Integrated Water Resources Management for Water-use efficiency and water productivity FAO Programme in Lebanon

1st Multi-Stakeholders Consultation Meeting

Elie Choueiri/ Programme Associate

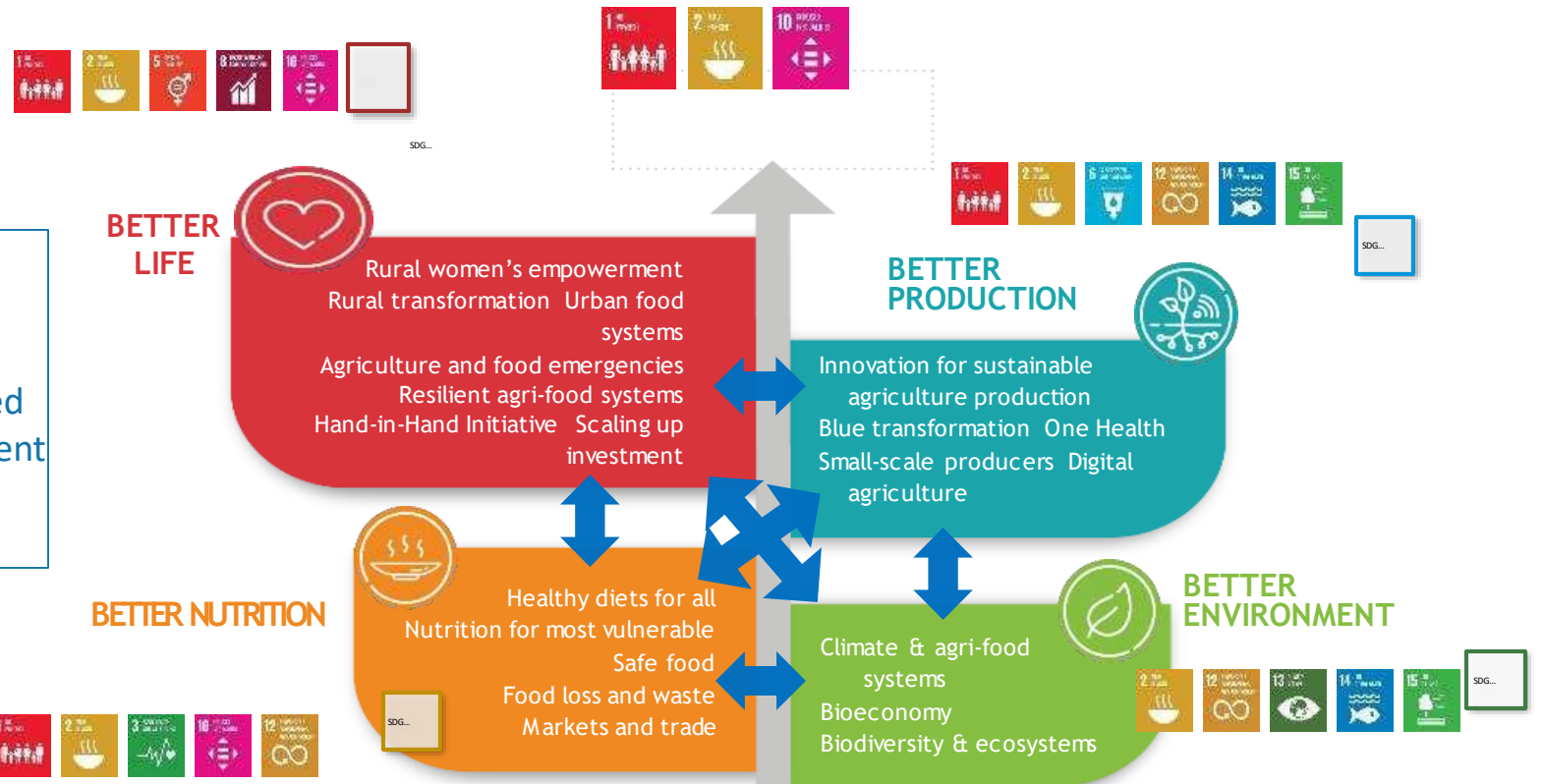
25 August 2022

THE FAO STRATEGIC FRAMEWORK 2022/2031

Supporting the Agenda 2030 through the transformation to MORE efficient, inclusive, resilient and sustainable agri-food systems for *better production, better nutrition, a better environment,* and *a better life,* leaving no one behind.

20 PPAs

Each **Priority Programmatic Area** describes an ***Outcome*** associated with the achievement of specific SDG Targets

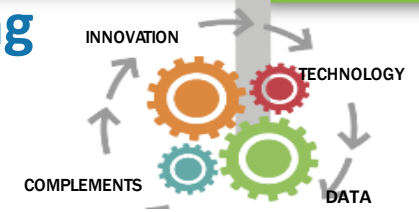


4 accelerators

3 cross-cutting issues

Gender

Youth



Inclusion

REGIONAL PRIORITIES

TRANSFORMING FOOD SYSTEMS TO DELIVER HEALTHY DIETS THROUGH INCLUSIVE AND EFFICIENT VALUE CHAINS AND SUSTAINABLE RESILIENT MANAGEMENT OF NATURAL RESOURCES

FOUR PRIORITIES TO TRANSFORM THE REGION'S FOOD SYSTEMS:

- → **Rural transformation and inclusive value chains:** enhancing productivity and income, focusing on youth employment and women empowerment to close rural/urban divide
- → **Food security and healthy diets for all:** focusing on trade, food safety and quality, and nutrition education
- → **Greening agriculture:** addressing water scarcity and ensuring environmental sustainability and climate action
- → **Building resilience** to multiple shocks, protracted crises and emergency situations along the humanitarian- development-peace nexus

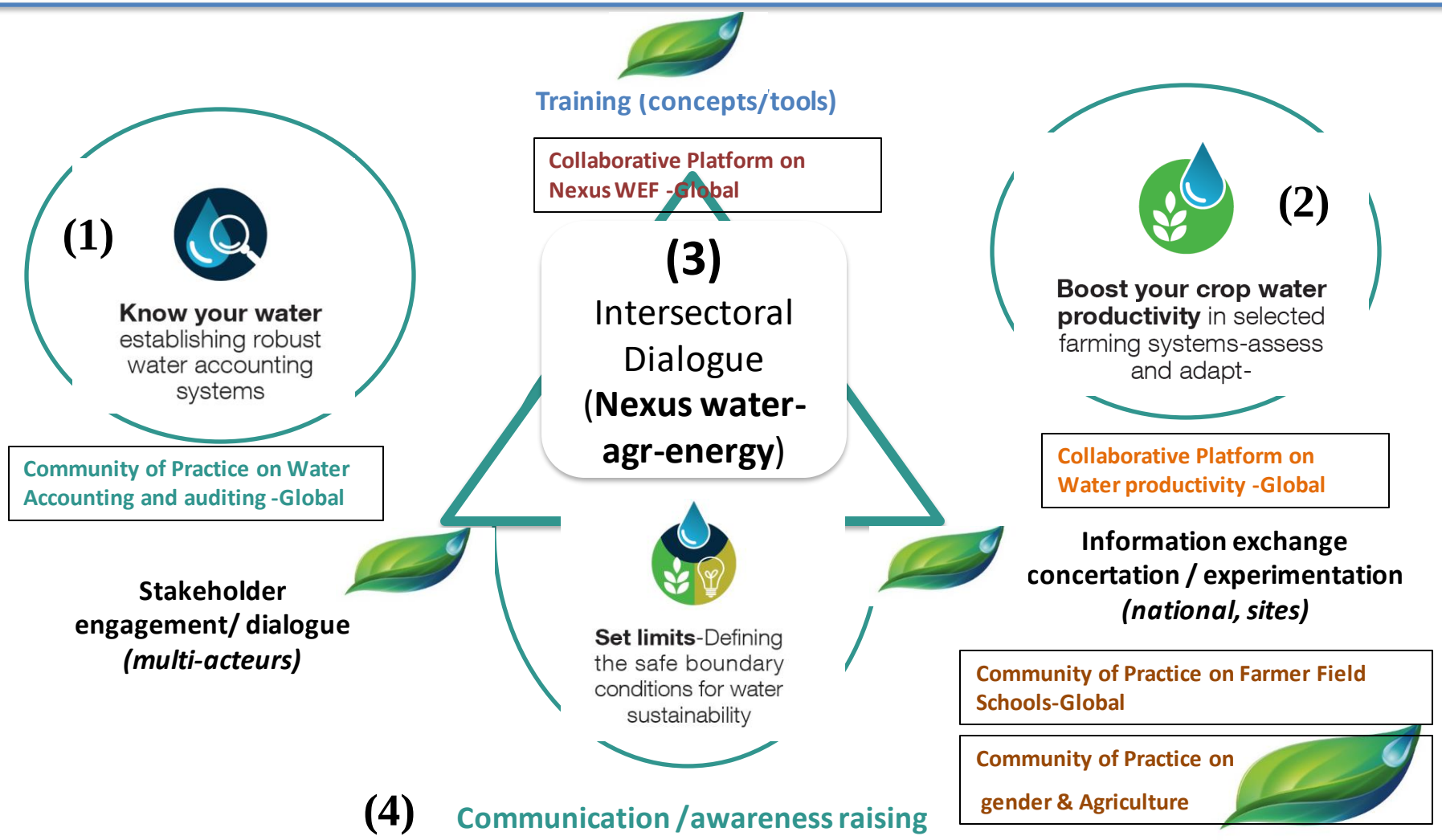
Sweden
Sverige

WATER
Productivity
Efficiency, and
Sustainability
in the NENA countries

Implementing the 2030 Agenda for water efficiency/productivity and water sustainability in the NENA countries

Project Title	**Implementing the 2030 Agenda for Water Efficiency, Water Productivity & sustainability in NENA Region**				
Funded by	**SIDA**	**Budget (USD)**	**USD 10 Million**	**Project Symbol**	**GCP/RNE/009/SWE**
Start date	**2018**	**Duration**	**5 years**	**End date**	**30/12/2022**
Implementing Agencies	**FAO**	**Implementing Partners**	**MoEW, MoA, LARI**		
Beneficiaries	**1 Ministry of Energy and Water**	**2 Ministry of Agriculture**	**3 Lebanese Agriculture Research Institute**	**4 Water establishments**	
Expected Impact	Pursue water and food security for **sustainable development** in an **environment of mounting water scarcity** and climate-related risks				
Project Outcomes	1. Adoption of international standards and scientifically sound 'water accounting systems' 2. Increasing water irrigation efficiency and productivity				
Main Result 1	**Water Accounting adopted**	**Main Result 2**	**Water Productivity increased**	**Main Result 3**	**Communication & Awareness**

