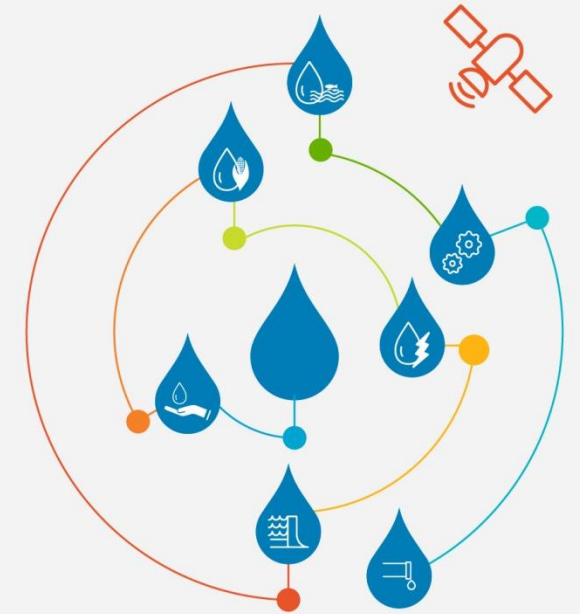


# Monitoring water productivity of investments in agriculture



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*3 October 2018*

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**ADB**



Knowing your water resources is the first step **towards fair and sustainable allocation** – especially in times of climate change, urbanization and rural transformation.

Towards achieving SDG 6





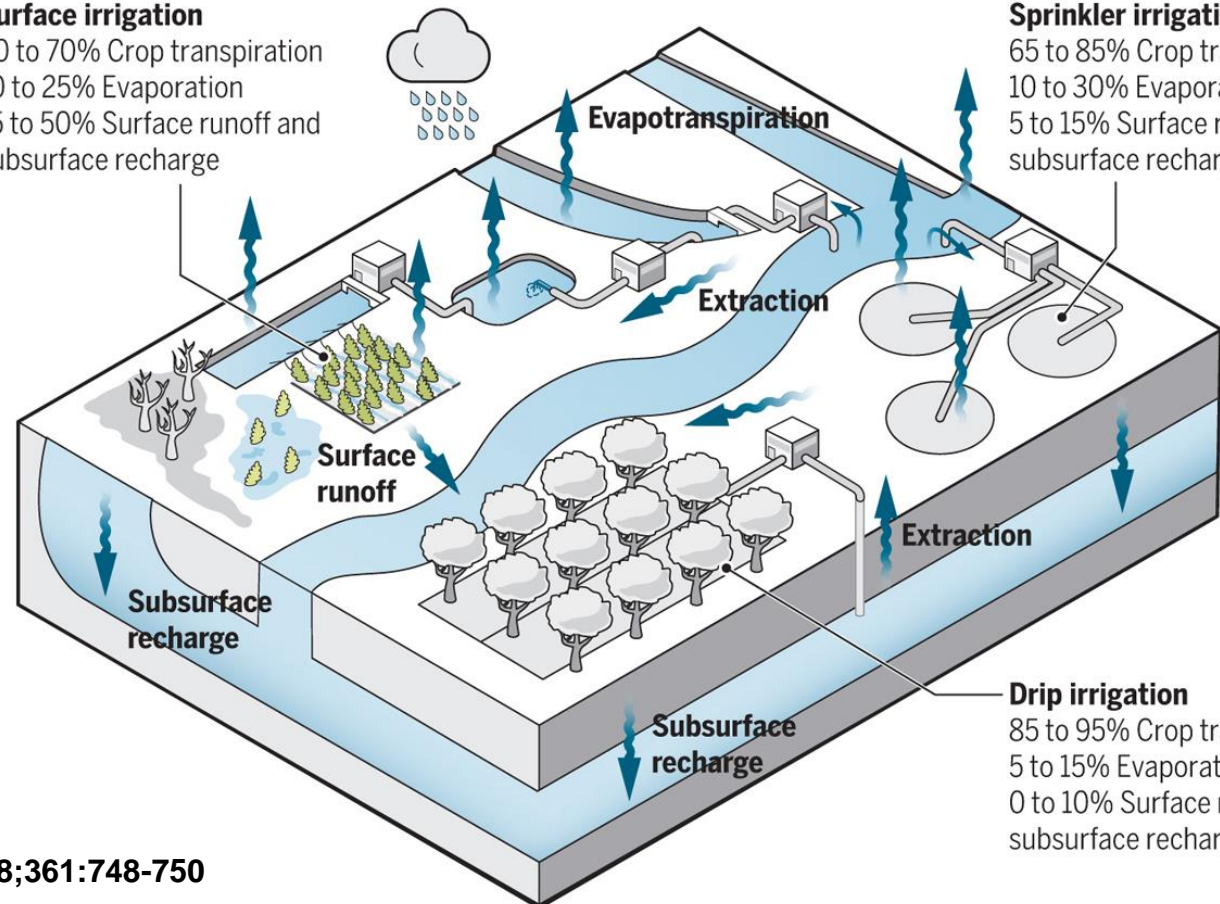
# Why do we care about water productivity?

## Accounting for water

The paradox of irrigation efficiency (surface, sprinkler, and drip) and the water inflows and outflows can be seen in a watershed example. Ranges of crop transpiration, evaporation, runoff, and recharge are authors' judgment of possible values. These values depend on crop and soil types, weather, and other factors.

