Annex 4: Guidance for Irrigation Efficiency and Water Productivity indicators

Calculation of the rainfall data and daily Kc values
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<tr>
<th>Swiss Confederation</th>
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<td>State Secretariat for Economic Affairs SECO</td>
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1 The four Delta Project partners are: Better Cotton, the Global Coffee Platform (GCP), the International Coffee Organisation (ICO), and the International Cotton Advisory Committee (ICAC).

2 Annex 4: Guidance for Irrigation Efficiency and Water Productivity Indicators
A guide to obtaining rainfall data

Rain gauges can be sourced from hardware or gardening supply stores, or even homemade (an internet search can provide a variety of prototypes, e.g., https://www.education.com/science-fair/article/DIY-rain-gauge/ made from a drink bottle).

Volume of rain is recorded after each event (in millimetres) in a rainfall chart (e.g., https://qrida-files.s3.ap-southeast-2.amazonaws.com/s3fs-public/2020-10/QRIDA%20Rainfall%20Chart%202021_FILLABLE.pdf) and summed over the growing season. In the example below, 10 mm was recorded on 2nd January, 20 mm on 5th January and 5 mm on 6th January, giving a total of 35 mm for the month to date.

Rainfall data can also be obtained from meteorological data. For instance, official rainfall data from the Meteorological Department for India can be found at: https://mausam.imd.gov.in/imd_latest/contents/rainfall_statistics_3.php
A guide to obtaining daily Kc values from IrriSAT

Step 1: Open the IrriSAT page: https://irrisat-cloud.appspot.com/

Step 2: Create account and sign in.

Step 3: Navigate map to region of interest.

Step 4: Locate sample fields and zoom in.

Step 5: Create a polygon for each sample field by first pressing the plus sign (indicated below with light blue circle) from the control buttons at the top of the screen.
Step 6: This will promote you to “Add a new field”.

Step 7: Click the cursor on each corner of the field to mark out the polygon.
Step 8: Enter a name for the field and click "Add".
Step 9: Repeat for all sample fields.

Step 10: To access fields and extract Kc values, click the "My Fields" button.
**Step 11:** Chose a field by clicking on the name of the field and the map will zoom to that field.

**Step 12:** Click within the polygon.

**Step 13:** A dialogue box will come up for that field.

**Step 14:** Wait while it loads.
**Step 15**: IrriSAT will calculate the crop coefficient box at the top but the evapotranspiration box will fail as the reference ET is linked to the Australian Bureau of Meteorology, and no reference ET is available for areas outside Australia.
Step 16: To extract the daily Kc values, click the "Data" tab at the bottom left of the "Crop Coefficient" box.
**Step 17:** Now click the “Field Settings” tab (cog icon).

**Step 18:** Fill in the appropriate “Planting Date” and “Harvest Date” and remember to click the adjacent blue “Apply” button after completing both.
Step 19: Now click on the “Crop Health” tab (plant icon).

Step 20: You can now extract the Kc data for the selected period by clicking the “Download CSV” tab.
**Step 21:** Once you have downloaded this file, open it in a spreadsheet.

**Step 22:** The Kc average and date (columns A and C) are all that is needed from this output. But please note that where Field Visibility (%) was zero (during the satellite pass), there will be no Kc estimate for the period until the next pass of the satellite. These will be indicated by a Kc value of negative 999. All negative Kc values will need to be corrected. Instead use the previous Kc value (row above) or an average of the previous and next values (average row above and row below).

**Step 23:** You can now input reference ET0. In the example below, reference ET0 is taken from Giridhar et al. Figs 1-12 were calculated on a monthly time frame.

**Step 24:** The next step is to calculate the ETc by multiplying the Kc by the corresponding ET0 values.

**Step 25:** Finally, to calculate cumulative ETc, multiply ETc (column D below) by the number of days between readings (8 days), this will give the cumulative ETc over those 8 days (column F). The sum of all cumulative ETc values over the growing season gives the overall crop water use of cumulative ETc.
## Annex 4: Guidance for Irrigation Efficiency and Water Productivity Indicators

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
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<tbody>
<tr>
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<td>3.0</td>
<td>5.0</td>
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<td>6</td>
<td>7.5</td>
<td>8.0</td>
<td>16.0</td>
<td>17.0</td>
</tr>
</tbody>
</table>

**Legend:**
- **A**: Year
- **B**: Reference Year
- **C**: Irrigation Efficiency
- **D**: Water Productivity

**Notes:**
- Use the above table to calculate the performance indicators for each year.
- Ensure all data is accurate and up-to-date.

**References:**

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**Table Example:**

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<td>2020/02/01</td>
<td>4.5</td>
</tr>
<tr>
<td>2020/02/15</td>
<td>5.0</td>
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**Figure:**

- Graph showing trends in irrigation efficiency and water productivity over the years.
- Bar chart comparing performance indicators across different regions.

**Summary:**
- Annex 4 provides detailed guidance on calculating irrigation efficiency and water productivity indicators.
- These indicators are crucial for assessing the sustainability and efficiency of irrigation systems.

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**Additional Resources:**
- World Bank (2022).
- FAO (2023).