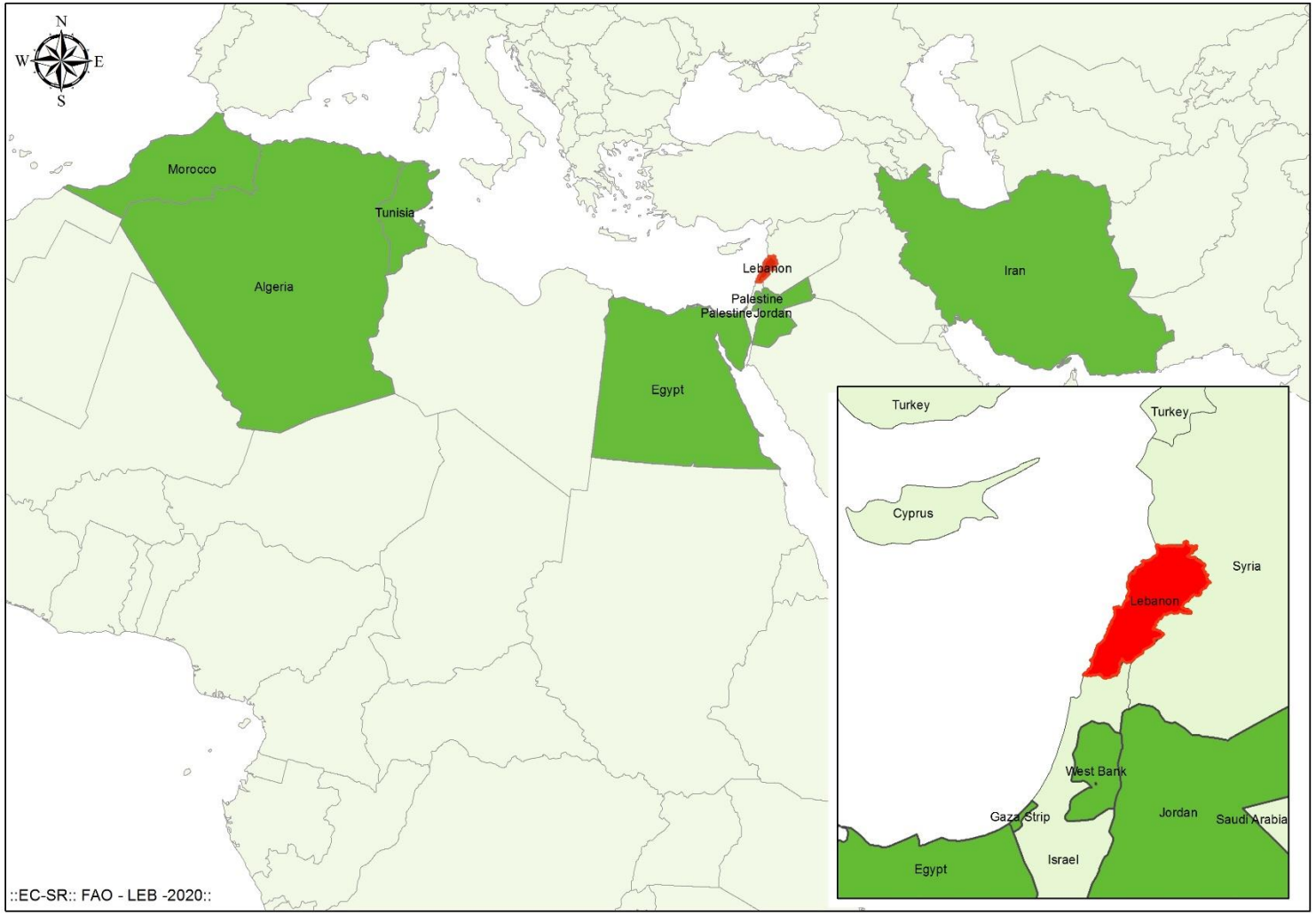
Project in brief



- Area of the country: 10 452 Km^2
- Total Population: 6.8 Million
- UAA: 271 412 ha

(2021)

- Cropped Area: 268 887 ha
- Irrigated crop Area: 151 918 ha



Project Relevance

FAO Country Programming Framework

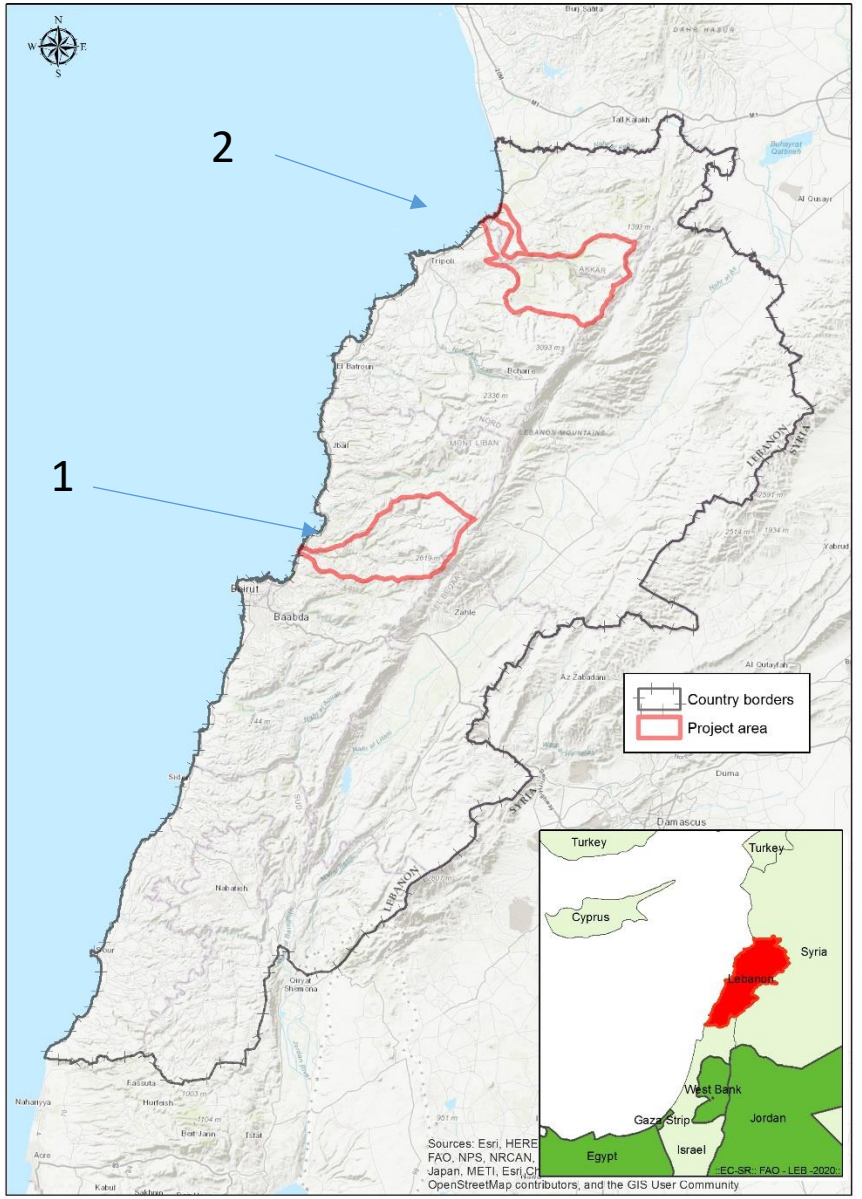
"initiatives for sustainable land, forest and water management in response to Climate Change"

Contribution to the improvement of sustainable and integrated water management practices in addition to improving water efficiency and water productivity in the agriculture sector

Government priority entitled "Improve performance of the agricultural sector contributing to the economic, social, environmental and sustainable rural development"

Project Activities

- Water Accounting: Nahr El Kalb Basin (1)
- Water Productivity (FFS): Akkar (2)
- RWA in Akkar: ongoing



Component/Output Title: Water Accounting

Rapid Water Accounting El Kalb River Basin

1. Data collection on main water balance components: water demand, supply, use and consumption
2. Main Water cycle components: inflows. Outflows (precipitation, evapo-transpiration, …)
3. Water Balance Generated

Water needs exceed total renewable water resources

Advanced Water Accounting

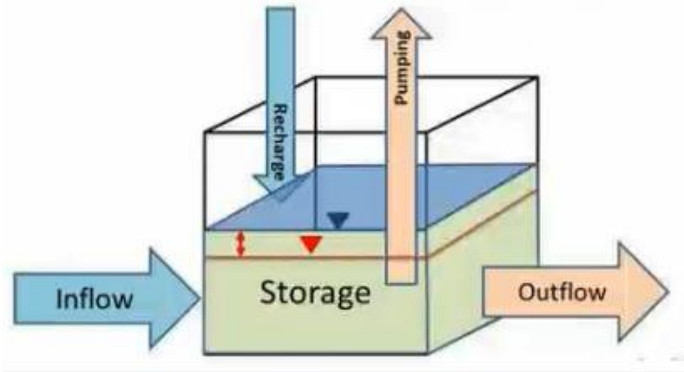
1. **Understand** the groundwater flow regime
2. **Assess** the modeling approach and model build-up using best resourced data.
3. Carry out model simulations with reasonable calibration, validation, and prediction
4. **Estimate aquifer water balance and assess its "sustainability"** under different stresses

Rapid Water Accounting Arqa Akkar

1. Use Same Methodology as for El kalb River Basin
2. Data Collection
3. Stakeholders meeting

Rapid Water Accounting

Water accounting can be defined as the systematic quantitative assessment of the status and trends in water supply, demand, distribution, accessibility and use in specified domains. (FAO, 2012, 2017)



A Rapid Water Accounting Assessment carried out in Kalb River Basin (2019/2020)

The estimated deficiency between inflows (321 MCM) and outflows (558 MCM) : -237 MCM

Compensation:

