated river basin planning



More food
production



More
hydropower



Better
navigation



Good
environment



Reduced
flood risk



Economic
growth

-
- Investigate impacts of cross-sectoral development
 - Help assess economic, social, and environmental consequences
 - Take into account climate change, population growth, economic development, technological innovations etc.
 - Facilitate information sharing and participation

DSS Planning tool – web based DSS portal



AYEYARWADY DECISION SUPPORT SYSTEM

By DHI WATER Tools for Hydro-Informatics Centre, Myanmar

Available application(s)



Ayeyarwady Dataviewer

Spatial and temporal data on water resources in the Ayeyarwady River Basin



Global data sources

Earth Observation data, climate forecasts etc. for Myanmar



Documents

Reports, papers and other documents related to the Ayeyarwady River Basin



Ayeyarwady basin planning

Comparison and analysis of river basin development scenarios, combining existing and



Ayeyarwady basin planning - Admin

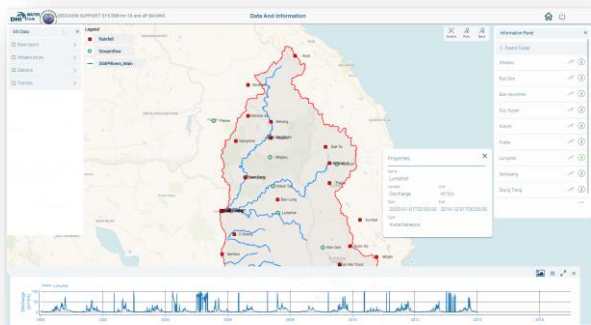
Comparison and analysis of river basin development scenarios, combining existing and



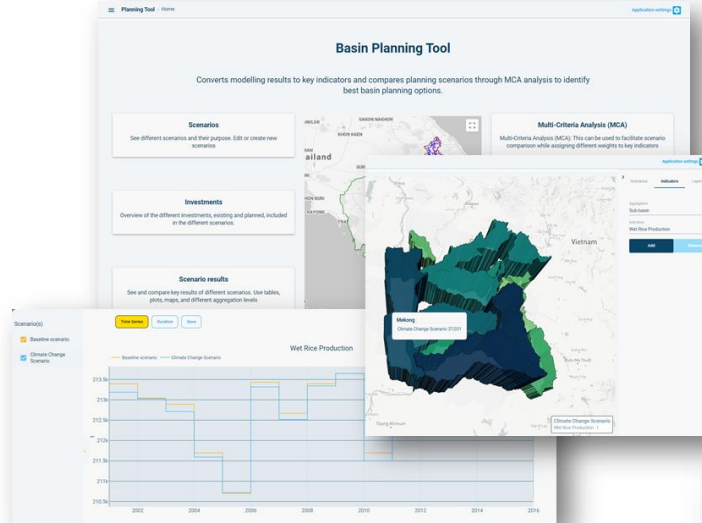
Ayeyarwady Basin Planning - Climate Change

Comparison and analysis of river basin development scenarios, combining existing and

