



Operational manual for the issuance of bulletins trough the flood and drought EWS platform myDewetra-VOLTALARM



June 2024





CONTENTS

INTRODUCTION	3
Impact bulletin for extreme precipitation and floods	4
1.1. Roles and responsibilities for the issuance of impact-based rainfall-flood bulletin	6
1.2. Procedures and operational steps for the issuance of impact-based raint flood bulletin	fall- 7
Impact-based drought monitoring bulletin	16
2.1. Roles and responsibilities for the issuance of impact-based drought monitoring bulletin	19
2.2. Procedures and operational steps for the issuance of impact-based dro monitoring bulletin	ught 20



INTRODUCTION

Within the framework of the Volta Flood and Drought Management (VFDM) project, it was foreseen the customization and implementation of a dedicated tool and the elaboration of operational procedures for the coproduction and issuance of early warning bulletins for floods and drought under the myDewetra-VOLTALARM EWS (Early Warning System). The early warning bulletins and their operational procedures integrates the results of the impact-based flood forecasting system based on the Continuum hydrological model, and the results of the drought combined index, developed for the drought monitoring in the Volta basin and based on available global satellite datasets.

The implementation of both type of bulletins, to be elaborated through the Bulletin application integrated into the myDewetra-VOLTALARM EWS platform, have been designed for supporting early warning and decisionmaking both at transboundary and local level (according to mandates and protocols existing in the 6 riparian countries).

A participatory approach has been used and discussion and coordination meetings have been realized to collect needs and requirements from all the stakeholders to:

- carry out the necessary IT activities to customize and adapt the Bulletin tool for regional and national use in the Volta Basin countries
- define roles and responsibilities and elaborate the procedures for the production and issuance of the bulletins.

Hydrologists and meteorological forecasters, as also agricultural focal points, from the national and regional stakeholders have been actively involved in the process for the design of the bulletin templates, the definition of functionalities of the dedicated app and the elaboration of procedures for the production and issuance. Furthermore, the experts of national civil protection agencies have been also involved as main beneficiaries of the bulletins in order to improve the effectiveness and usefulness of the bulletins for decision-making and anticipatory actions at national and local level.

This participatory approach has been identified and used in order to guarantee full understanding of the process and long-term sustainability (even beyond the project duration) of the myDewetra-VOLTALARM EWS and the bulletins issued through it.



Impact bulletin for extreme precipitation and floods

Real-time impact estimation for population is the main information considered for the co-production of an impact-based warning bulletin covering the whole Volta basin for extreme precipitation and floods. The bulletin template has been co-designed with local stakeholders and it has the following structure:

- A first page with three maps, referring to impact on population due to hydrometeorological conditions forecasted for the next 5 days:
 - o impact of extreme precipitation,
 - o impact of riverine floods
 - a combined assessment of impact of precipitation and floods, showing the highest level of impact between the two hazards considered

The first page also includes a text component which is the general outlook on the Volta basin produced by the Volta Basin Authority (VBA) highlighting main elements coming from the analysis of national stakeholders

- > A second page with
 - For every impact level, an automatic list of regions having an estimate of impact falling in that same impact class due to heavy rainfall
 - A text box with comments and analysis of heavy rainfall hazard and impact conditions from each national meteorological agency of the 6 riparian countries of the Volta Basin
- > A third page with
 - For every impact level, an automatic list of regions having an estimate of impact falling in that same impact class due to riverine flood
 - A text box with comments and analysis of riverine flood hazard and impact conditions from each national hydrological agency of the 6 riparian countries of the Volta Basin
- > A fourth page with
 - o a summary of the methodology and issuance procedure
 - the acknowledgements and institutional logos.

An example from a bulletin issued in September 2023 is presented hereafter.





Figure 1: The Impact bulletin for precipitation and floods in the Volta basin co-produced and issued on 19th September 2023.



Impacts are estimated cross-referencing information on the hazard, exposure, vulnerability and coping capacity. Hazard classes are defined for each hazard based on threshold values from the statistical analysis of past events, historical model run or reference values from the literature.

Through the combination of hazard, exposure, vulnerability and coping capacity information, for each cell grid an estimated number of people potentially affected by extreme precipitation and river floods is calculated daily in real-time. People potentially affected is aggregated by administrative units (level 1) and the relative impact (percentage of people potentially affected compared to the total population of the administrative unit) is also calculated with the following formulas.

$$Impact_{admin} = \sum (Impact_{pixels_in_admin})$$

$$Relative Impact_{admin} = \frac{\sum (Impact_{pixels_in_admin})}{PopTot_{admin}}$$

Regions are color-coded into four impact classes based on increasing rates of population affected, from level 1 (no impact, green) to level 4 (high impact, red).