### Surface irrigation

40 to 70% Crop transpiration  
10 to 25% Evaporation  
15 to 50% Surface runoff and subsurface recharge



### Sprinkler irrigation

65 to 85% Crop transpiration  
10 to 30% Evaporation  
5 to 15% Surface runoff and subsurface recharge

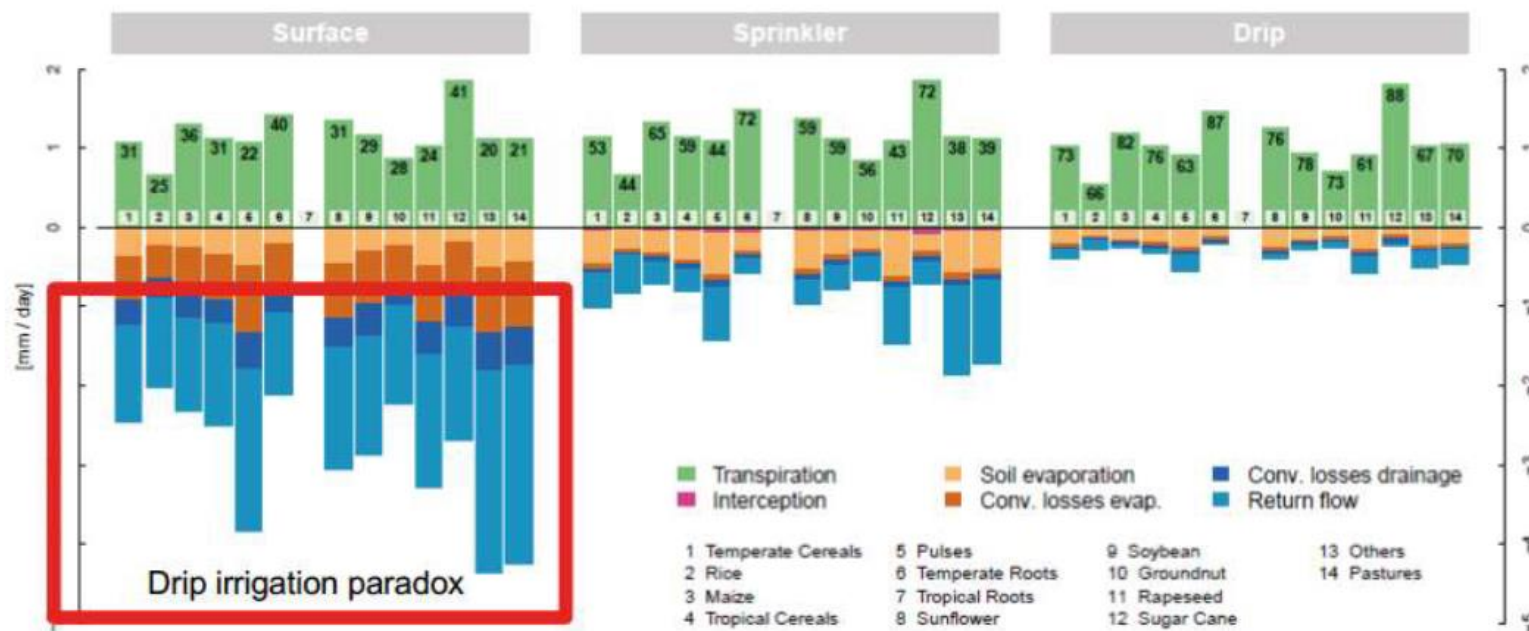
### Drip irrigation

85 to 95% Crop transpiration  
5 to 15% Evaporation  
0 to 10% Surface runoff and subsurface recharge



# Scale matters for irrigation efficiency

## Irrigation paradox



Irrigation efficiencies for different techniques (Source: Jägermeyr *et al.*, 2015).

