1. Methods to Estimate Effective Rainfall

Current prevailing estimation methods and procedures of effective rainfall (RE), which have been applied for National Irrigation Systems (NISs) in the Philippines, are listed below;

- NIA Irrigation Manual on Irrigation Water Management , prepared by NIA-ADB, 1971
- General Operation and Maintenance Manual, prepared by NIA, Jan. 1991
- Effective Rainfall, Irrigation and Drainage Paper No.25, prepared by FAO

Out of these estimation methods, the first method described in the "NIA Irrigation Manual on Irrigation Water Management" prepared by NIA-ADB in 1971 is deemed to be the most popular and practical way at the field level of NISs.   So, in the Manual NIA-ADB method is proposed as an estimation method of an effective rainfall.

2. NIA-ADB Methods to Estimate Effective Rainfall

Effective rainfall (RE) is defined as a portion of the rainfall which will be stored in the field for subsequent use for both evapo-transpiration (Et) and percolation (P). It is the depth of water resulting from rainfall stored above the original depth of water up to the free board of the border ridge (notch) of each plot of paddy field.

1) Factors affecting Effective Rainfall

The factors affecting effective rainfall are enumerated as follows;

- Intensity and distribution of rainfall
- Depth of standing water in the paddy
- Size and maintenance of farm dikes
- Irrigation method and water delivery interval
- Topography of land
- Facilities for drainage

2) Procedures for Estimating Effective Rainfall

The procedures for estimating effective rainfall (RE) applying NIA-ADB method are described as follows;

a) Select representative monthly and daily rainfall data observed in and around the irrigation service area for the periods of about ten years. Attached Table 01 indicates tabulated 10-day monthly rainfall in Aganan RIS, as a sample.

b) Present the rainfall fluctuation in ten day decade in graph showing the monthly rainfall distribution (refer to attached Figure 01)

c) Select wet and dry seasons in the Figure. The wet season is of from May to October in this example.

d) Make a table showing an average daily rainfall and number of rainy day in decade basis (see attached Table 02

e) The rates of Percolation (P) and Evapo-transpiration (Et) are derived as the water management parameters. In case of Aganan RIS, P and Et are 1.06 mm/day and 5.60 mm/day respectively. Therefore, the rainfall in excess of 66.6 mm ((1.06 mm/day + 5.60 mm/day) x 10-day) for decade of 10-day period can not be used effectively. If the decade rainfall is less than 66.6 mm, the percentage of effective rainfall is 100 percent. Take the third decade of May as an example, efficiency rate is 41.2 percent (66.6/161.57 x 100). This means that 94.97 mm of rainfall is ineffective during the decade. The average percentage in dry and wet seasons is 100 percent in dry season and 81.9 percent in wet season.

f) The average total rainfall is 289.5 mm for dry season and 1,423.4 mm for wet season, but the effective rainfall is 289.5 mm and 1,034.0 mm, respectively (refer to attached Figure 01).

3. Format for Calculation of Effective Rainfall

Based on the above mentioned procedures monthly average effective rainfall to be applied for individual irrigation system (NIS) could be calculated. To calculate the effective rainfall, following calculation formats are attached for the references.

Form 01 : Daily Rainfall Records (mm/day)
Form 02 : Analyzed Rainfall Distribution based on Every 10-Day Period and Calculation of Effective Rainfall
Form 03 : Analyzed Monthly Rainfall Distribution in 10-Day

Form 01 Daily Rainfall Records (2004)
(Station :   )

Months/Days	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	sept.	Oct.	Nov.	Dec.
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
Sub-Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
Sub-Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												
Sub-Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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Form 02   Analyzed Rainfall Distribution based on Every 10-Day Period in   RIS (Region-) (-) and Estimation of Effective Rainfall