The four warning classes are based on thresholds of absolute and relative values of impact on population, has been defined together with national and regional stakeholders.

Impact Level	Value Impact
Green: No Impact	0 people
Yellow: Low Impact	< 0.5% admin unit pop
Orange: Medium Impact	< 5% admin unit pop or > 10k people
Red: High Impact	> 5% admin unit pop or > 50k people

Figure 2: Color-coded warning classes of impact for the Extreme Precipitation and Floods bulletin in the Volta basin.

1.1. Roles and responsibilities for the issuance of impactbased rainfall-flood bulletin

The bulletin is co-produced by the VBA (coordinator) and the national meteorological and hydrological agencies through the Bulletin tool, integrated into the myDewetra-VOLTALARM platform.

A procedure for the elaboration and dissemination of the bulletin has been developed with participatory approach and it defines the following roles and responsibilities:



<u>VBA</u>

- Coordination
- Opening the bulletin
- General comment resuming highlights from national agencies and information on water resources (especially at transboundary level)
- Closing of the bulletin
- Dissemination of the bulletin to relevant national stakeholders

National meteorological agencies

- Analysis and comment on meteorological conditions (rainfall) and impacts about its own national portion
- Discussion with peer agencies of neighboring State parties (if needed for sake of coherence)

National hydrological agencies

- Analysis and comment on hydrological conditions (floods) and impacts about its own national portion
- Discussion with peer agencies of neighboring State parties (if needed for sake of coherence)

1.2. Procedures and operational steps for the issuance of impact-based rainfall-flood bulletin

The procedure has been conceived for having 2 bulletins produced every week, on Tuesday and Friday, during the monsoon season (May to November). During dry season, in case of unexpected critical conditions, VBA could request to national agencies to contribute for the issuance of a bulletin on demand.

The procedure foresees the elaboration starts from 07.30 am and it concludes with the dissemination at 2.00 pm. It is composed by several steps:

1. T0 = 07.30 am – 08.00 am (VBA)

VBA verify presence of the layer of multi-hazard impact-based assessment in myDewetra-VOLTALARM





Figure 3: Verification of availability of the layer of multi-hazard impact-based assessement in myDewetra-VOLTALARM

2. T0 = 8.00 am (VBA)

VBA opens a new bulletin in the dedicated application.

M	TYPOLOGIE DE DOCUMENT	Mult	irisque bassin	Volta 🕫			- 1	+	Nouveau
	Multirisque bassin Volta	ID T	Statut T	Date de création 🗸	Dernière Modification	Publié T		16	Actions
		20	023-007 Ouvert	14/06/2023, 16:51	14/06/2023, 17:09	PastPublik	B, C	×	0.5
		20	223-006 Farma	14/06/2023, 16:33	14/06/2023, 16:41	Pas Publik	8° C	1 10 1	0.0
WI MSC		20	223-005 Ferma	14/06/2023, 13:52	14/06/2023, 13:54	Pas Publik	B, C	1 × 1	0.
		20	23-004 Farma	14/06/2023, 12:44	14/06/2023, 12:47	Pas Publik	01 0	1 × 1	01
	2	20	23-003 Ferma	10/06/2023, 15:26	14/06/2023, 08:41	Pas Publié	C ' 1	XI	
🗛 🛛 🖌		20	23-002 Fermi	09/06/2023, 15:28	09/06/2023, 15:29	Pas Publié	01 C	100	0.5
		20	23-001 Ferma	09/06/2023, 13:44	09/06/2023, 15:19	Publik	B 3	1 8 8	0.5
		7 tota	al S						

Figure 4: Opening of a new bulletin for extreme precipitation and floods in the Bulletin tool integrated within myDewetra-VOLTALARM.



3. TI = 08.00 am – 12.00 am (Meteo agencies)

Meteorological agencies analyze the forecasts and impact-based assessment for rainfall available on myDewetra-VOLTALARM and also other data available (local data, other models in use, etc...)



Figure 6: Layer with impact assessment from rainfall over the next 5 days available in myDewetra-VOLTALARM.