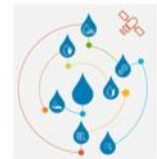
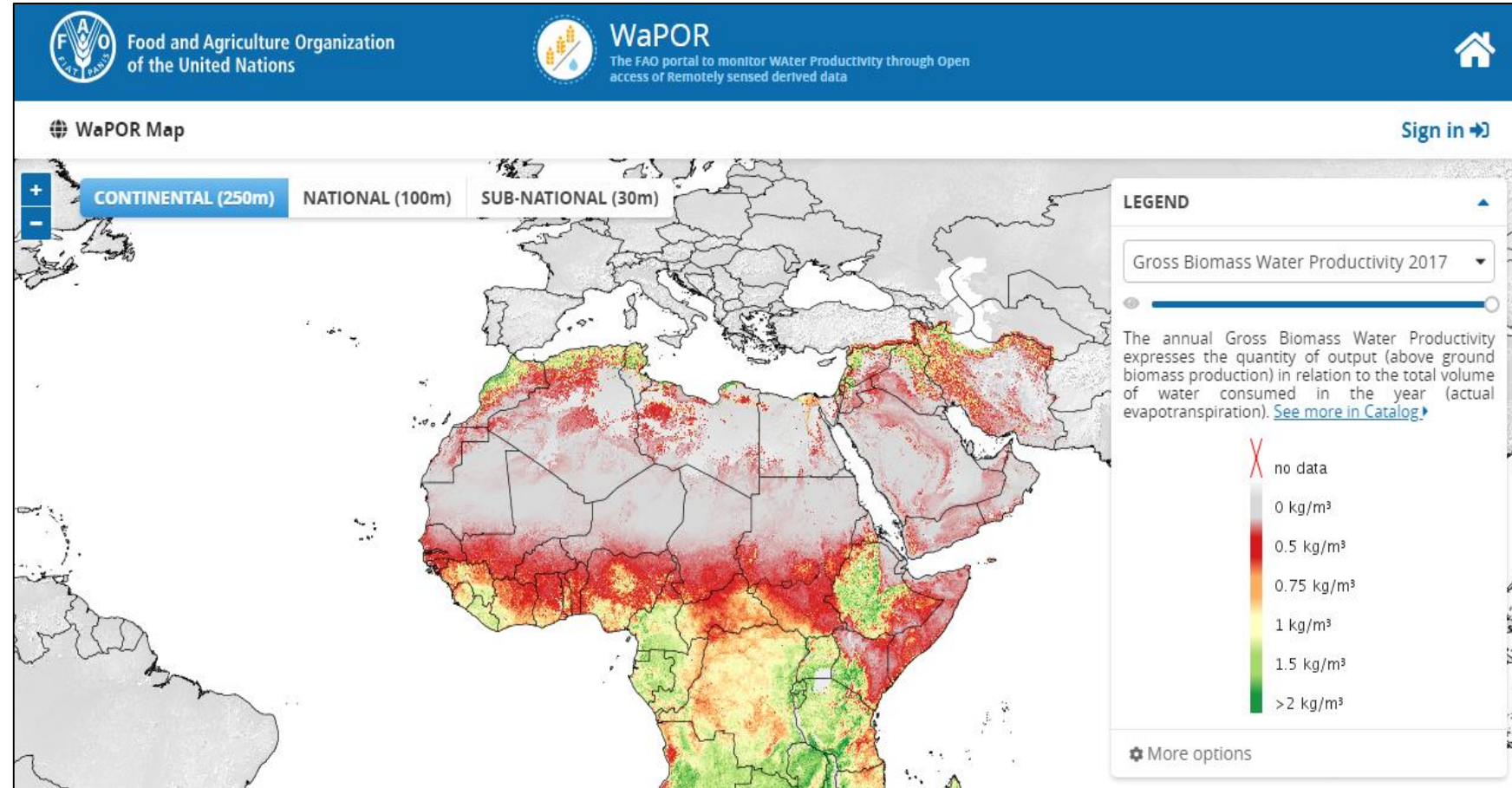


# WaPOR

## Big data to tackle the world's water crisis



Near real time monitoring  
of water productivity at  
30m-250m resolution with  
data updates every 10 days  
over 10 years





# 1. What is the water balance of a country or river basin?

## Water accounting

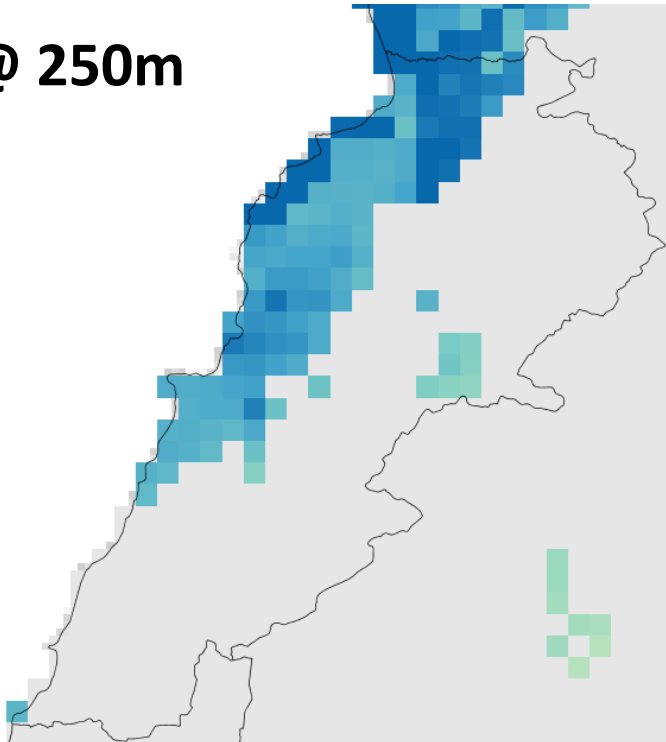
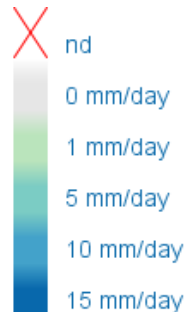
Precipitation → IN