- *Ground Water*
- *Chabrouh Dam*

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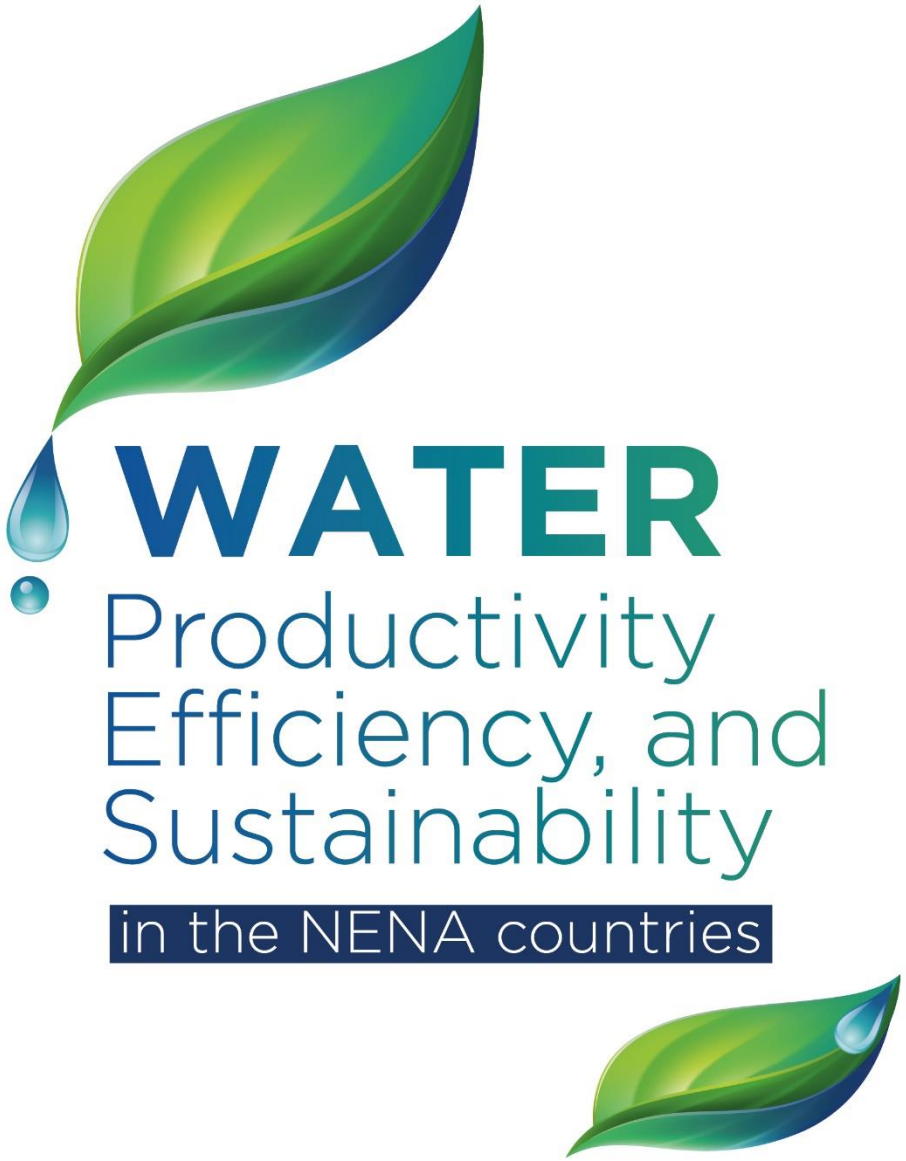
Water Auditing/Water Governance



Water Auditing in Kalb River Basin

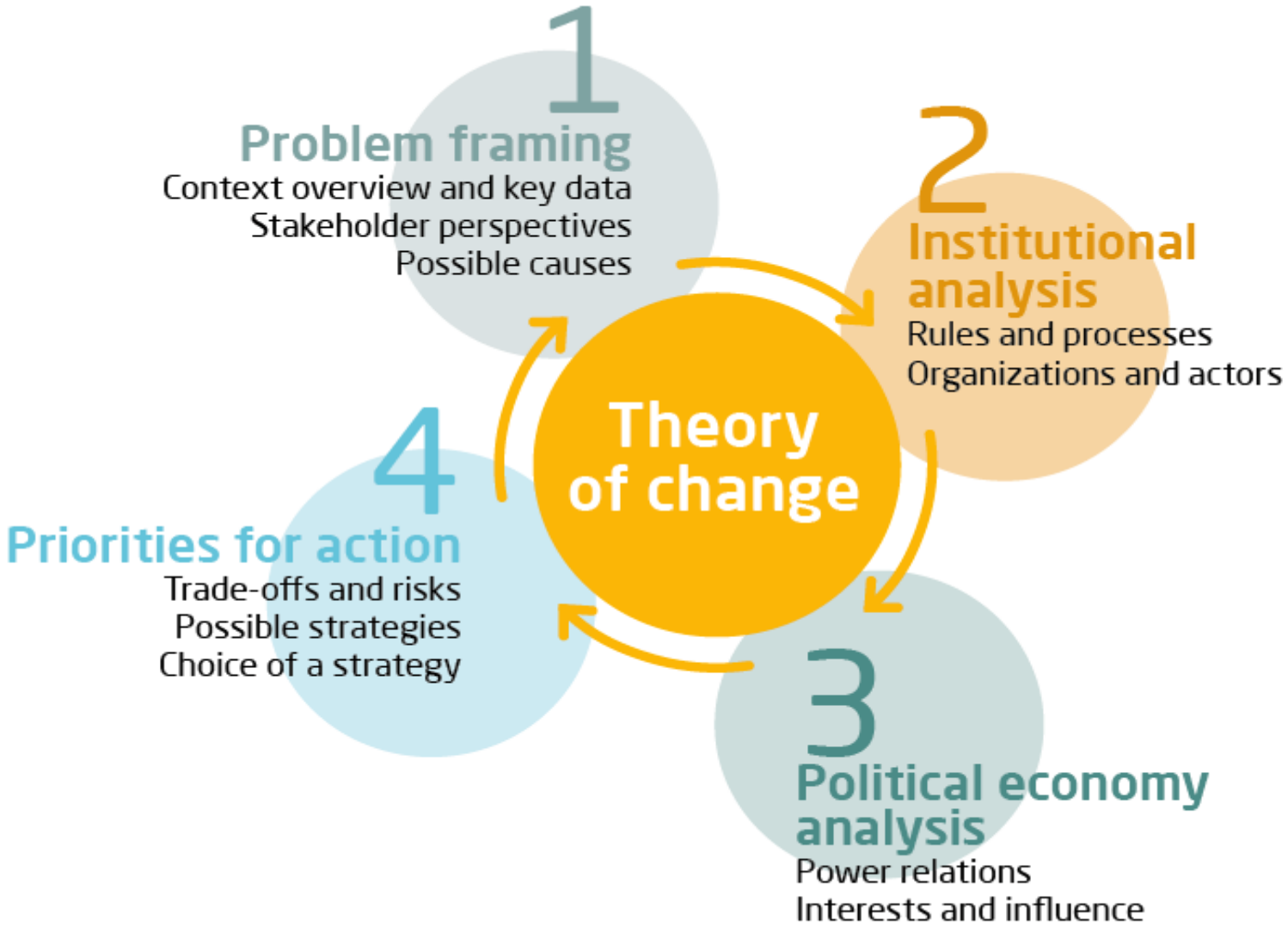
- **Objectives**:

  - Produce information needed to ***recommend how to reduce water stress in Kalb River*** Basin such as water consumption by region or sector, water productivity, etc.

  - ***Deepen /understand of the definitions and key concepts of Water Auditing*** (Water Governance Analysis) among the WA team and stakeholders who may be involved in WA (WA team/production network)

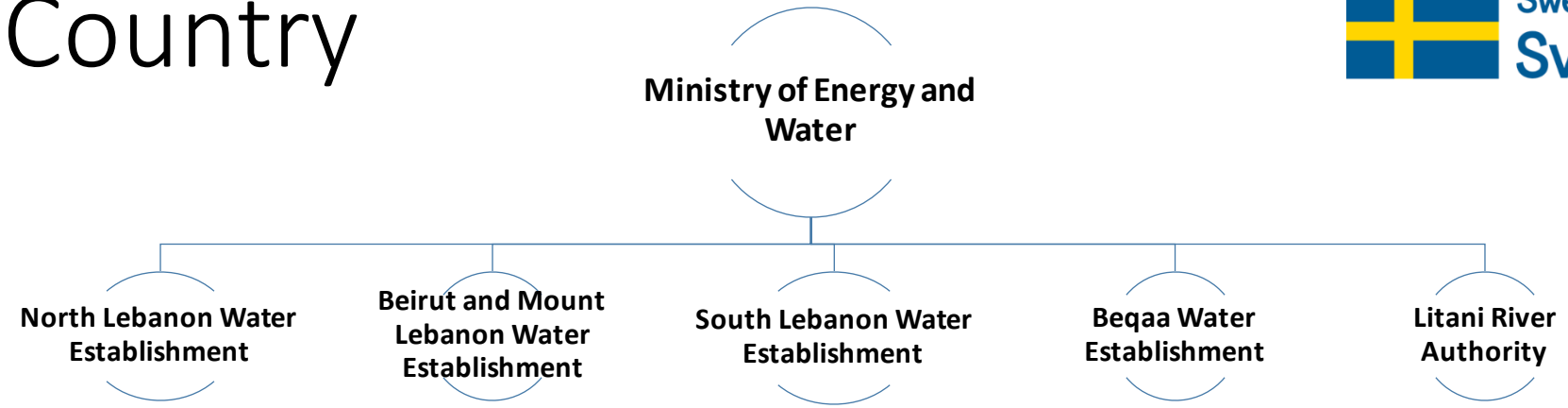
  - ***Deepen /understand in the WA team on the role of every stakeholder*** in the Water Auditing process

