

Hydrological Analysis for Agricultural Water Availability in a Semi-Arid Terraced Catchment

A Case Study from Ta'izz Government, Yemen

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**To my son
Moritz Paul Dagobert**

Lebenslauf Gerhard D. Rappold

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Preface

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List of Abbreviations

Abbreviations

AMC	available moisture content
AREA	Agricultural Research and Extension Authority
CDF	cumulative density function
E	East
e_a	actual vapour pressure
e_s	saturation vapour pressure
E_S	evaporation from bare soil
e_{sa}	saturation vapour pressure for given air temperature
E_{SO}	maximum evaporation from soil surface
ET	evapotranspiration
ET_0	reference evapotranspiration
ET_{act}	actual evapotranspiration
ET_c	crop evapotranspiration
ET_{pot}	potential evapotranspiration
FAO	Food and Agricultural Organisation
g	gravitational acceleration 9.81 m/s ²
G	soil heat flux
G_d	soil heat flux density
GDP	gross domestic product
GEV	generalised extreme value distribution
HDI	human development index
IDAS	Innovation Development Agricultural Sector
ITCZ	inter-tropical convergence zone
ϕ	runoff coefficient
k_c	crop coefficient
k_{cb}	basal crop coefficient
k_e	evaporation coefficient
k_r	evaporation reduction coefficient
k_s	water stress coefficient
LAI	leaf area index
m a.s.l.	meter above sea level
MDMC	National Drought Mitigation Center
N	North

Abbreviations

NWRA	National Water Resource Authority
P	precipitation, total rainfall
PDRY	Peoples Democratic Republic of Yemen
P_{eff}	effectiv rainfall
P_F	precipitation computed from the probability function
P_i	precipitation during time step i
PM	potentially available moisture
PM	Penmann-Monteith-equation
PWP	permanent wilting point
Q	runoff
q_{WH}	discharge on the water harvesting zone
Q_i	runoff during time step i
θ_{FC}	water content at field capacity
θ_{FC} .	soil water content at field capacity
θ_V	volumetric water content
θ_{WP}	water content at wilting point
θ_{WP}	soil water content at wilting point
RAW	readily available water
REW	readily evaporable water, maximum amount of water that evaporates at full potential
REW_{cor}	corrected readily evaporable water
RH	relative humidity
R_n	net radiation at the crop surface
RRA	rapid rural appraisal
RSCZ	Read Sea convergence zone
SC	stone content
S	South
S	potential maximum retention
s_a	slope of vapour pressure
SCS	Soil Conservation Service
SWSI	social water stress index
TAW	total available water
TDR	time domain reflecting method
TEW	total evaporable water
TEW_{cor}	corrected total evaporable water

Abbreviations

TIN	triangle irregular network
UNDP	United Nation Development Program
UNESCO	United Nation Educational, Scientific and Cultural Organisation
W	West
WC	volumetric water content
WH	water harvesting
YAR	Yemen Arab Republic