Evapotranspiration → OUT

= basic water balance

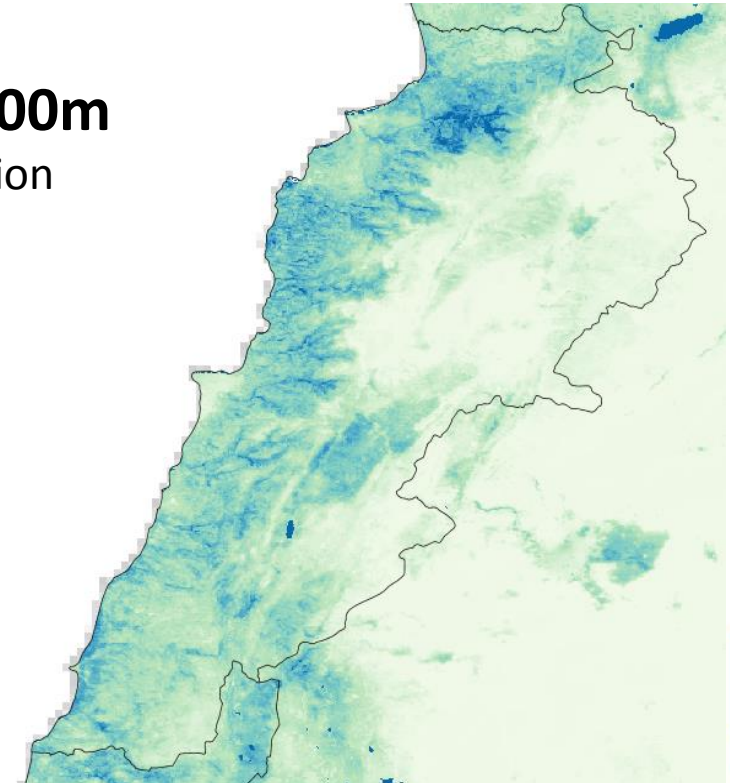
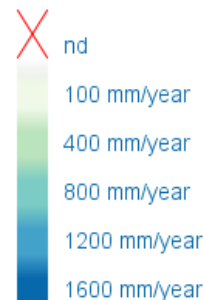
**30 Oct. 17 @ 250m**

Precipitation  
(daily)



**Oct. 17 @ 100m**

Evapotranspiration  
(decadal)



2

# How productive is agricultural land use?

Primary biomass production

Indicative of yields (+ ground level data)