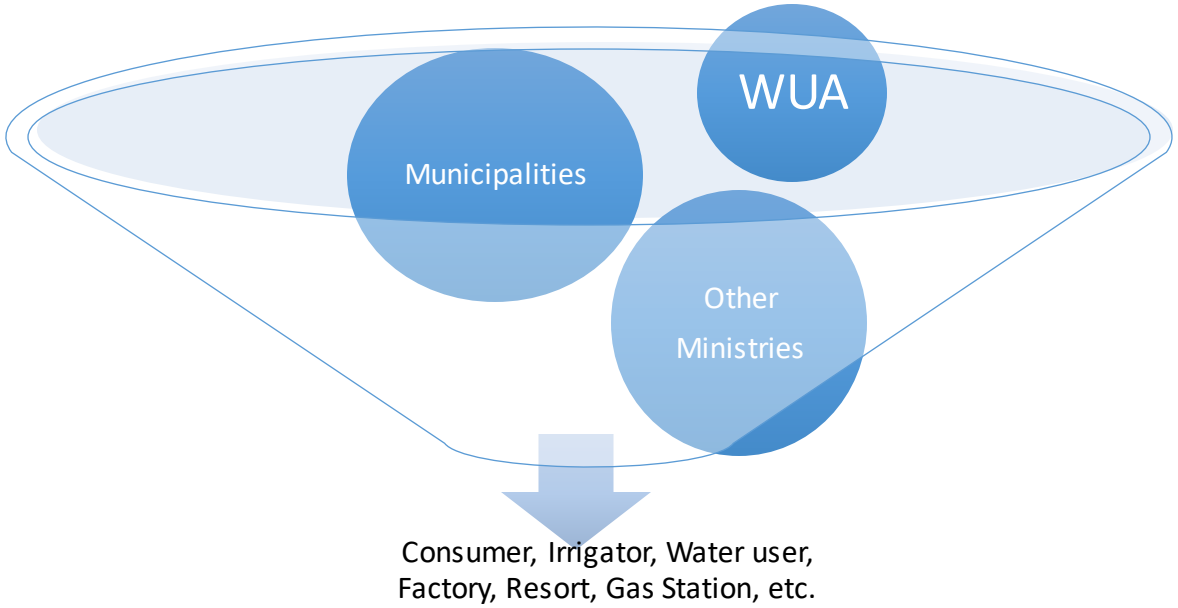
Four-phase Governance Analysis/Water Auditing



The Context - Country

- Institutions:

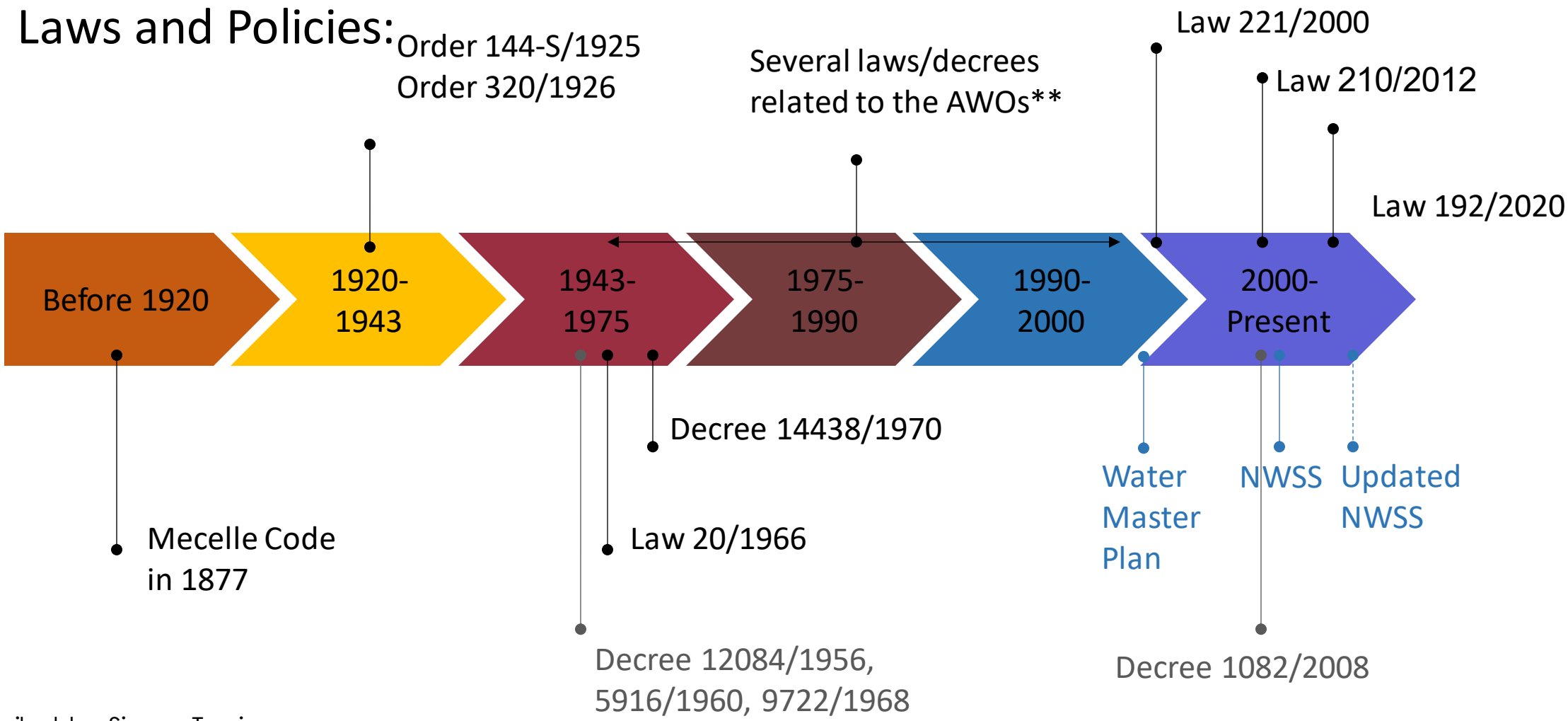




The Context - Country

Sweden
Sverige

- Laws and Policies:



Compiled by Simon Tanios

* Reviewed to date; ** Autonomous Water Offices

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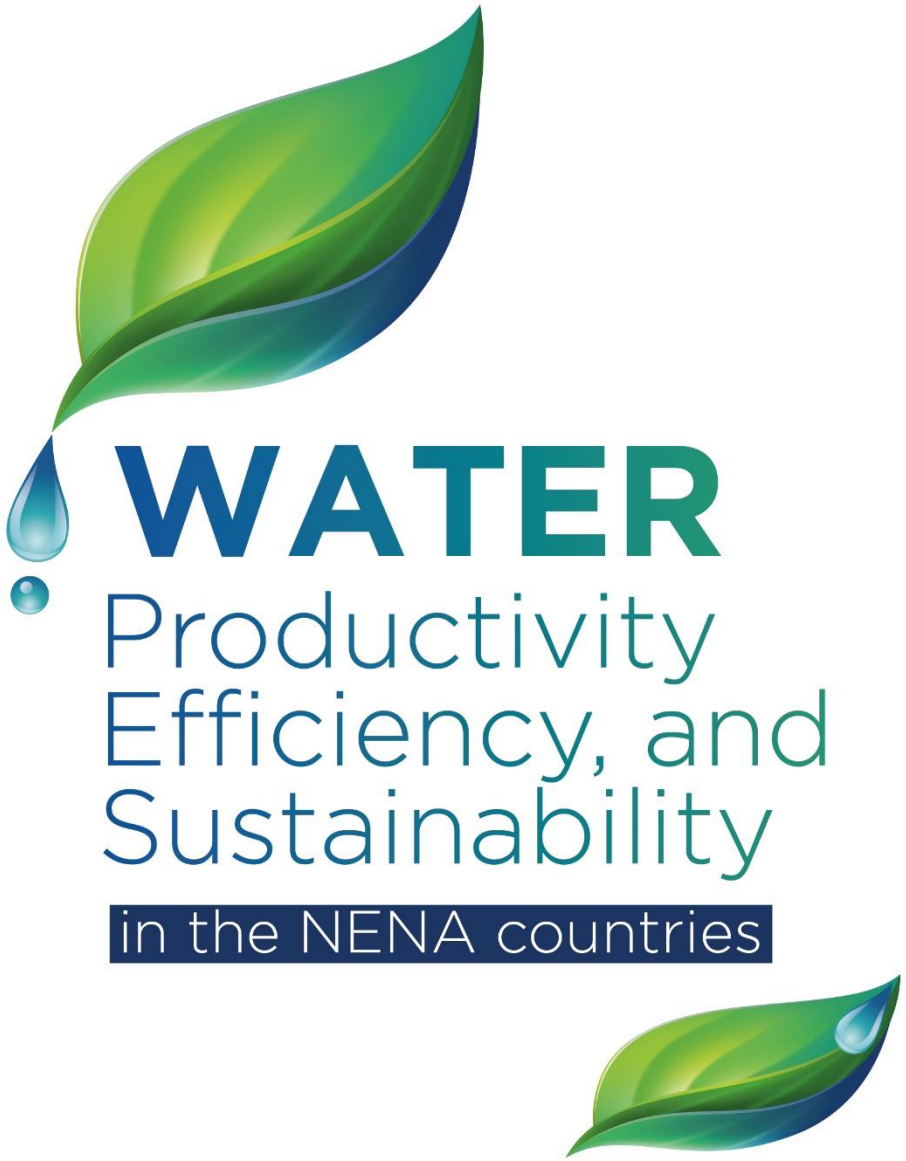
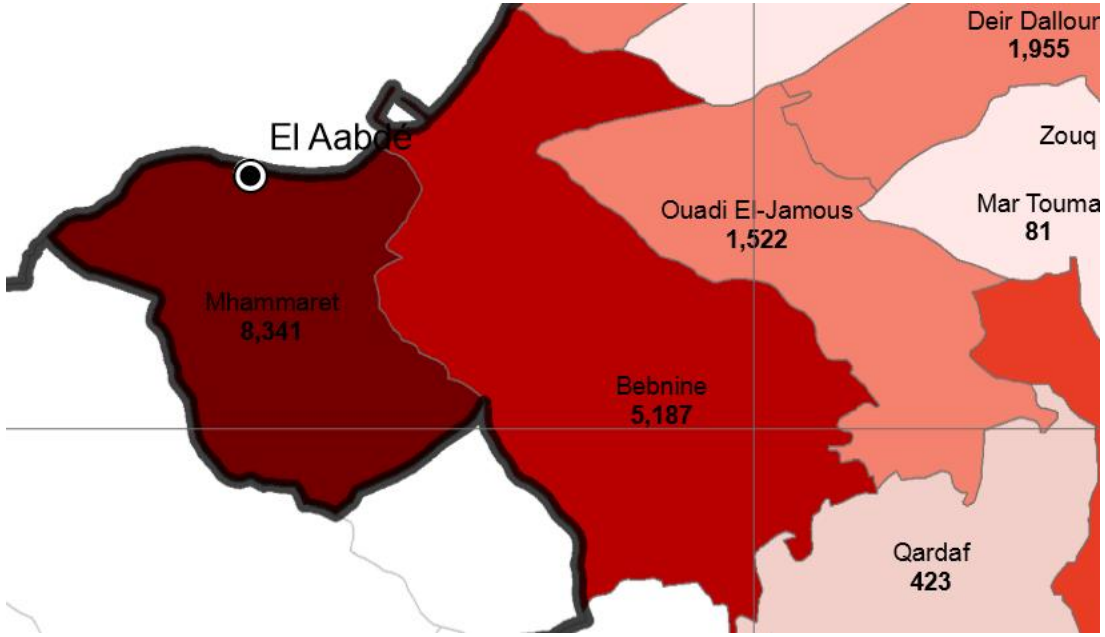
Water Productivity