Information management



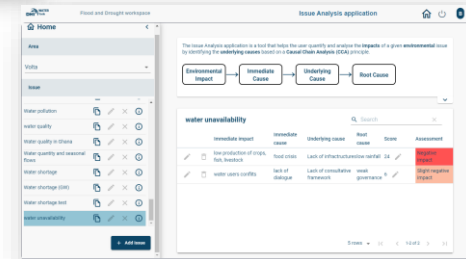
Water resources planning



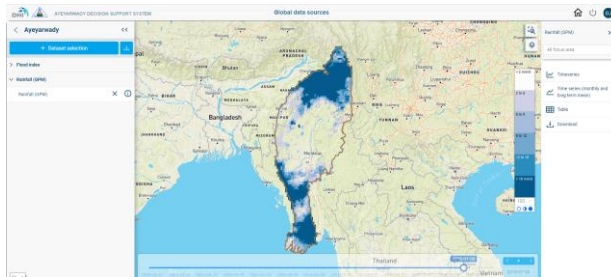
Indicators



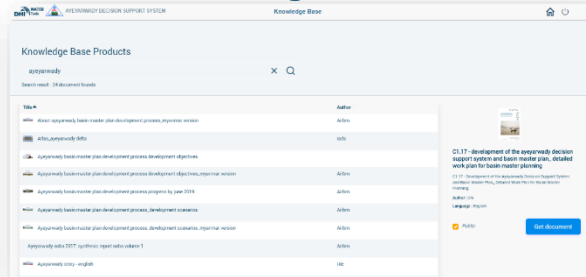
Issues



Global data access



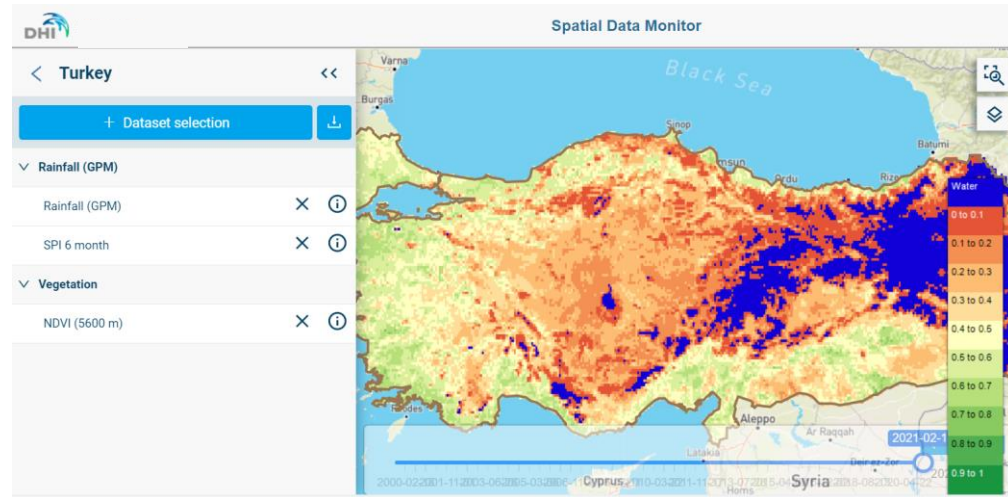
Knowledge base



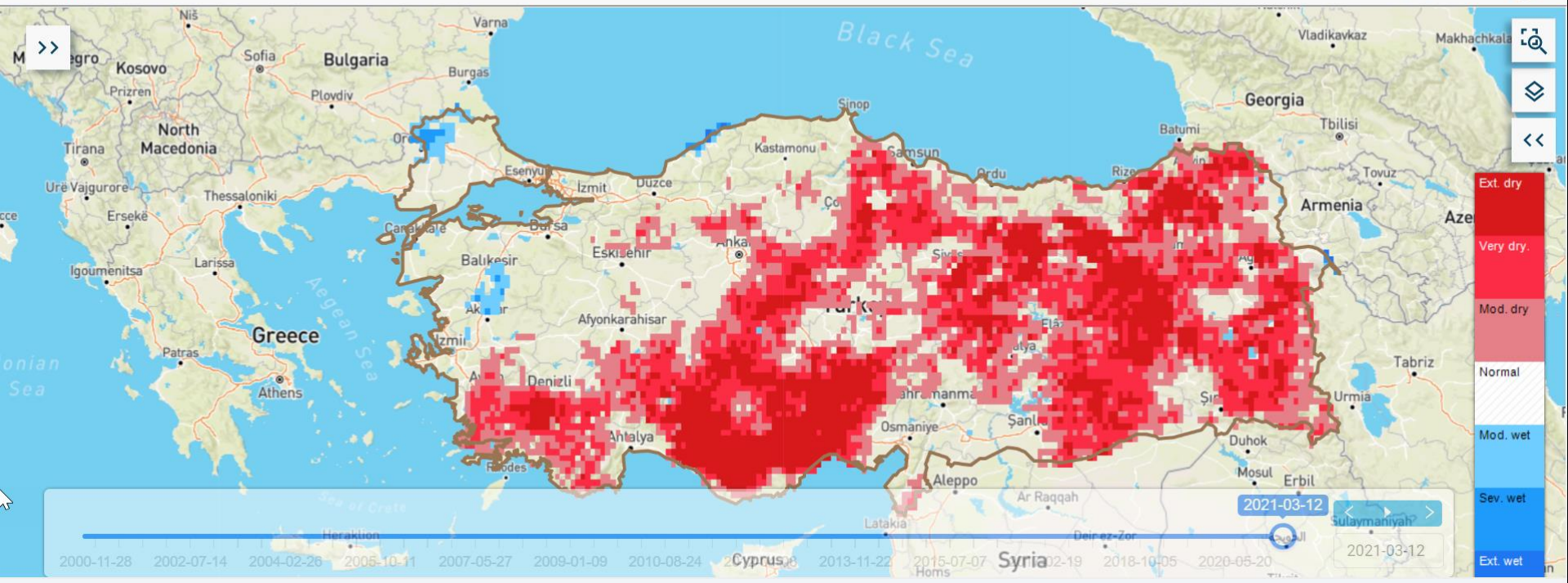
Data available in near-real time for Turkey