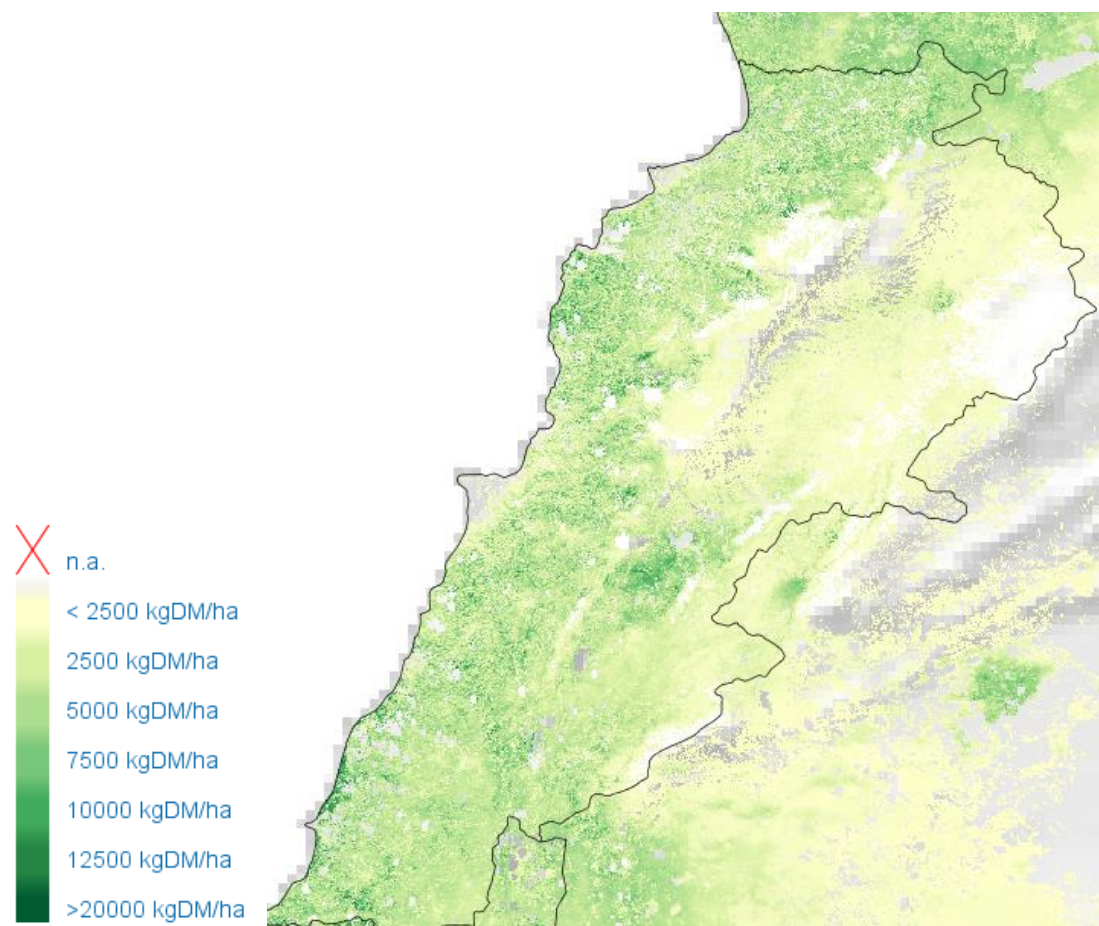




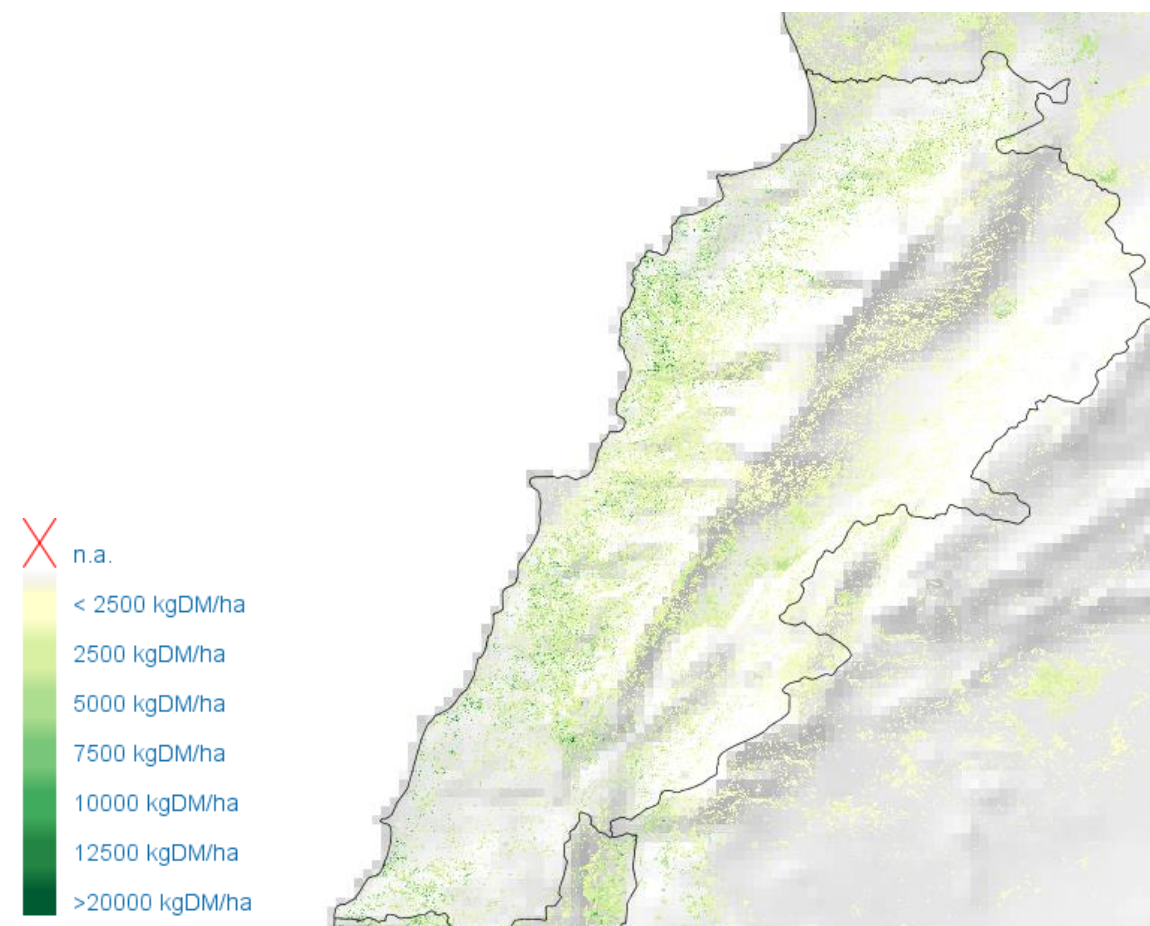
## An Example from Lebanon

Above Ground Biomass Production in Lebanon (100m resolution)