Output 2 - Water Productivity (FFS Tomato)

Selection of sites for the implementation of the project

- Use of LCRP map to select the most vulnerable areas in Akkar
- UNHCR map to select areas with high refugee density
- MoA and LARI recommended areas for tomato cultivation
- **Ouadi Jamous and Mhamara selected**



Output 2 - Water Productivity (FFS Tomato)

Location	Crop	No. of farmers	Farmers
Ouadi Jamous	Tomato	30	30
Mhamara	Tomato	30	30

Initiation of the project

- Focus Group Discussion: explanation of the project, training location, host community for training, tomato variety
- 6 demo plots (3 farmers in each village), of which 3 experimental
- Tested soil samples to identify land needs and detect inefficient practices especially in nutrient inputs

Picture taken during the FGD on: 01/08/2019

Output 2 - Water Productivity (Workers training)

- Farmers were supported by unskilled and semi skilled Syrian workers
- 192 Syrian workers **(113 women)** trained on :
  - Mulching
  - Seeding
  - Weeding
  - Leafing
- Laborers splits amongst 60 farmers, receiving a minimum wage of 3.5$/hour

Agriculture workers

Output 2 - Water Productivity (FFS Tomato)

- Equipment and tools provided to achieve project objectives:
  - Tensiometer
  - Humidity meter
  - Thermometer
  - Training on water conservation methods: weeding, leafing, duration of irrigation …

Humidity meter

Tensiometer

Thermometer

Training on leafing

Key Recommendations and Findings

- Farmers still reluctant to apply all integrated pest management practices advised - long term awareness needed from experts
- Tensiometer and humidity meter were key in monitoring water needs and should be made available to all farmers
- Farmers improved their irrigation practices after theoretical and practical trainings along with minimizing their chemical inputs due to the shared knowledge related to IPM
- Due to the decrease of inputs the profitability of farmer in this season increased
- Water resource is polluted biologically (E.coli, Fecal coliforms), chemically (heavy metals) and physically (high turbidity)
- Importance of inputs support to farmers in a context of increased costs

Key Recommendations and Findings

- Physical enhancement of greenhouses structure (major difference between demo plots and regular greenhouses)
- Adaptation of water management technics (irrigation frequencies differed between farmers using water management equipments)
- Intensify the IPM approach
- Adoption of bio-pests that could replace chemical pests
- Work more on water quality issues (especially in the area of intervention)

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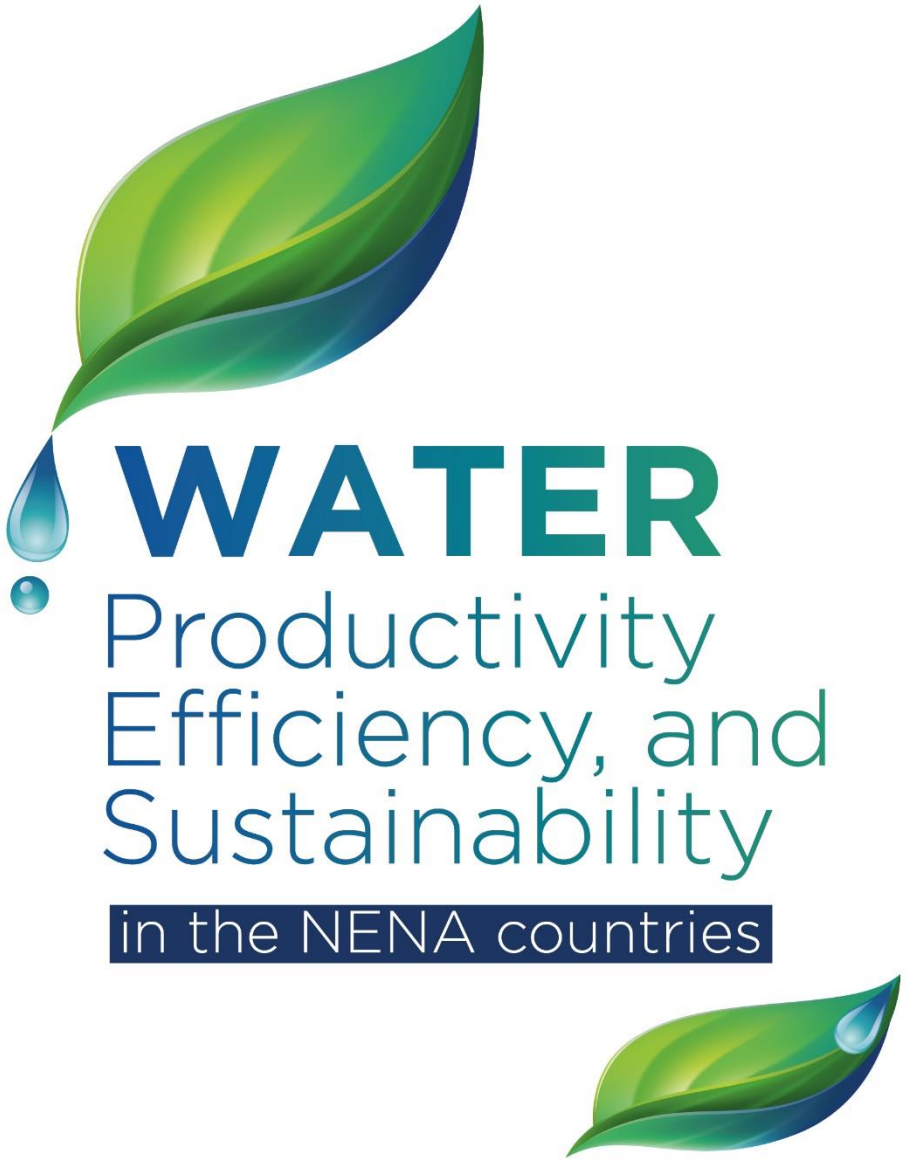
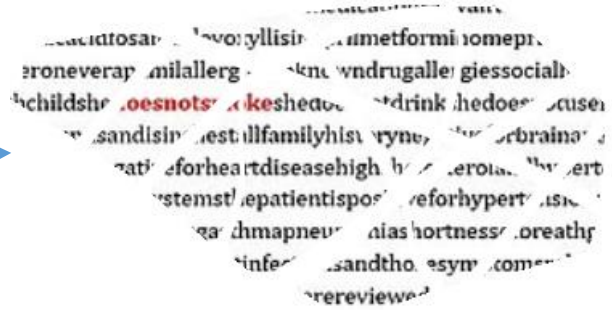
Water Productivity / Baseline Study



Baseline Study on Water Productivity



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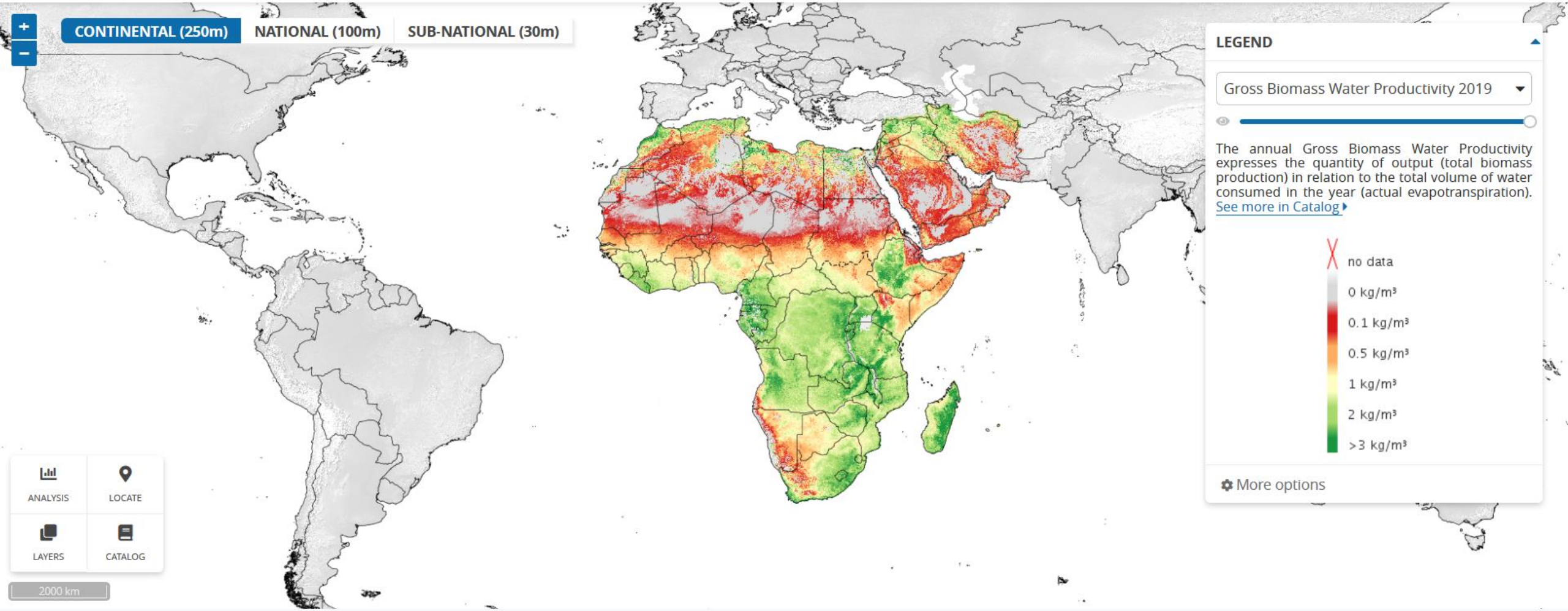
WaPOR

The FAO portal to monitor WAter Productivity through Open access of Remotely sensed derived data