Visualisation and dissemination of hydrological, climate and socio-economic datasets

- Access to **near real-time datasets** (rainfall, temperature, soil moisture, vegetation and forecast data)
- **Visualisation** on maps and as time series and tables for **analysis**
- **Download** functionality







DSS for basin management

AYEYARWADY DECISION SUPPORT SYSTEM Ayeyarwady basin planning

Ayeyarwady Basin Planning

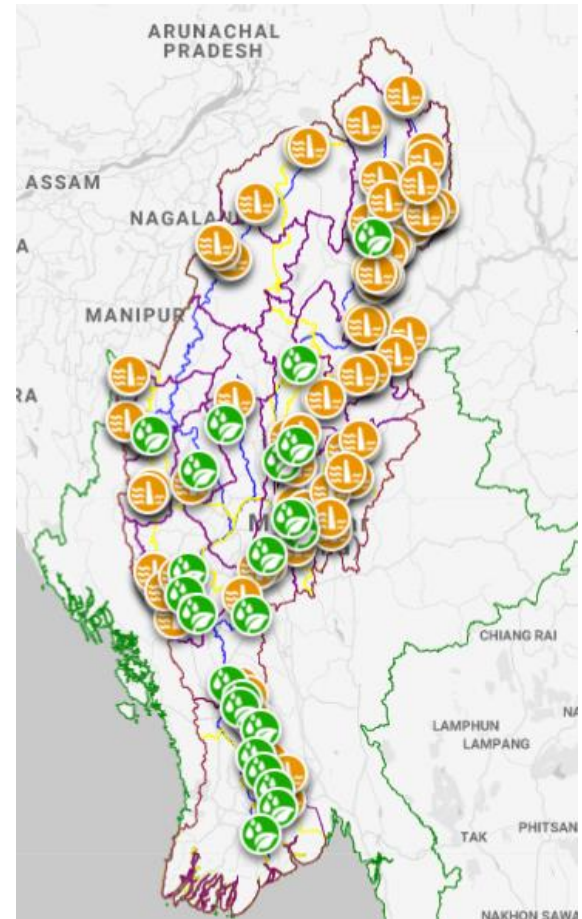
Comparison and analysis of river basin development scenarios, combining existing and proposed reservoirs, hydropower plants, irrigation schemes etc. This is done through scenario result presentation and Multi-Criteria Decision Analysis to identify the best basin planning options.

- Scenarios**
See different scenarios and their purpose. Edit or create new scenarios
- Investments**
Overview of the different investments, existing and planned, included in the different scenarios.
- Scenario Results**
See and compare key results of different scenarios. Use tables, plots, and different aggregation levels
- Scenario Results Map**
Geographical comparison of different indicators for the same scenarios or the same indicator for different scenarios
- Multi-Criteria Decision Analysis (MCDA)**
Apply MCDA to compare and rank scenarios using weighted indicators

Map showing the Ayeyarwady Basin and surrounding regions: SIKKIM Bhutan, ARUNACHAL PRADESH, ASSAM, MEGHALAYA, NAGALAND, MANIPUR, Bangladesh, TRIPURA, MIZORAM, Myanmar (Burma), YUNNAN, Laos, Thailand.