2015 – First growing cycle



2015 – Second growing cycle

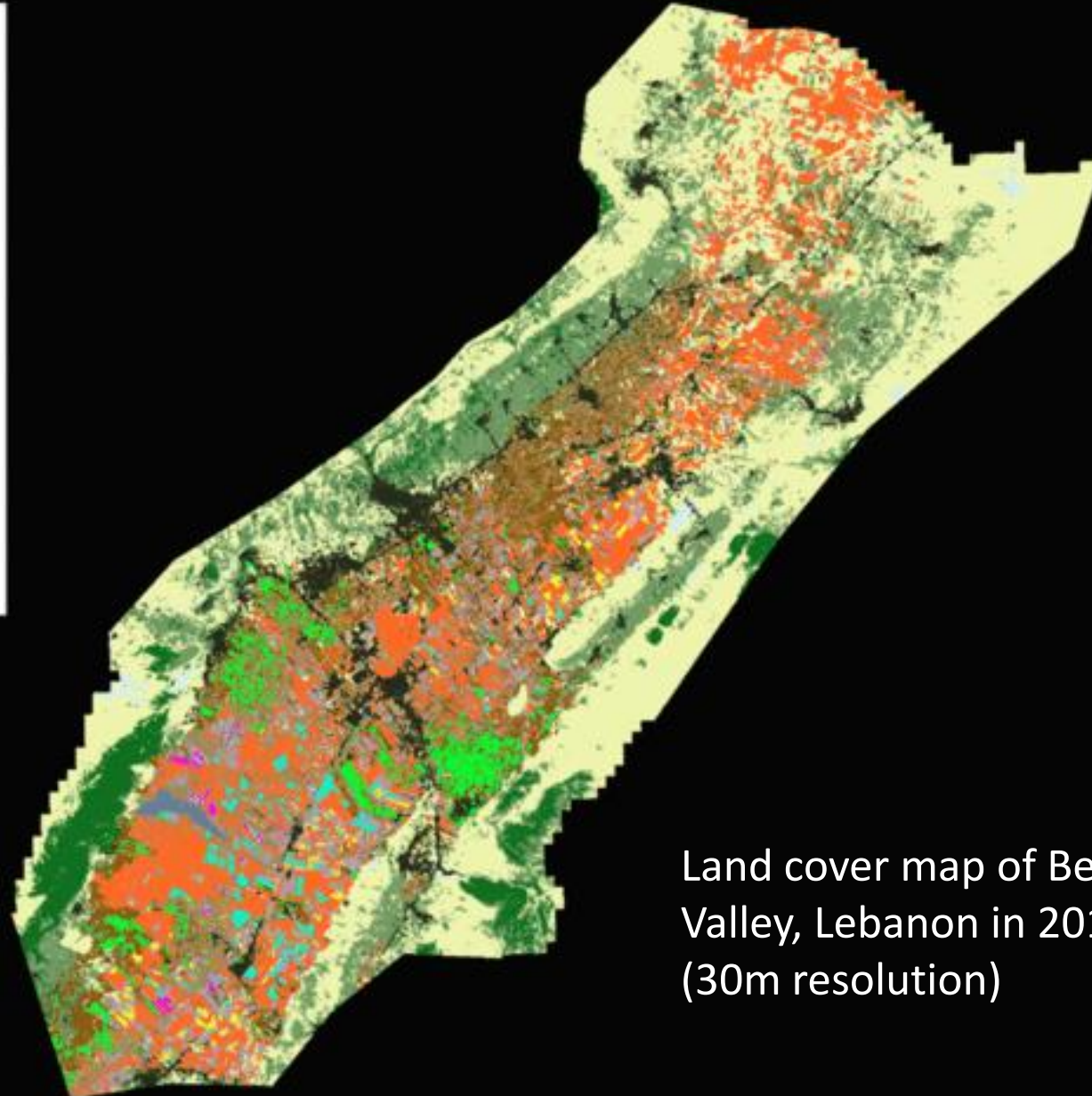




January 1-10

LandCover\_1701

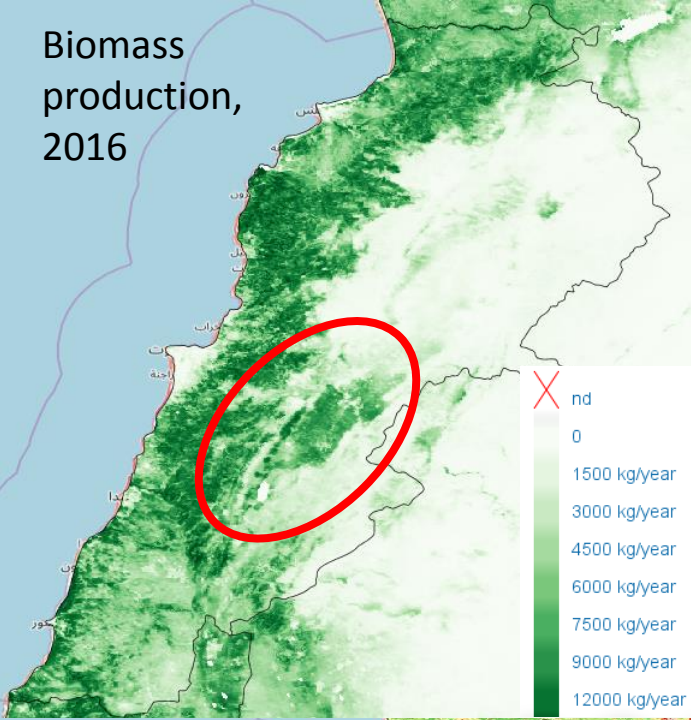
- 1-Woodland
- 4-SparseGrass
- 5-Bare
- 7-Urban
- 8-Wheat
- 9-Maize
- 10-Potato
- 11-Vegetables
- 12-Fallow
- 13-Orchard
- 14-Olive
- 15-Vineyard
- 16-HillsidePerennial
- 17-Wetland
- 21-Other crop
- 50 - Other perennial



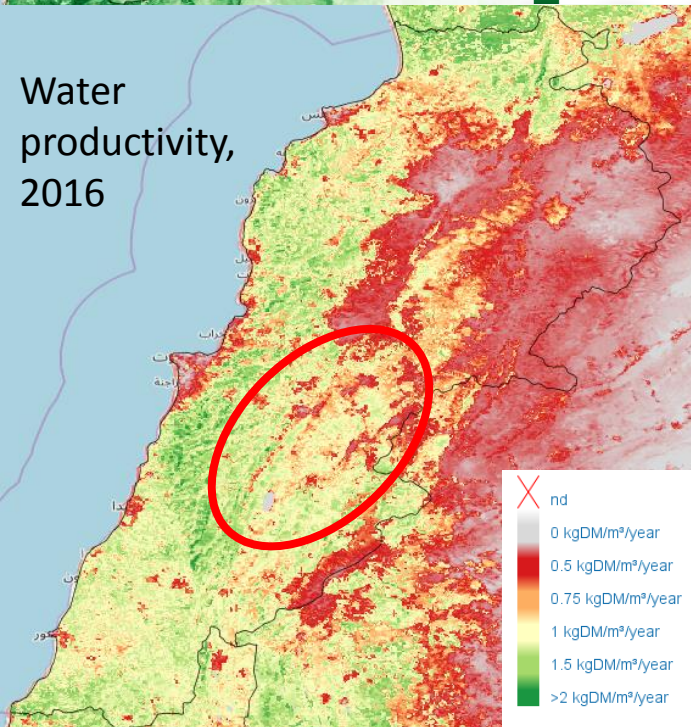
Land cover map of Beqaa Valley, Lebanon in 2017 (30m resolution)