Month	Decade	(A) (mm/10day)	(B) (day)	(A) (mm/10day)	(B) (day)	(A) (mm/10day)	(B) (day)	(A) (mm/10day)	(B) (day)	(A) (mm/10day)	(B) (day)	(A) (mm/10day)	(B) (day)	(A) (mm/10day)	(B) (day)	Average (A) (mm/10day)	Average (B) (day)	Percentage of Effective Rainfall (%)	Average Effective Rainfall (mm/10day)	Monthly Average Daily Effective Rainfall (mm/day)	Seasonal Average Rainfall Total Rainfall (mm)	Seasonal Average Rainfall Effective Rainfall (mm)	Remarks
Jan.	1															0.00	0.0	100.0	-				Dry Season
	2															0.00	0.0	100.0	-	-			
	3															0.00	0.0	100.0	-				
Feb.	1															0.00	0.0	100.0	-				
	2															0.00	0.0	100.0	-	-			
	3															0.00	0.0	100.0	-				
Mar.	1															0.00	0.0	100.0	-				
	2															0.00	0.0	100.0	-	-			
	3															0.00	0.0	100.0	-				
Apr.	1															0.00	0.0	100.0	-		-	-	
	2															0.00	0.0	100.0	-	-			
	3															0.00	0.0	100.0	-				
May	1															0.00	0.0	100.0	-				Wet Season
	2															0.00	0.0	100.0	-	-			
	3															0.00	0.0	100.0	-				
June	1															0.00	0.0	100.0	-				
	2															0.00	0.0	100.0	-	-			
	3															0.00	0.0	100.0	-				
July	1															0.00	0.0	100.0	-				
	2															0.00	0.0	100.0	-	-			
	3															0.00	0.0	100.0	-		-	-	
Aug.	1															0.00	0.0	100.0	-				
	2															0.00	0.0	100.0	-	-			
	3															0.00	0.0	100.0	-				
Sept.	1															0.00	0.0	100.0	-				
	2															0.00	0.0	100.0	-	-			
	3															0.00	0.0	100.0	-				
Oct.	1															0.00	0.0	100.0	-				
	2															0.00	0.0	100.0	-	-			
	3															0.00	0.0	100.0	-				
Nov.	1															0.00	0.0	100.0	-				Dry Season
	2															0.00	0.0	100.0	-	-			
	3															0.00	0.0	100.0	-		-	-	
Dec.	1															0.00	0.0	100.0	-				
	2															0.00	0.0	100.0	-	-			
	3															0.00	0.0	100.0	-				
Total/Ave.		-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0.0	100.0	-	-			

(A) :   Total rainfall in every 10-day (mm)

(B) :   Number of rainy days (day)