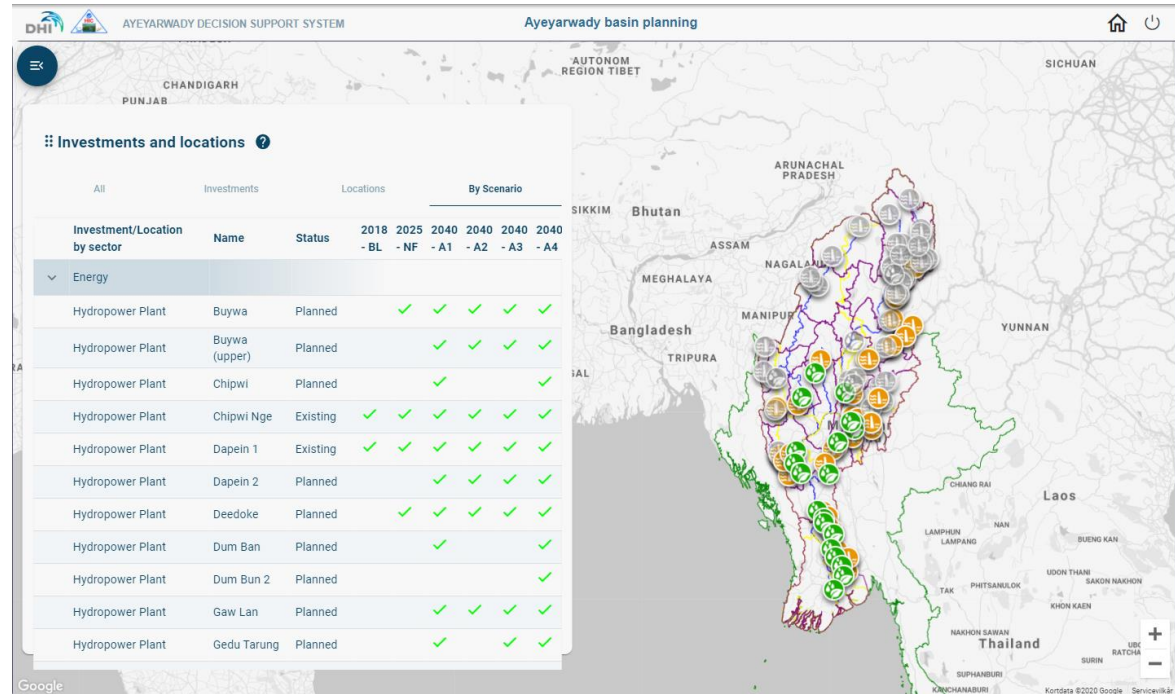
DSS for basin management

- **Overview of all investments** included in one or more scenarios
- **Tables of key and non-key indicators** in scenarios for each investment, sub-area, or the whole river basin
- **Result maps** showing the geographical distribution of **benefits and impacts**
- **Multi-criteria decision analysis** enabling further scenario comparison and weighting of indicators