Biomass  
production,  
2016



Water  
productivity,  
2016

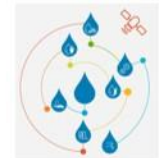


3

How productive is agricultural  
water use?

## Water productivity

*More crop, per drop.* Water productivity  
varies in space and time depending on  
management

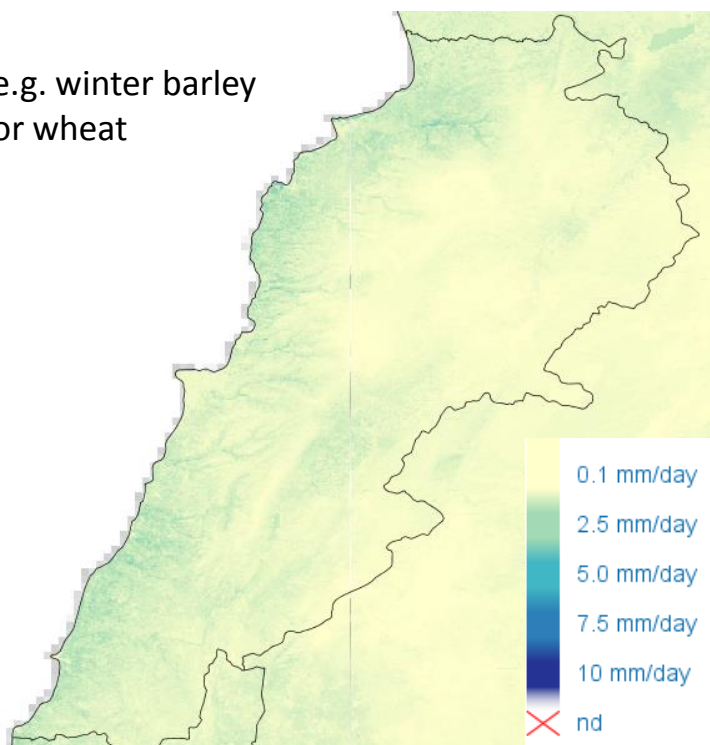




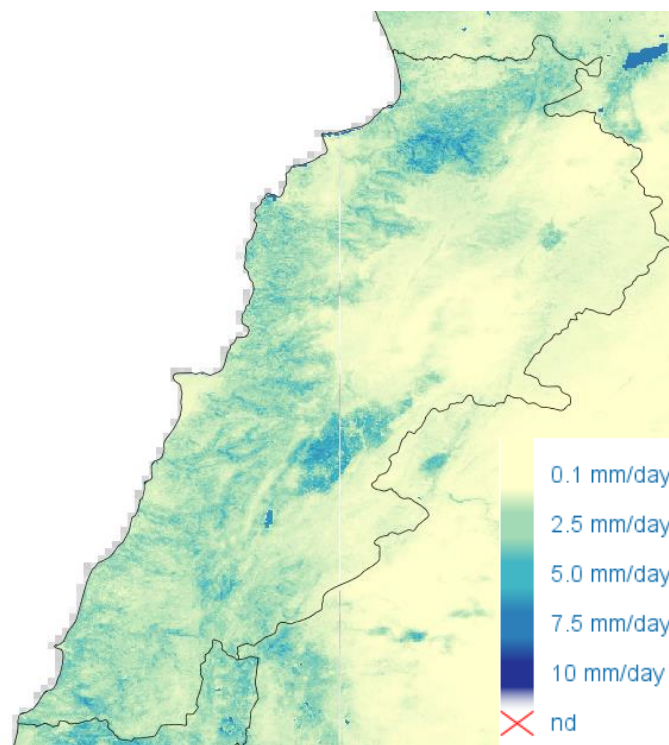
# Actual Evapotranspiration in Lebanon (100m resolution)