4. TI = 08.00 am – 12.00 pm (Hydro agencies)

Hydrological agencies analyze the forecasts and impact-based assessment for floods available on myDewetra-VOLTALARM and also other data available (local data, other models in use, etc...)



Figure 7: Layers on forecast of hazard conditions for floods available in myDewetra-VOLTALARM.



Figure 8: Layers with impact assessment from floods over the next 5 days available in myDewetra-VOLTALARM.

5. TI = 10.00 am - 12.00 pm (Meteo and Hydro agencies)

Every national meteorological and hydrological agency make access to the opened bulletin (through the dedicated and customized Bulletin tool) and note down its own analysis and comments over the situation in its national portion



7						DRE
Ind	ondation	is Togo Mu	ltirisque bassin V	olta		+ Nuovo
		Stato	Data Creazione 🗸	Ultima Modifica	Pubblicato	Azioni
1	2023-007	Aperto	14/06/2023, 16:51	14/06/2023, 17:09	Non Pubblicato	2
	2023-006	Chiuso	14/06/2023, 16:33	14/06/2023, 16:41	Non Pubblicato	2 🖬
	2023-005	Chiuso	14/06/2023, 13:52	14/06/2023, 13:54	Non Pubblicato	2
	2023-004	Chiuso	14/06/2023, 12:44	14/06/2023, 12:47	Non Pubblicato	1
	2023-003	Chiuso	10/06/2023, 15:26	14/06/2023, 08:41	Non Pubblicato	2
	2023-002	Chiuso	09/06/2023, 15:28	09/06/2023, 15:29	Non Pubblicato	2
	2023-001	Chiuso	09/06/2023, 13:44	09/06/2023, 15:19	Pubblicato	2 🖪

Figure 9: Access to the edition mode of the opened bulletin for extreme precipitation and floods from the Bulletin tool integrated into myDewetra-VOLTALARM (e.g. Togo hydrological agency configuration).



Figure 10: User interface for the edition of map and text box of extreme precipitation and flood bulletin in the Bulletin tool for a customized version for an hydrological agency (e.g. Togo one).

If a national agency does not consider necessary to include a dedicated analysis (e.g. no particular impact conditions highlighted), the bulletin will come out with a pre-defined sentence for the respective text box, saying that the impact-based forecast are derived from automated analysis.

6. TI = 08.00 am – 12.00 pm (VBA)

Meanwhile the national agencies work on their contributions to the bulletin, the VBA can access to the setting tool for verifying, adding or modifying the email addresses of the recipients



					Déconnexion	M	Ar aster	nna M ABV V	lapeli olta ▼	i)
Multirisqu	e bassin V	/olta 🕸					+ 1	Nouve	au	
ID	Statut T	Date de création 🗸	Dernière Modification	Publié T				Actio	ns	
2023-008	Ouvert	15/06/2023, 09:57	15/06/2023, 11:14	Pas Publié	ľ	з,	< m	۵	Bi	
2023-007	Fermé	14/06/2023, 16:51	15/06/2023, 09:33	Pas Publié	2	з,	((iii)	۵	3	
2023-006	Fermé	14/06/2023, 16:33	14/06/2023, 16:41	Pas Publié	Z'	3.	(🗇	0		
2023-005	Fermé	14/06/2023, 13:52	14/06/2023, 13:54	Pas Publié	2	3	()	۵	6	
2023-004	Fermé	14/06/2023, 12:44	14/06/2023, 12:47	Pas Publié	2	3	(🗇	۵	3	
2023-003	Fermé	10/06/2023, 15:26	14/06/2023, 08:41	Pas Publié	2	3.5	()	۵	B	
2023-002	Fermé	09/06/2023, 15:28	09/06/2023, 15:29	Pas Publié	Z i	3,	(🔟	۵	3	
2023-001	Fermé	09/06/2023, 13:44	09/06/2023, 15:19	Publié	2	з,	() (m)	0	6	

8 total

Figure 11: Button for accessing the setting tool for the recipient mailing lists for extreme precipitation and floods bulletin from the main user interface of the Bulletin tool.