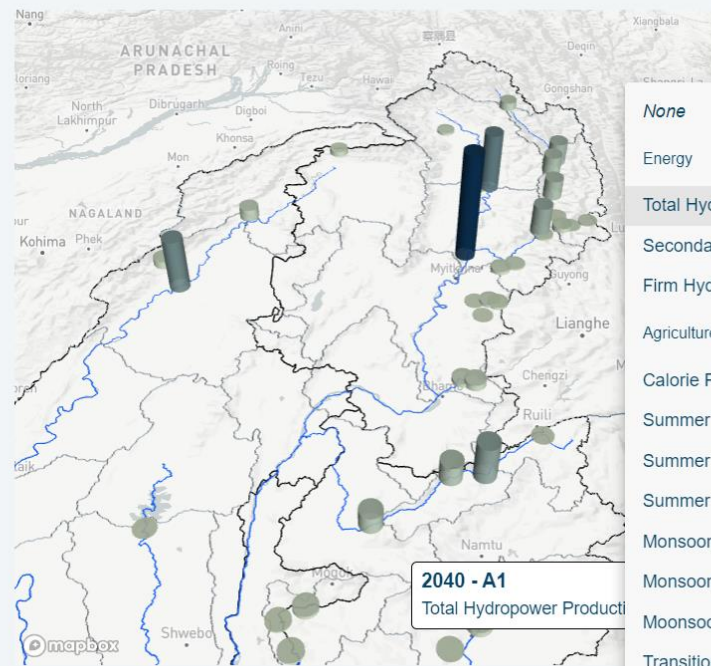
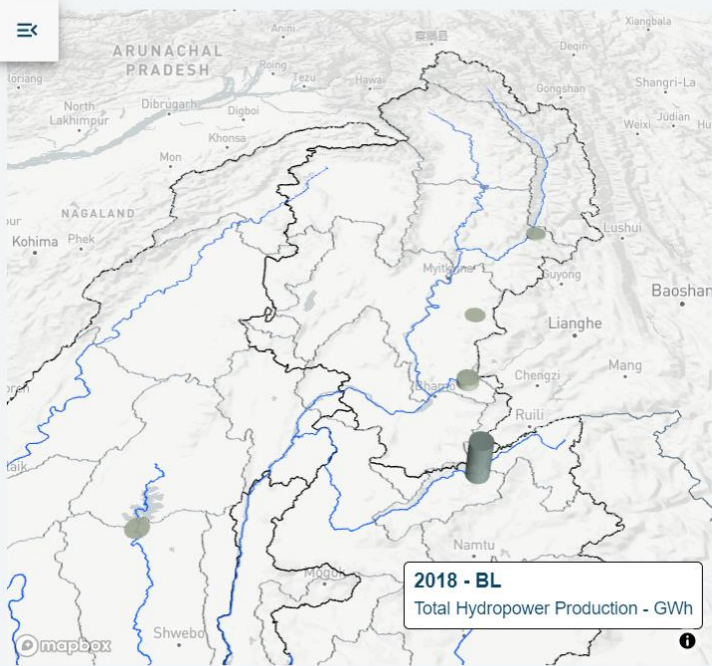


DSS for basin management

- Overview of power plants, irrigation schemes and other investments in the scenarios
- Hoover over a scenario to grey-out investments not included in this



DSS for basin management





- None
- Energy
- Total Hydropower Production
- Secondary Hydropower Production
- Firm Hydropower Production
- Agriculture
- Calorie Production
- Summer Paddy Production
- Summer Sesame Production
- Summer Vegetable (Tomato) Production
- Monsoon Cotton Production
- Monsoon Paddy Production
- Monsoon Sesame Production
- Transitional Paddy Production