Percolation (P)   :   mm/day

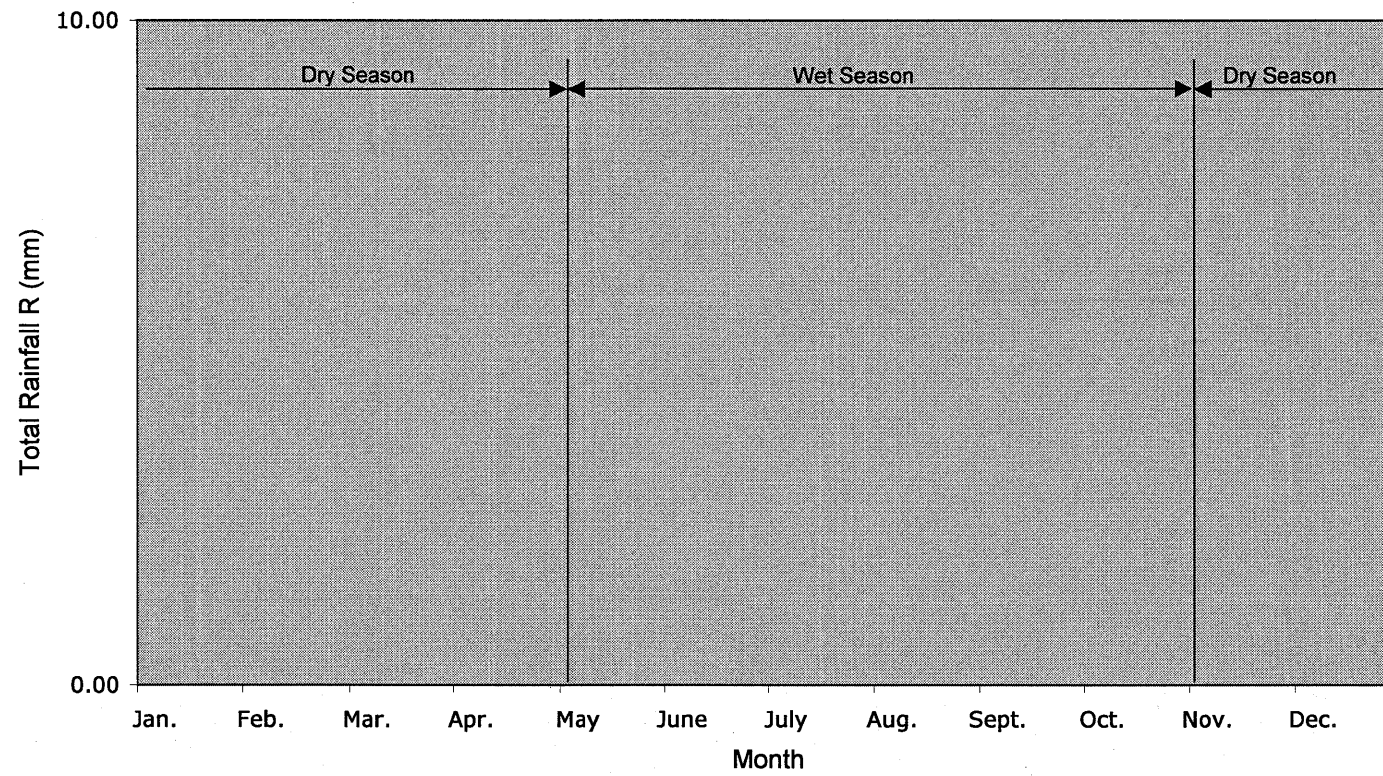Evapo-transpiration (Et)   :   mm/day

Percentage of Effective Rainfall (%):   R10 < (P + Et) x 10 :   100

R10 > (P + Et) x 10 :   ((P + Et) x 10 x 100/R10

Form 03

Analyzed Monthlt Rainfall Distribution in 10-Day

Total Rainfall R (mm)

10.00

0.00

Dry Season

Wet Season

Dry Season

Jan.　Feb.　Mar.　Apr.　May　June　July　Aug.　Sept.　Oct.　Nov.　Dec.

Month

Form CT-1 (1)　Classification of NIS Facility Scale for the Sector of Functionality of Irrigation and Drainage Facilities

NO.	Region	NIS	Diversion Dam Name	Srevice Area (ha)	Intake Discharge (m³/sec)	Flood Discharge (m³/sec)	Diversion Dam		Spillway (weir, gate)			Sluice Way (gate)			Intake (gate)			Protection Dike		Protection Side-wall	
							Width (m)	Height (m)	Width (m)	Height (m)	Length (m)	Width (m)	Height (m)	No. (set)	Width (m)	Height (m)	No. (set)	Length (m)	Height (m)	Length (m)	Height (m)
Maximum				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Large-scale	Maximum			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0.00
	Minimum			1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1	0.01	0.01	1	0.01	0.01	0.01	0.01
Medium-scale	Maximum			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0.00
	Minimum			1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1	0.01	0.01	1	0.01	0.01	0.01	0.01
Small-scale	Maximum			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0.00
	Minimum			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0.00
1	CAR	Upper Chico	Chico																		
			Talaca Catch																		
2		Hapid																			
3		West Apayao Abulog																			
4	Region I	Bonga PIS-1	Bonga # 1																		
5		Bonga PIS-2	Bonga # 2																		
6		Bonga PIS-3	Bonga # 3																		
7		Laoag Vintar	Vintar																		
8		Nmc Pasuquin	N/A																		
9		Dingras	Dingras Int.																		
10		Bolo	N/A																		
11		Cura	Cura Int.																		
12		Nueva Era	Nueva Era																		
13		Madongan Area	Madongan																		
14		Solsona Area	Solsona																		
15		Labugaon Area	Labugaon																		
16		Papa Area	Papa																		
17		Sta. Maria-Burgos	Sta. Maria-Burgos																		
18		Sta. Lucia-Candon	Sta. Lucia-Candon																		
19		Tagudin	N/A																		
20		Amburayan	Amburayan																		
21		Ambayoan	Ambayoan Int.																		
22		Ambayoan-Extension																			
23		Dipalo	Dipalo																		
24		Masalip	Masalip																		
25		Lower Agno	Lower Agno Int.																		

NO.	Region	NIS	Diversion Dam Name	Srevice Area (ha)	Intake Discharge (m³/sec)	Flood Discharge (m³/sec)	Diversion Dam Width (m)	Height (m)	Spillway (weir, gate) Width (m)	Height (m)	Length (m)	Sluice Way (gate) Width (m)	Height (m)	No. (set)	Intake (gate) Width (m)	Height (m)	No. (set)	Protection Dike Length (m)	Height (m)	Protection Side-wall Length (m)	Height (m)
205	Region XIII	Simulao	Simulao																		

No. of Diversin Dam (unit: No.)

Scale of Diversion Dam	Srevice Area	Intake Discharge	Flood Discharge	Diversion Dam Width	Height	Spillway (weir) Width	Height	D/S Apron Length	Sluice Way (gate) Width	Height	No.	Intake (gate) Width	Height	No.	Protection Dike Length	Height	Protection Side-wall Length	Height
Large-scale	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium-scale	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Small-scale	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Percentage of Diversion Dam (unit: %)

Scale of Diversion Dam	Srevice Area	Intake Discharge	Flood Discharge	Diversion Dam Width	Height	Spillway (weir) Width	Height	D/S Apron Length	Sluice Way (gate) Width	Height	No.	Intake (gate) Width	Height	No.	Protection Dike Length	Height	Protection Side-wall Length	Height
Large-scale	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Medium-scale	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Small-scale	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Total	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!