**31 January 2015** – wet winter;  
growing period of winter crops

e.g. winter barley  
or wheat

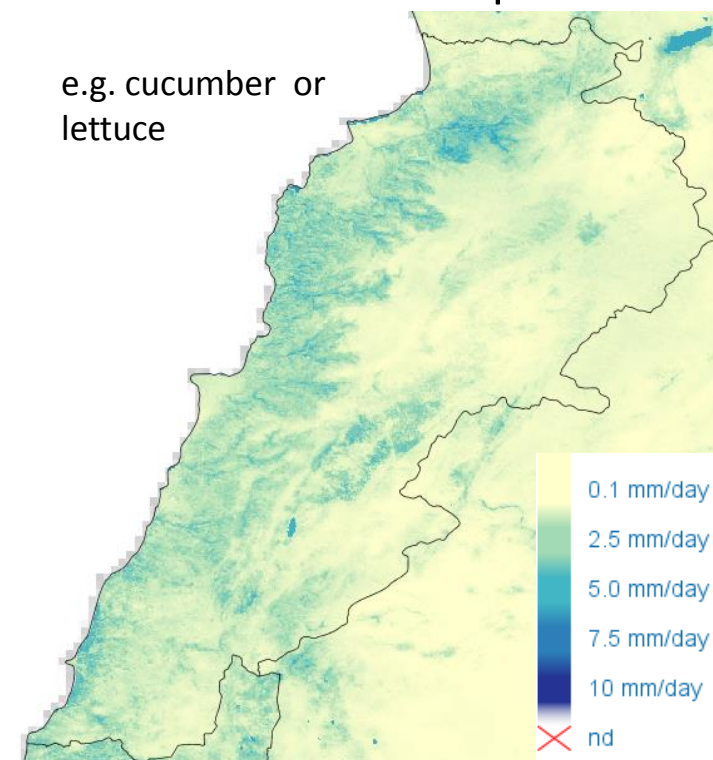


**31 May 2015** – harvest period of  
winter crops



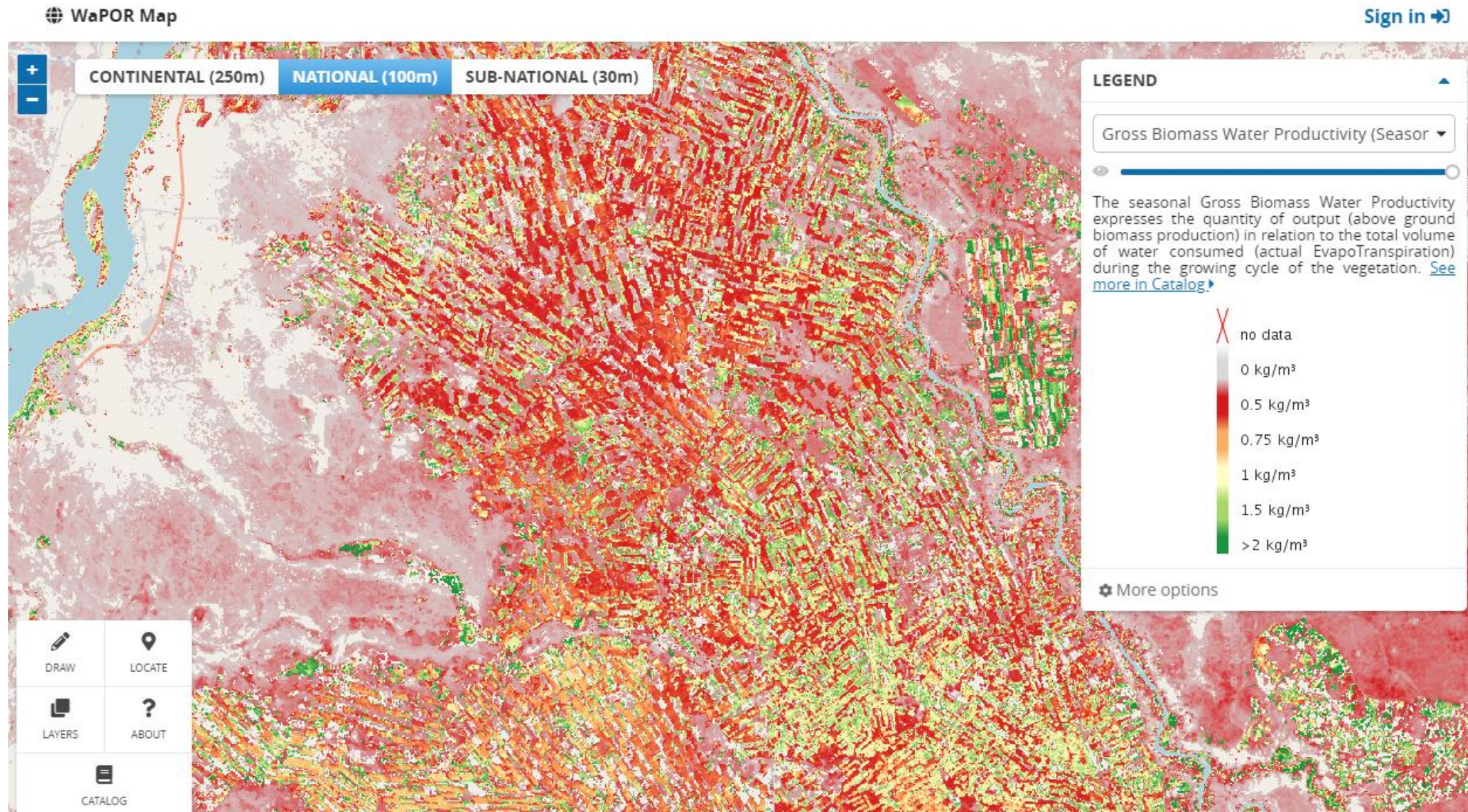
**30 September 2015** – end of dry  
summer and growing period of  
summer crops

e.g. cucumber or  
lettuce





# Identify where and why investments are needed (most effective)





# Unleashing the Power of ICT

1. Water accounting is hard  
*(but getting easier)*
2. Enforcing recommendations  
(think water allocation,  
consumption limits...) are even  
harder *(but can be phased in)*