Map

WaPOR 2.1

Sign in | Info | Feedback



LEGEND

Gross Biomass Water Productivity 2019

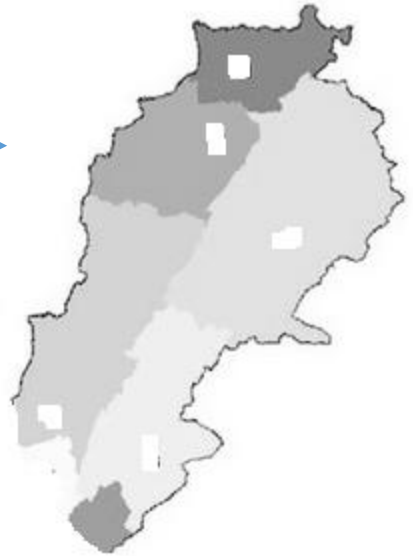
The annual Gross Biomass Water Productivity expresses the quantity of output (total biomass production) in relation to the total volume of water consumed in the year (actual evapotranspiration). See more in Catalog

- no data
- 0 kg/m³
- 0.1 kg/m³
- 0.5 kg/m³
- 1 kg/m³
- 2 kg/m³
- >3 kg/m³

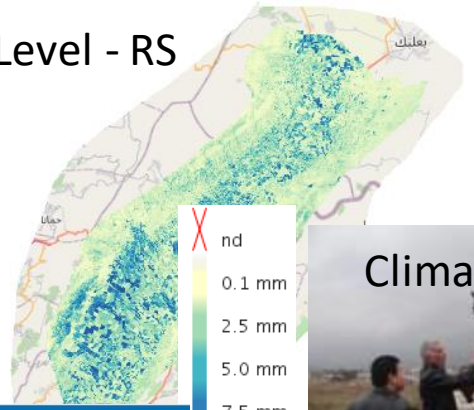
More options

Farm Field Plot

To Basin or Political Boundary



Actual Evapotranspiration at Crop Level - RS

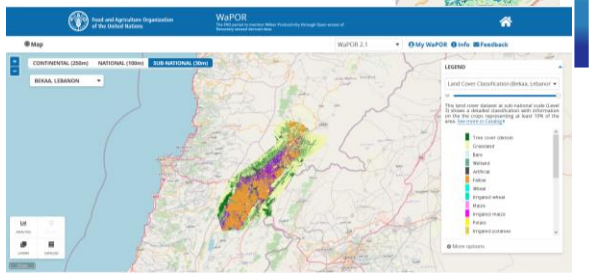


Time Series

Irrigated vs Rainfed Systems

Climate Data

LandCover Map




Cordoba ET Weather Station
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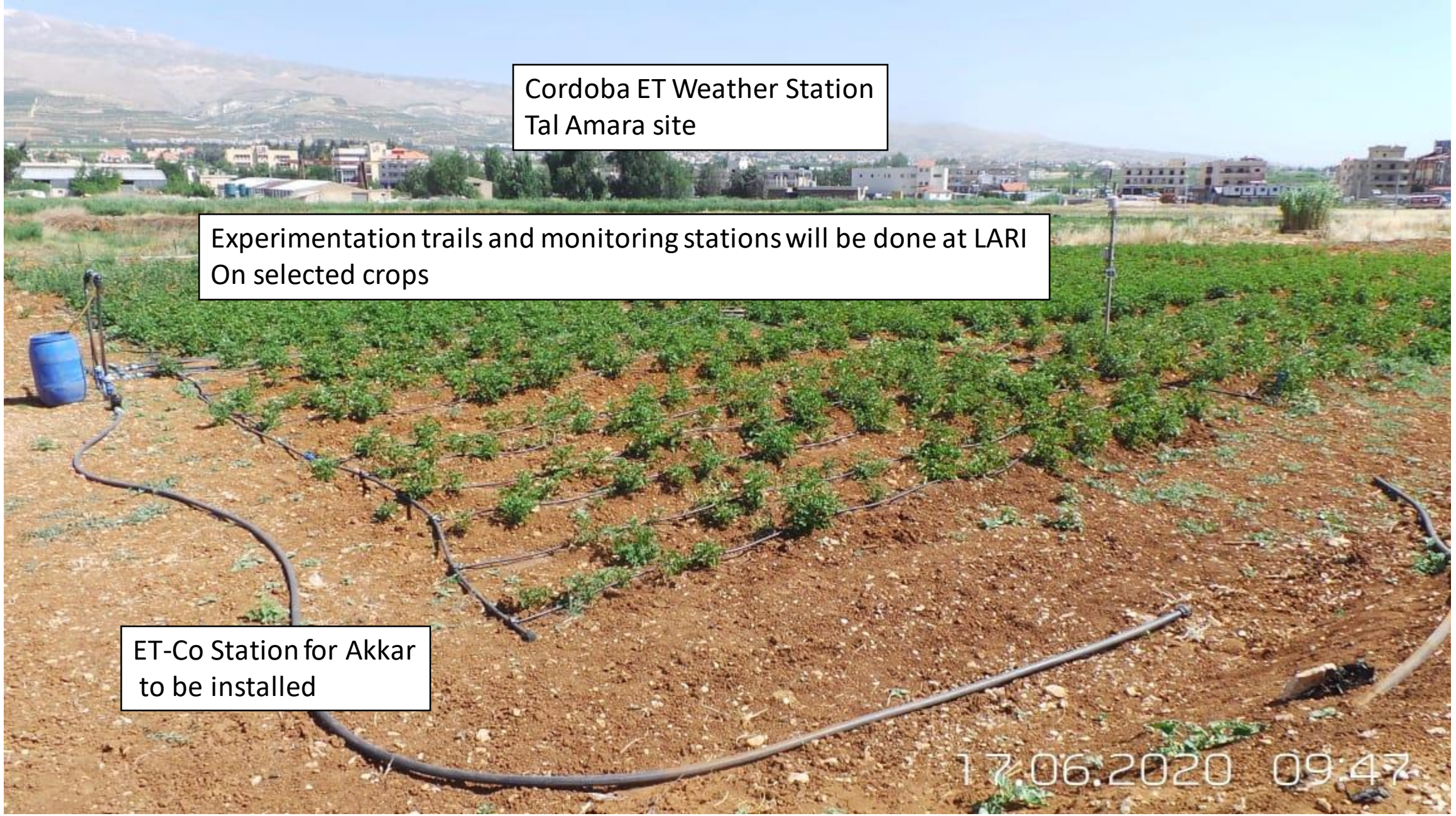

Cordoba ET Weather Station
Tal Amara site
Experimentation trails and monitoring stations will be done at LARI
On selected crops
ET-Co Station for Akkar
to be installed
17.06.2020 09:47

Food and Agriculture Organization of the United Nations

3- Nexus work in WEPS-NENA Project

Set limits-Defining the safe boundary conditions for water sustainability

Goal: Set sustainable limits while managing trade-offs between water, energy and agriculture

Assess Integrated Nexus WEF Modelling

Morocco & Jordan

Share Webinar series on Nexus WEF (14)+ & D group

NENA & Global

Explore Nexus WEF solutions:

Solar irrigation

Water & Energy efficiency

Palestine & Tunisia

Nexus & Climate Change adaptation

Lebanon & Algeria

Partners:
SEI, KTH
GIZ
ESCWA, ACSAD
FAO/ Energy
+ many at country level

NEXT – Competition on NEXUS Solutions

3) Resilience of Nexus solutions with Climate Change

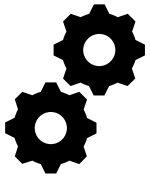
Main Components

1

Regional Climate Modelling

To generate high-resolution reference and future climate projections analysis at the watershed scale

2



Vulnerability Assessment

Watershed-wide vulnerability assessment to climate change using RICCAR's integrated vulnerability assessment methodology

3

Yield Simulation Under Climate Change

Assessment of the effect of climate change on agricultural production in the watershed

Informed by consultations with national and local stakeholders as well as situational analysis on the human right to water and sanitation

Implemented by ESCWA with ACSAD and local partners

Improved Water Resources Monitoring System/Integrated Water Resources Management at regional level in Lebanon

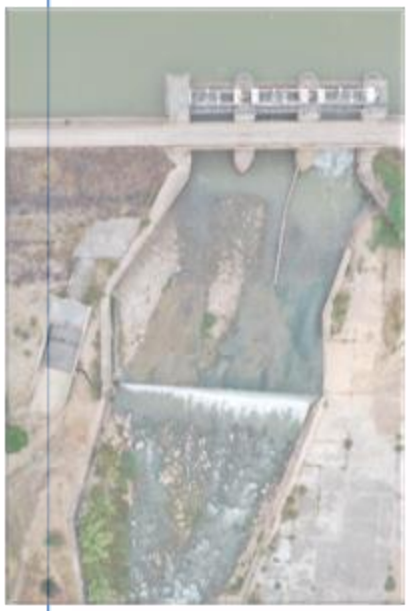
Food and Agriculture Organization of the United Nations

مؤسسة
مياه لبنان الشمالي
NORTH LEBANON WATER
ESTABLISHMENT

وزارة الطاقة والمياه

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development
and Cooperation SDC



PROJECT OVERVIEW

Project Rationale Enable Lebanon's water management institutions to improve their performance at the regional level, through:

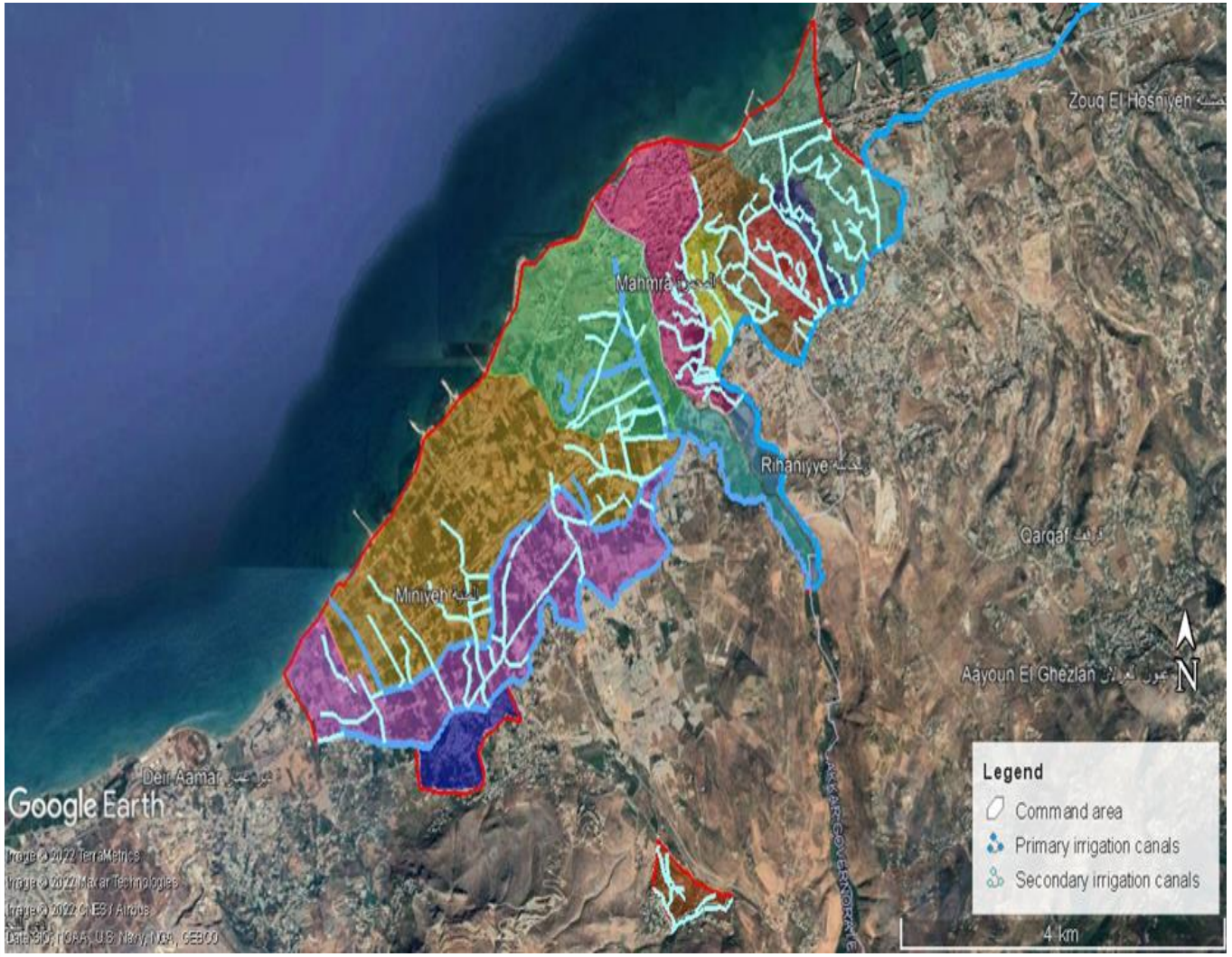
1. Enhanced water resources monitoring

II. Raise the capacity and support the development of stakeholder platforms at the level of Water Establishments/Watershed with a view to aiding water management decision-making.

PILOT AREA: EL-BARED WATERSHED

El-Bared watershed as selected pilot area

Two adjacent **peri-urban irrigation schemes** (Akkar and El-Minieh) as monitoring command area



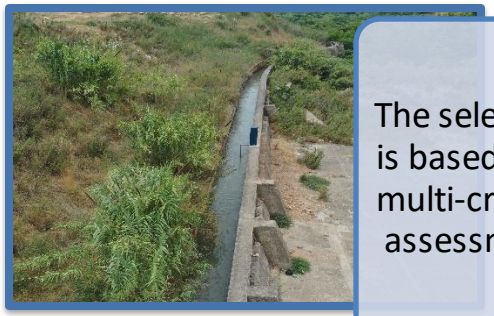
Problems

- **Climate change impacts**
- Growing **demographic pressure** with an increase in **poverty rates**
- Growing **need for better water management** in line with environmental, social and economic objectives

ACHIEVEMENTS

Output 1 - Real time monitoring at key locations

1. Selection of Monitoring sites



The selection is based on a multi-criteria assessment

2a. Installation of Monitoring equipment

45 monitoring sites equipped with discharge measurement techniques

2b. Introduction of optic technology

ACHIEVEMENTS

Output 1 - Real time monitoring at key locations

3. Calibration Exercises

Calibration of measurement equipment and monitoring sites

4. Validation of data and equipment

5. Integration into PMS

Discharge history built and integrated into central monitoring system

6. Field Training

Data acquisition, O&M manuals prepared & field training administered to 11 NLWE engineers and technical staff

7. Hands on Training

ACHIEVEMENTS

Output 2 - Water quality monitoring at key locations within a pilot watershed is established

» Water quality parameters identified (chemical, physical and bacteriological)
» 15 monitoring sites selected based on multi-criteria assessment
» Analysis protocol established for the 7 final monitoring sites
» 4 laboratories (Tripoli, Halba, Minieh, Donieh) fully equipped with devices and reagents

ACHIEVEMENTS

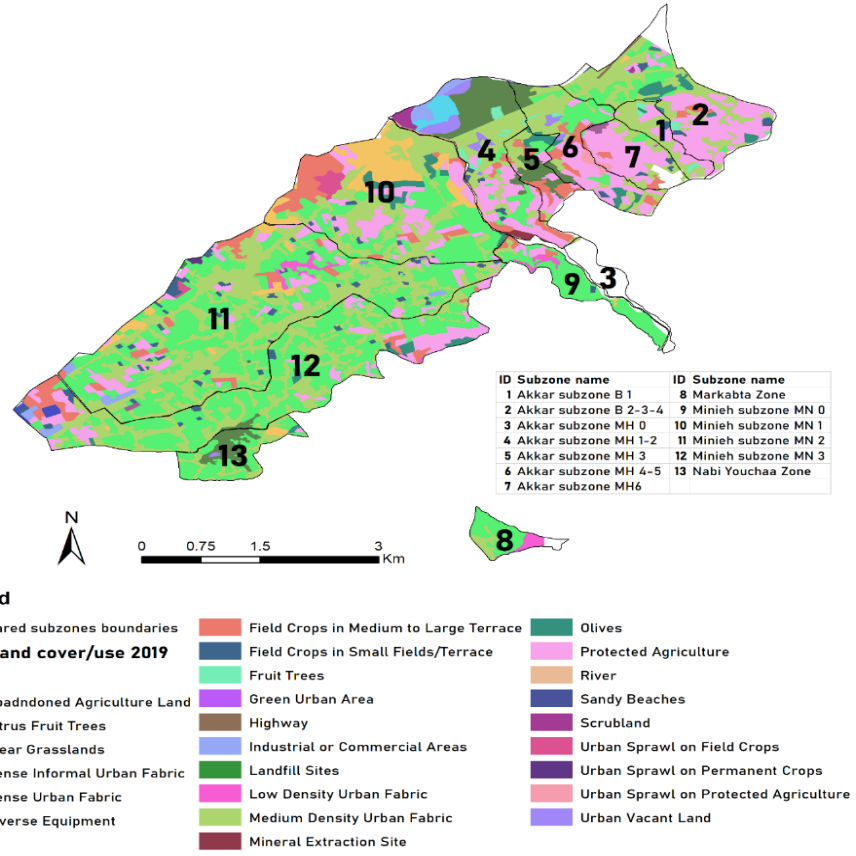
Output 3 - Watershed Prototype Monitoring System is developed, management authorities empowered, and their capacity is enhanced to operate the system

- Branded room rehabilitated and IT infrastructure established to host PMS
- Computer-based water monitoring system called **'Prototype Monitoring System (PMS)'** developed
- **Four monitoring dimensions** connected and integrated into the PMS
- Non-traditional business plan – **'asset management module'** – created and integrated into the PMS
- PMS O&M manuals prepared & training administered to NLWE engineers and technical staff

ACHIEVEMENTS

Output 4: Water accounting tool implemented

- Land-Cover/Land-Use maps of the command area generated through remote sensing
- Information on vegetation state, land surface temperature, primary biomass production, and ET from space were generated
- Crop water requirements and water productivity scores established for the main crops in the command area for the season 2019 – 2020



ACHIEVEMENTS

Output 6: Scaled-up approach through stakeholder platforms and data-sharing

» **4 major types of knowledge products and dissemination materials (ready and on-going)**

1. ***Peer-reviewed publications (10)*** field guides and briefs
2. ***Visual learning (2)*** tutorial videos for training purposes
3. ***Media (5)*** dissemination videos on various components
4. ***Training (8)*** on-job and traditional trainings for various stakeholders (farmers, site engineers, professionals, decision-makers)

Rehabilitation and waste management of El-Bared Canal Irrigation System to reduce source-to-sea pollution and improve livelihoods in the Akkar Region of Lebanon

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مؤسسة مياه لبنان الشمالي
NORTH LEBANON WATER ESTABLISHMENT

وزارة الطاقة والمياه

Norwegian Embassy

PROJECT OVERVIEW - Outputs

1. Rehabilitation and equipment

Relevant areas rehabilitated and trash removal equipment is installed

2. Water quality monitoring

Monitoring system is designed and operated to measure improvement of environmental conditions

3. Public awareness and capacity building

Capacities of local communities are improved and waste-reduction sensitization is promoted

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NORTH LEBANON WATER ESTABLISHMENT

