Water Productivity

Lenneke Knoop
April 13, 2017
Who am I

- Wageningen University – Tropical landuse
- Internship in 2006
- Communication embedded in MetaMeta workflow
Goals and program

- Get an idea on Water Productivity
- Water Productivity in the Dutch policy
- Data vs Implementation
- Your own Water Productivity Challenge
- MetaMeta and the master class series on water productivity
What is Water Productivity?

Take a minute to write your idea on water productivity in one sentence down on a post it
Water challenges: Did you know that?

- Of all land that is irrigated, **20% is too salty** to farm. This means 1.6 million hectares are lost every year.
- In just over a decade we lost **groundwater equivalent to 40 million Olympic-size swimming pools**.
- Due to human activity, many **deltas are sinking 5 times faster** than sea levels are rising.
Agriculture

- Double the amount of food production for the world by the end of this century > less water available.
Dutch Policy and Water goals

Access to Drinking water en Sanitation

Improve delta management for safety

Increase water productivity in agriculture with 25%
Why focus on Water Productivity

- Each project has its own indicators
- Difficult to compare
- Impossible to say something about efficient water use on farm, basin, regional and country level.
- With Water Productivity as indicator, it will be possible to compare the water use in different projects/regions/countries, resulting in a reliable overview of water use worldwide.
- Bangladesh
- Benin
- Ethiopia (food security)
- Ghana
- Indonesia
- Kenya
- Mali
- Mozambique
- Palestine territories
- Rwanda
- South Sudan
- Yemen
What is Water Productivity?

- Amount of crop production we can obtain from a volume of water (crop per drop) e.g. kg crop per cubic meter water.

- Water efficiency is not the same as water productivity
  - Efficiency represents the percentage or ratio of output divided by input, both with the same units.
  - Productivity is a different term and refers to what we can produce from a unit of input, it is also a ratio of output to input but both do not need to have the same units, e.g. WP is 50 kg grains per 1 m$^3$ of water.

- Yield in money vs kg?
Databases

- Remote sensing measuring evapotranspiration and biomass
- Resulting in maps representing the potential of water productivity of a certain crop
Differences in 1 area, the Indus

- WP Pakistan: 1000 l for 1 kg
- WP India: 1000 l for 1.4 kg
- Why??
- Potential?
- Important: check reality to see what is going on
FAO database

<table>
<thead>
<tr>
<th>Data component</th>
<th>Temporal resolution</th>
<th>Level I (250m) Africa and Near East</th>
<th>Level II (100m) 18 countries and 4 River Basins</th>
<th>Level III (30m) 4 pilot areas of ~100,000 ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual ET (separate E and T)</td>
<td>Decadal</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Above ground biomass production</td>
<td>Decadal / Seasonal</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Crop calendars</td>
<td>Seasonal</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Harvest Index</td>
<td>Seasonal</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Reference ET (20 km resolution)</td>
<td>Daily</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Precipitation (5 km resolution)</td>
<td>Daily</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Land cover / Crop classification</td>
<td>Seasonal</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Level 1** – For major land cover classes:
- Total Biomass Water Productivity
- Biomass Water Productivity under rainfed conditions
- Biomass Water Productivity under Irrigated conditions
- Water Productivity Score

**Level 2** – For three main cereals (maize, rice, wheat):
- Total Crop Water Productivity
- Rainfed Crop Water Productivity (under rainfed conditions)
- Irrigated Crop Water Productivity (under Irrigated conditions)

**Level 3** – For all major crops in the scheme / sub-basin:
- Rainfed Crop Water Productivity (under rainfed conditions)
- Irrigated Crop Water Productivity (under Irrigated conditions)
- Economic Water Productivity
Database then what? Knowledge to implementation

- How can farmers, NGOs, policy makers use this database?
- What needs to happen to transfer knowledge to implementation?
- What are the applications?
- Open access?
Discussion assignment in 2 groups

1. What is the applicability of Water Productivity and such databases for farmers?
2. How is Water Productivity useful for water managers / decision makers at river basin scale?

Draw upon own experience. Think about challenges, opportunities, needs
Example SWA Kenya

- Smart Water for Agriculture in Kenya, funded by Dutch embassy
- Targeting 20,000 farmers through smart water solutions
- Increasing water productivity

Challenges

- Access to data (instead actual evapotranspiration gross amount of water used)
- Higher WP is not first thing on farmers mind (reducing costs in terms of labour, fertilizer etc.)
- Water availability and distribution seems more important to address
- Social relevance, where to invest to improve livelihoods?
Concluding remarks

- Promising database
- Common indicator has advantages
- But... there so much more than a database
- Need to invest in applications and knowledge / experience sharing
- Ground checking is very very important
Water Productivity Challenge

- Who has reached the highest water productivity of her/his own plant at the end of the internship?

- Think about:
  - Evaporation (permeable pots)
  - Fertilizer
  - Water buffers
  - Quick yield vs large quantities of water
  - Soil
  - Temperature
  - Etc. etc.
Master classes
Setup Master classes

- Appr. 3 hours
- 20 participants
- 1st part content, presentations
- 2nd part discussion, cooperation
- Located at host (where possible)
- Outputs on www.thewaterchannel.tv/waterproductivity
- Announcements shared by mail, NWP newsletter
- Registration
Master Class 2: Water productivity in rainfed agriculture

May 10 (Wednesday), 16:30 – 19:15, hosted by RAIN

1. In-situ solutions, examples Uganda, 3R (RAIN)
2. Managing green water
3. Landscape approach, examples (Justdiggit)
Master Class 3: Water productivity and basin management

May 31 (Wednesday), 16:30 – 19:15, hosted by MetaMeta

1. Managing blue water
   - Applications in irrigation
2. Link to groundwater management (RAIN / Acacia Water)
3. Link to value chains and trademarks
4. Policy levels (zooming out again)