


UN WATER
Integrated Monitoring Initiative for SDG 6

Cr Calculation

Proportion of agricultural GVA produced by rainfed agriculture

Monitoring of SDG 6.4 Indicators for the Countries of the Near East and North Africa
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Riccardo Biancalani – Project Coordinator
Integrated Monitoring Initiative for SDG6, FAO

C_r = Proportion of agricultural GVA produced by rainfed agriculture

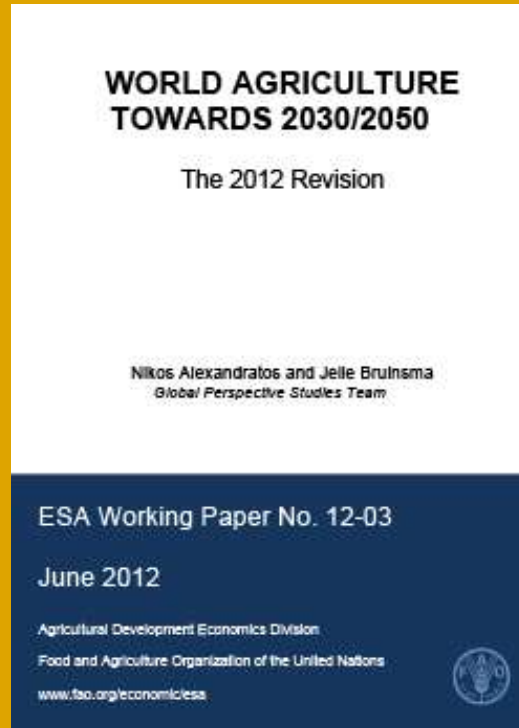
$$C_r = \frac{1}{1 + \frac{A_i}{(1 - A_i) * Y}}$$

Where:

A_i = proportion of irrigated land on the total cultivated land, in decimals

Y = ratio between rainfed and irrigated yields (generic default ratio: 0.5625)

Yield ratio



<http://www.fao.org/3/a-ap106e.pdf>

- 20% of areas in the world are irrigated and produce 40% of the world crop production [$(20 \cdot 60) / (80 \cdot 40) = 0.375$]
- Perspective study based on yields and areas (irrigated and rainfed) by country and by crop
- Irrigated and rainfed yields available for 95 countries → Yield ratio for each crop → Area weighted average ratio by country (0-1)
- Average Y for 95 countries: 0.5625 instead of 0.375 (default value)

Yield ratio: example for Philippines (data from AT 2030/2050)

Crop	Rainfed Area	Rainfed Yield	Irrigated Area	Irrigated Yield	Total Area (A)	Yield Ratio (R)
Rice	2382	3439	1785	4033	4167	3439/4033=0.853
Maize	2457	2330	97	3106	2554	2330/3106=0.750
Sugarcane	316	74660	65	126075	381	74660/126075=0.592
Vegetables	565	7998	38	15849	603	7998/15849=0.505
Banana	414	15858	14	21145	428	15858/21145=0.75
Citrus	35	7098	2	9464	37	7098/9464=0.75
Groundnut	15	927	12	1235	28	927/1235= 0.75
Tobacco	3	1022	24	1363	27	1022/1363=0.75
Total					8225	

Country average weighted by areas: 0.777

$$= \frac{[(\text{Ratio} * \text{Area})_{\text{Rice}} + (\text{R} * \text{A})_{\text{Maiz}} + (\text{R} * \text{A})_{\text{Cane}} + (\text{R} * \text{A})_{\text{Veg}} + (\text{R} * \text{A})_{\text{Bana}} + (\text{R} * \text{A})_{\text{Citrus}} + (\text{R} * \text{A})_{\text{Tobac}} + (\text{R} * \text{A})_{\text{Ground}}]}{\text{Total Area}}$$

Ai

Proportion of irrigated land on cultivated land

- Cultivated land = Arable land + Permanent crop (“Cropland” in FAOSTAT)
- Irrigated land :
 - 1st and best option: Total harvested irrigated area (double cropping counted twice)
 - 2nd option (estimation): Total area equipped for irrigation actually irrigated (physical area)
 - 3rd option (not desirable): Total area equipped for irrigation
- Ai is considered 100% in few arid country (Djibouti, Egypt, Kuwait, Oman, Qatar, Saudi Arabia, Turkmenistan, United Arab Emirates) where all crop production is considered irrigated

Example of C_r computation for Philippines

Cultivated land = 10 940 000 ha
Irrigated land = 3 300 000 ha

$$A_i = 0.302$$

$$C_r = \frac{1}{1 + \frac{A_i}{(1-A_i) * 0.777}} = 0.643$$

0.543

0.556

1.556

Cr & Ci

C_r = Proportion of agricultural GVA produced by rainfed agriculture

C_i = Proportion of agricultural GVA produced by irrigated agriculture

$$C_i = 1 - C_r$$

Y & Yi

Y = Ratio between rainfed and irrigated yields

Y_i = Ratio between irrigated and rainfed yields

$$Y_i = 1/Y$$

External resources

Guidelines for calculation of the agriculture water use efficiency for global reporting

<https://www.fao.org/documents/card/en/c/cb8768en>

Available in Arabic, English, French