DSS for basin management

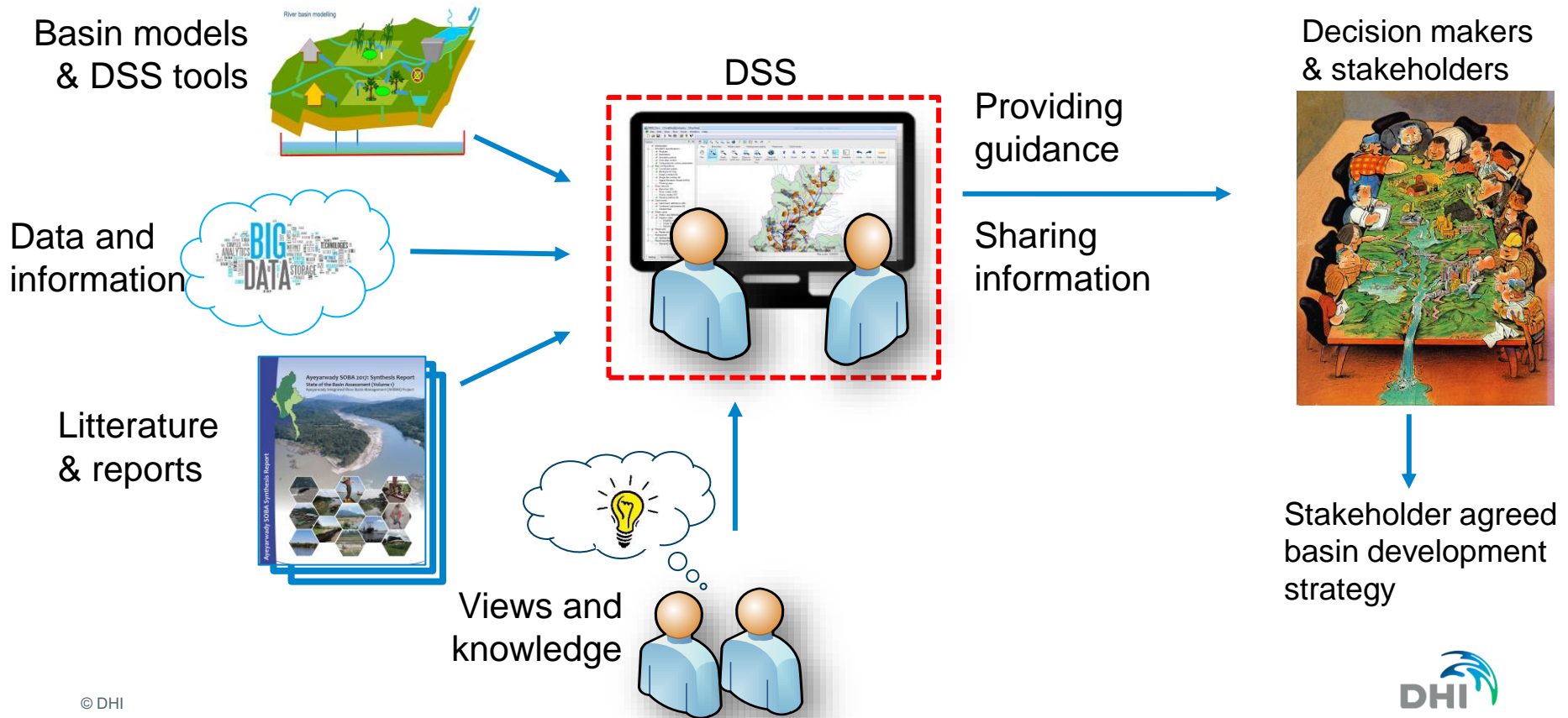
- Compare scenario indicators in bar-charts or trade-off plots
- Assign weights to indicators to determine ranking of scenarios

AYEYARWADY DECISION SUPPORT SYSTEM Ayeyarwady basin planning

Number	Title	Description	Organization	Date Created	Actions
1	Power - environment - social trade off	Sept 2020	DHI	Mon Sep 07 2020	 

		ACTUAL VALUES	NORMALIZED VALUES	WEIGHTED VALUES	RANKING							
Sector	Indicator	Aggregation	Investment / Location	Unit	Weight	Min	Max	2025 - NF	2040 - A2	2040 - A3	2040 - A4	2040 - PL
	TOTAL				100.00			5	3	1	2	4
Energy	Total Hydropower Production	Summary		GWh	30.00	0	0	5	4	3	1	2
Navigation	Navigation Days per Year (500 ton)	Details	Bhamo	d	10.00	0	0	4	4	2	3	1
Environment	Dendritic Connectivity Index (DCI)	Summary		%	12.50	0	0	1	2	5	4	3
Environment	Saline Intrusion Front	Details	Delta	km	0	0	0	1	1	1	1	1
Environment	Habitat Impact	Details	Myitstone	%	12.50	0	0	1	2	4	3	5
Environment	Reduced CO2 Emission	Summary		Mt	0	0	0	1	1	1	1	1
Economy	NPV (10%) - New Hydropower Plants	Summary		Mill-\$	10.00	0	0	5	2	1	3	4
Social Welfare	Number of People Resettled	Summary		-	12.50	0	0	1	3	5	3	2
Social Welfare	Sites with High to Very High Conflict Sensitivity	Summary		-	12.50	0	0	5	3	1	2	4

What is a Decision Support System (DSS)?