Norwegian Embassy


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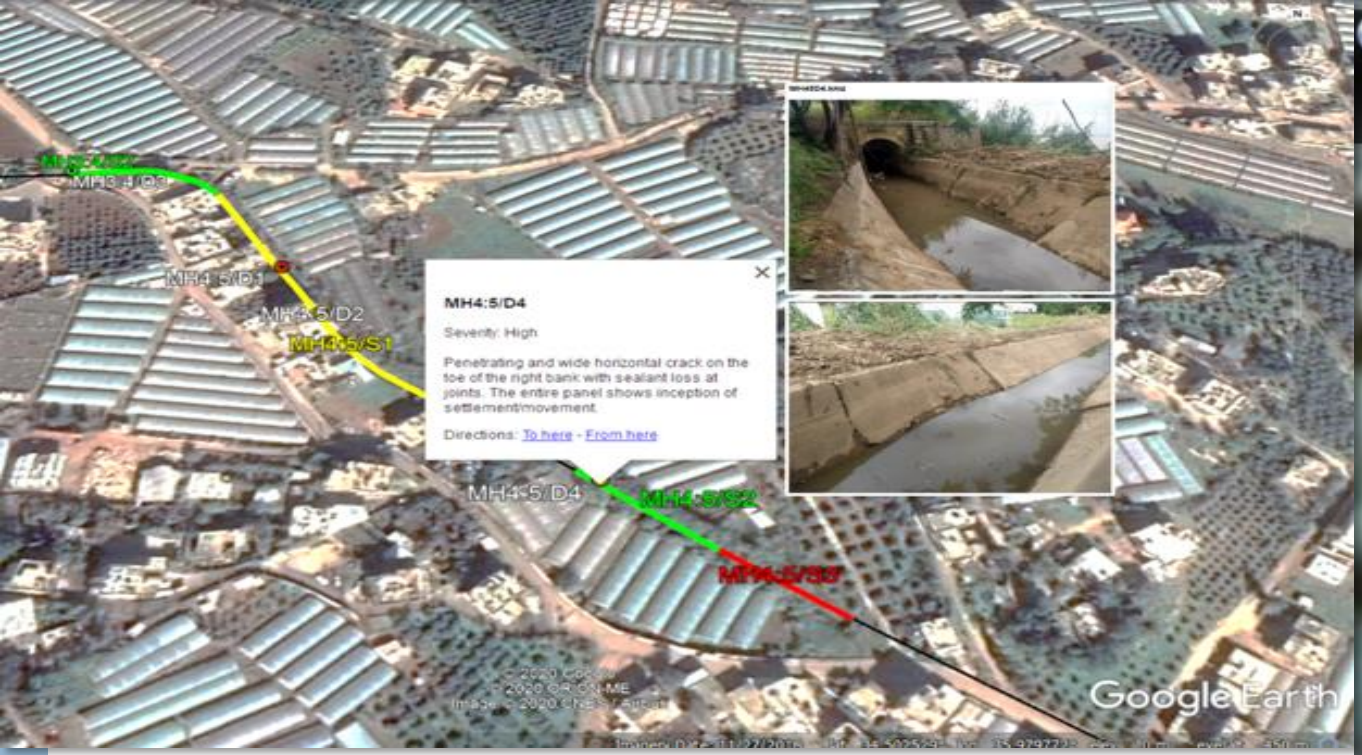
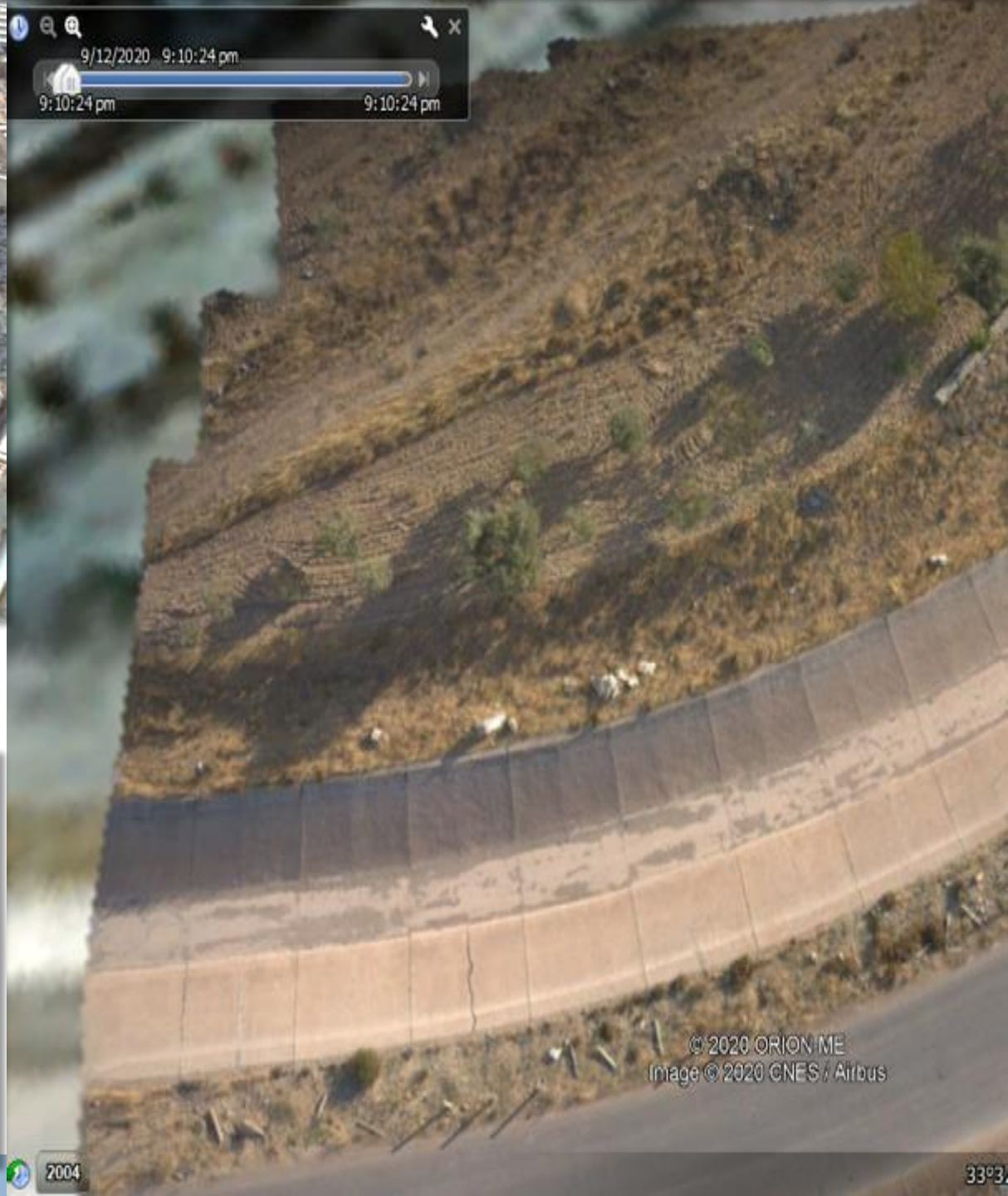
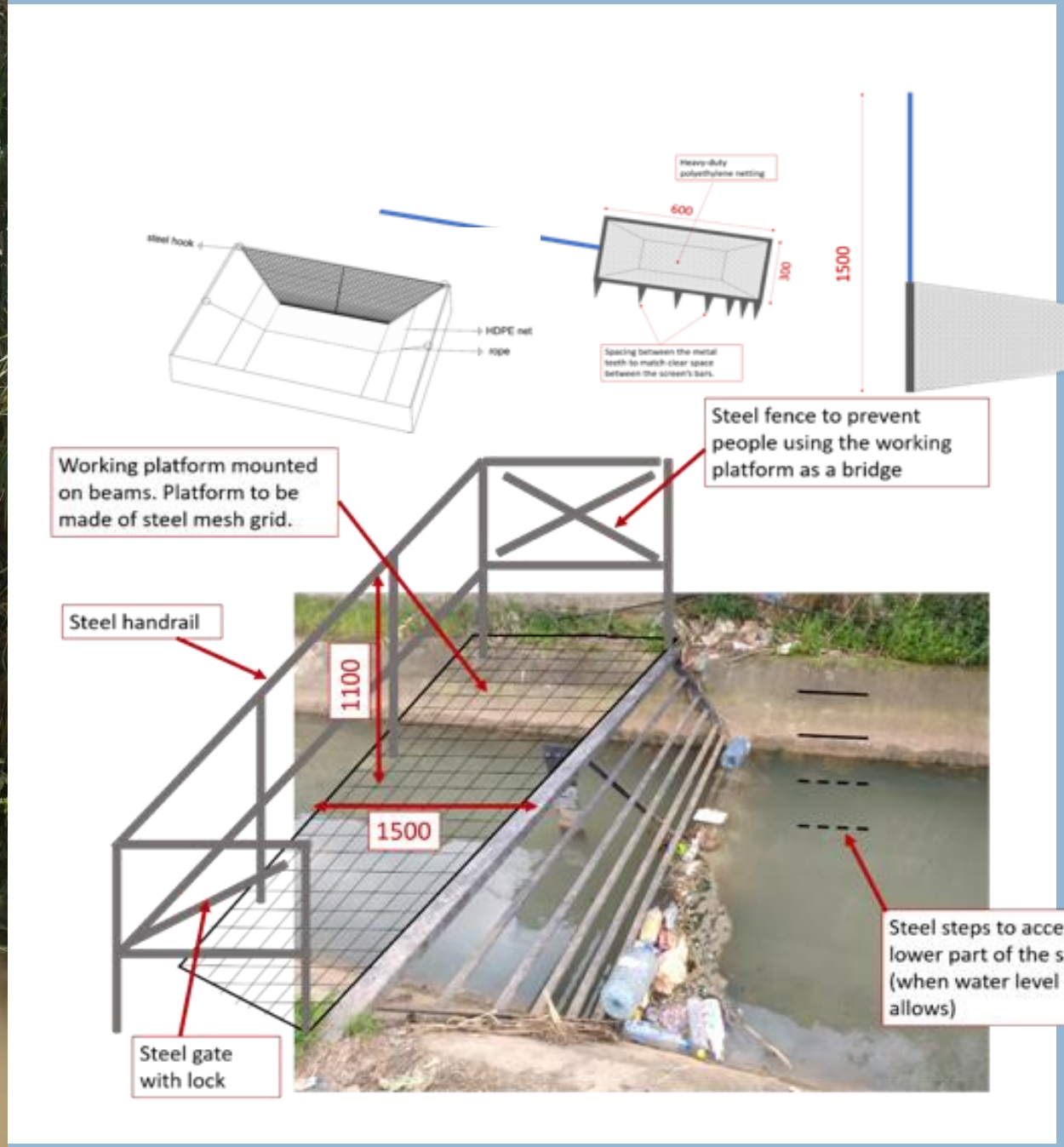




Remote-based Rapid Appraisal Procedure


Steel hook
HDPE net
rope
Heavy-duty polyethylene netting
600
300
1500
Spacing between the metal teeth to match clear space between the screen's bars.
Steel fence to prevent people using the working platform as a bridge
Working platform mounted on beams. Platform to be made of steel mesh grid.
Steel handrail
1100
1500
Steel steps to access t
lower part of the scre
(when water level
allows)
Steel gate with lock

Food and Agriculture Organization of the United Nations

Every Drop Counts campaign

- Main message: **Every Drop Counts – Water is life. Water is food. Water is your responsibility.**
- Objective: To raise awareness on the topic of water scarcity and the responsibility that each audience has toward this issue.
- Main target audience:
  - Public
  - Youth
  - Farmers
- When: World Water Day to end August
- https://www.fao.org/in-action/water-efficiency-nena/edccampaign/en/r Week 2022