LLETTINI Version: 1.9.7.ba63	fa07		Anna Mapelli 🗘 Gord Déconnexion Master ABV Volta 🔻
Multirisque t Multirisque bassin Vol	bassin Volta ^{ta}		
RETOUR	Destinataires des e-mails		
Destinataires des e-mails	Mouvelle advesse sewrrielen	anna.mapelli@cimafoundation.org	â
	email@abc.com	nicola.testa@cimafoundation.org	ā
1	Ajouter >	andrea.libertino@cimafoundation.org	â
		samumax@yahoo.fr	面
		tctapsoba@yahoo.fr	â
		charlottenorman72@yahoo.ie	面
		ericmuala25@gmail.com	面
			â Annuler 🔒 Enregistrer 2

Figure 12: The setting tool for recipient mailing list of extreme precipitation and flood bulletins and functions for adding and saving new addresses.

7. T2 = 12.00 pm – 1.30 pm (VBA)

VBA get access to the opened bulletin, it verifies that all national agencies have contributed to the bulletin (via the Preview function). If it's not the case, VBA can check if any agency might need extra-time to contribute via a dedicated whatsapp group created for transboundary EW coordination with national focal points.



					G Déconnexion	Mas	Ann ter AB	a Mape BV Volta V	lli 7
Multirisqu	e bassin V	/olta 🕫				-	► No	ouveau	
ID	Statut	Date de création 🗸	Dernière Modification	Publié 🕇 🦳			A	ctions	
2023-008	Ouvert	15/06/2023, 09:57	15/06/2023, 11:14	Pas Publié	ľ	×	â	0 B	
2023-007	Fermé	14/06/2023, 16:51	15/06/2023, 09:33	Pas Publié	8.0	×	۵.	0 B	
2023-006	Fermé	14/06/2023, 16:33	14/06/2023, 16:41	Pas Publié	e e	; ×	Î	a 6	
2023-005	Fermé	14/06/2023, 13:52	14/06/2023, 13:54	Pas Publié	2 0	×		0 B	
2023-004	Fermé	14/06/2023, 12:44	14/06/2023, 12:47	Pas Publié	e c	×	Ô	0 B	
2023-003	Fermé	10/06/2023, 15:26	14/06/2023, 08:41	Pas Publié	Z C	7 ×	1	06	
2023-002	Fermé	09/06/2023, 15:28	09/06/2023, 15:29	Pas Publié	2 0) x	Î	a B	
2023-001	Fermé	09/06/2023, 13:44	09/06/2023, 15:19	Publié	1 2' - C	×	۵.	0 B	

8 total

Figure 13: Access to the opened bulletin for extreme precipitation and flood for edition from the VBA configuration of the Bulletin tool.

SOLLETTINI Version: 1.9.7.ba63fa07			Anna Mapelli Master ABV Volta ▼
A PAGE D'ACCUEIL / Multirisque bassin Volta 2023-008	PDF Volta Multihazard Multilanguage	AFFICHER L'APERÇU	📓 GÉNÉRER PDF
Ghana			
	Perspectives détaillées pour les pr les prochains 5 jours Valable Du 20/06/2023 to 21/06/2023	C: Full Scree écipitations excremes a	010
Perspectives ABV	Fort	tes Pluies	
	Impact moyen Burkina Faso (Centre-Ouest, Hauts-Bassir	rs)	
Langue originelle	Togo (Plateaux), Mali (Sikasso), Ghana (Eas du Mouhoun, Centre-Sud)	tern, Northern East, Oti, Savannah, Volt	a), Burkina Faso (Boucle
D C B <i>I</i> U S x ₂ x ² - x	Météo Bénin Les prévisions basées sur l'impact sont dérivées d'une analyse automatisée.	ANAM Les prévisions basées sur l'impact sont dérivées	d'une analyse automatisée.
Les prévisions basées sur l'impact sont dérivées d'une analyse automatisée. atelier de formation Cl			
	SODEXAM Les prévisions basées sur l'impact sont dérivées d'une analyse automatioée.	GMet Les prévisions basées sur l'impact sont dérivées	d'une analyse automatisée.
	Mali-Météo Les prévoices basées sur l'impart sont dérivées d'une analyse automatisée.	DGMN Les prévisions basées sur l'impact sont dérivées	d'une analyse automatisée.

Figure 14: Use of Preview function to verify if national agencies contributed to the extreme precipitation and flood bulletin

Finally, VBA can note down its own contribution summarizing main elements from national contributions to provide a general overview of the situation for the entire Volta basin.