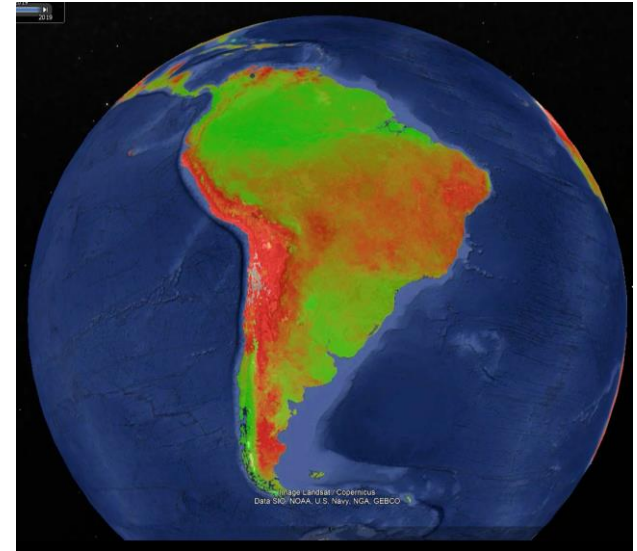
Drought management – operational tools

Drought **monitoring**

Drought **early warning**

Drought **planning**

Tools cover drought issues on spatial scale
from local to global



Drought Index based on DHI's Global Hydrological Model

is based on the water availability in the root zone



The drought index simulates the **actual** and **future** state of the drought conditions

Example of simulated drought index

where values can be computed in **hindcast** and in **forecast** period

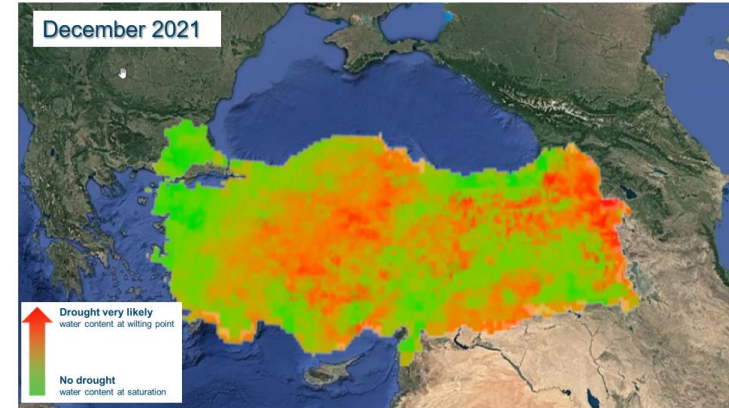
See an example in the following video...

December 2021



Drought management – operational tools

- Online **Drought Monitoring** system with near real-time update
- Drought **Early Warning** with automated warnings based on seasonal forecast
- Linkage to hydrological models for **impact estimations**
- Publishing on dedicated **web portals** or embedding the solution into existing website

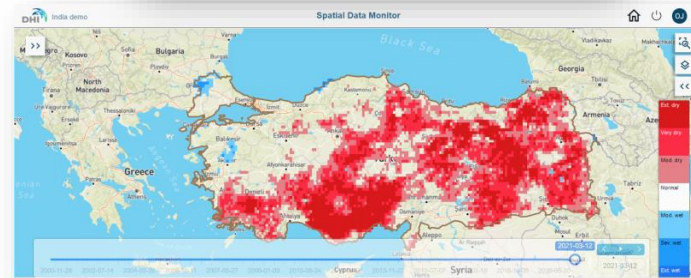
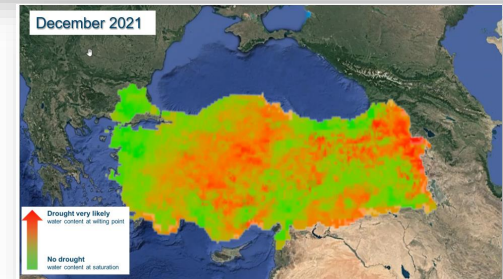
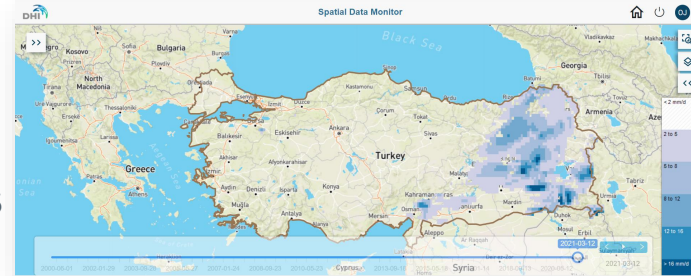


and for almost **any area on the globe**

Summary

- Integrated basin management looks at impacts across sectors allowing for many different information sources and tools to be used
- Web based applications allows for dissemination to stakeholders across sectors
- Mature and well proven tools are essential for successful basin management

Please contact us for more information!!



Thank you!

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