Figure 15: User interface for comments from VBA on extreme precipitation and floods bulletin within the Bulletin tool

8. T3 = 1.30 pm – 2.00 pm (VBA)

VBA realizes the final review of the bulletin, it closes the bulletin (no more modification is possible) and it disseminate it via email to the recipients through the dedicated function for semi-automatic transmission

					Déconnexion	ې Maste	Inna Ma ABV Vo	apelli Ita ▼
lultirisqu	e bassin \	/olta 🌼				+	Nouvea	au
ID	Statut 7	Date de création 🗸	Dernière Modification	Publié T		l	Action	IS
2023-008	Ouvert	15/06/2023, 09:57	15/06/2023, 11:14	Pas Publié	2	×	i a	6 /
2023-007	Fermé	14/06/2023, 16:51	15/06/2023, 09:33	Pas Publié	e c	X	0	8
2023-006	Fermé	14/06/2023, 16:33	14/06/2023, 16:41	Pas Publié	e s	×ī	0	
2023-005	Fermé	14/06/2023, 13:52	14/06/2023, 13:54	Pas Publié	e c	×ī	0	8
2023-004	Fermé	14/06/2023, 12:44	14/06/2023, 12:47	Pas Publié	e c	×ī	6	÷.
2023-003	Fermé	10/06/2023, 15:26	14/06/2023, 08:41	Pas Publié	e c	X	0	6
2023-002	Fermé	09/06/2023, 15:28	09/06/2023, 15:29	Pas Publié	22	Xī	0	8
2023-001	Fermé	09/06/2023, 13:44	09/06/2023, 15:19	Publié	2° C	×	0	8

Figure 16: Closure of the bulletin.

	Multirisqu	e bassin \	/olta 🕫						t No	puvea	ų
I	ID	Statut	Date de création 🗸	Dernière Modification	Publié				A	ctions	5
	2023-010	Ouvert	20/06/2023, 08:00	20/06/2023, 08:01	Pas Publié	ľ	C	×	t P	uhlier	
	2023-009	Fermé	16/06/2023, 13:41	16/06/2023, 13:59	Pas Publié	Z	C	×	L	9	5
	2023-008	Fermé	15/06/2023, 11:57	15/06/2023, 19:23	Pas Publié	Z	C	×	m	0	5





Figure 17: Dedicated function for the semi-automatic dissemination via email.

The Bulletin tool has been adapted and customized according to the stakeholders roles and the defined procedure. All the stakeholders can access simultaneously to the Bulletin tool and contribute to the open document according to its own mandate and role, being able to visualize in real-time the contributions of the other stakeholders.

Multirisqu	e bassin \	/olta 🌣										Area M
10	Statut T	Date de création 🗸	Dernière Modification	Publié	1	2	Actions	PAGE D'ACCUEIL / Multirisque bassin Volta 2023-000		PDF Volta Multiburard Multilanguage	е мновнаец	B styles
2023-008	Overt	15/06/2023, 09:57	15/05/2023, 11:14	Pastralit	e o	×B	0.5	2 - 3			XY	29
2023-007	Tama	14/06/2023, 16:51	15/05/2023, 09:33	Patrola	80	H 10	0.5	The second se	- 1	Perspectives détaillées pour les	précipitations automética	
2023-005	Famil	14/06/2023, 16:33	14/05/2023, 16:41	Pas Publik	@ 0	×II	0.5	July 1		Res prochains 5 jours www.lo.antwittet.com/mot		010
2023-005	Famil	14/06/2023, 13:52	14/05/2023, 13:54	Pas Publik	2.0	× 11		12 10 10 10	10		Fyrite Dates	
2023-004	Tama	14/06/2023, 12:44	14/05/2023, 12:47	Pas hubite	12° 12	×II		Perspectives ABV		Butter feet Series Aust. Mark.	-	
2023-003	Terms	10/06/2023, 15:26	14/05/2023, 08:41	Past Publik	8 D	× 11		Large angrefe	_	And the Party of the Owner, Name	a diamon Namuri Kati (N. Sausi an M.	-
2023-002	Termi	09/06/2023, 15:28	09/06/2023, 15:29	Past Publik	12 C	× 11	0.8	0 C B / U 5 x, v' - x		Mana Sava	-	
2023-001	(Terres)	09/06/2023, 13:44	09/05/2023, 15:19	Patro	12 D	×B	0.5	Les prévisions basées sur l'impact sont dérivées d'une analyse automatisée. atalier de formation D				
8 total										1 SOCOM		
									ſ			
									- 1	E Mak Market	COM	

Figure 18: The Bulletin tool for the VBA, allowing the edition of the VBA outlook and real-time access in view-mode to the contributions of the national agencies through the Preview functionality.

The defined procedure has been tested and implemented during the last rainy season and from June to November 2023 a total of around 50 coproduced bulletins have been issued.

For the rainy season of 2024, the procedure is operational, and bulletins are issued regularly twice per week on Tuesday and Friday.



Impact-based drought monitoring bulletin

Every 10 days, various drought monitoring indexes (SPI, SPEI, SSMI, FAPAR) are calculated for different time aggregation. A Combined Drought Index (CDI), inspired by the approach developed by the Copernicus European Drought Observatory (EDO¹), is also calculated in order to have a proper metric of hazard conditions to be used to assess agricultural risk. All the corresponding maps are available on myDewetra-VOLTALARM.



Figure 19: SPEI-3 months, SSMI-10 days and CDI for the 10 days from 11th to 20th February 2024.

¹ https://drought.emergency.copernicus.eu/data/factsheets/factsheet_combinedDroughtIndicator.pdf



Information on exposure and vulnerability have been gathered considering both global and local data and they are used to calculate a combined exposure layer and a combined vulnerability layer for both population agriculture.

An approach for real-time impact assessment has been implemented: it's based on the Combined Drought Index which is further multiplied by the combined (normalized) layers representing exposure and vulnerability for population and agriculture.

The results are 2 maps providing information on potential risk due to drought conditions for population and agriculture.



Figure 20: Example of risk maps for population and agriculture due to drought conditions.

Considering the information provided by the drought monitoring indexes and the drought risk maps, a participatory approach have been carried out with local stakeholders to define the bulletin template and the procedure for issuing a regular monthly drought monitoring bulletin for the Volta basin. The bulletin includes the two risk maps for population and agriculture (due to monitored drought conditions according to the Combined Drought Index) with four severity levels and it is co-produced by the VBA (coordinator) and the national meteorological, hydrological and agricultural agencies through the Bulletin tool, integrated into the myDewetra-VOLTALARM platform.

The bulletin template has been co-designed with local stakeholders and it has the following structure:

- A first page with
 - two maps, referring to drought risk conditions for population and agriculture based on the monitored hazard conditions of



the Combined Drought Index (CDI) of the last 10 days of the previous month

- a text component which is the general outlook on the Volta basin produced by the Volta Basin Authorities highlighting main elements coming from the analysis of national stakeholders
- the acknowledgements with all institutional logos
- Pages from 2 to 7 with same structure repeated for every riparian country, including:
 - The two risk maps of the national portion representing the drought risk conditions based on the CDI and impact assessment of the last 10 days of the previous month
 - A text box with comments and sectoral analysis from the national meteorological agency
 - A text box with comments and sectoral analysis from the national hydrological agency
 - A text box with comments and sectoral analysis from the national agricultural focal point/department

The risk maps that feed the bulletin are a "snapshot" of the situation at the end of the last ten days of the previous month, but since the bulletin has a monthly validity, national agencies can build their analyses and comments for the bulletin by exploring all drought hazard indicators over the three 10day periods of the previous month. Furthermore, they can also look at the drought risk for agriculture and population for the previous ten-day periods of the same month to assess if certain risk conditions have persisted over time.

An example of the template of the impact-based drought monitoring bulletin is presented hereafter.





Figure 21: Example of the impact-based drought monitoring bulletin template for the Volta basin.

2.1. Roles and responsibilities for the issuance of impactbased drought monitoring bulletin

The bulletin is co-produced by the VBA (coordinator) and the national meteorological, hydrological and agricultural agencies through the Bulletin tool, integrated into the myDewetra-VOLTALARM platform.

A procedure for the elaboration and dissemination of the bulletin has been developed with participatory approach and it defines the following roles and responsibilities:

<u>VBA</u>

- Coordination
- Opening the bulletin
- General comment resuming highlights from national agencies and information on water resources (especially at transboundary level)
- Closing of the bulletin
- Dissemination of the bulletin to relevant national stakeholders



National agencies

- Sectoral analysis and comment on drought conditions about its own national portion
- Discussion with peer agencies of neighbouring State parties (if needed for sake of coherence)

2.2. Procedures and operational steps for the issuance of impact-based drought monitoring bulletin

The procedure has been conceived for having 1 bulletin produced every month on the drought conditions as per the monitoring via satellite data on the previous month, along the entire year.

The procedure should be carried out on the 10th of the month and over 2 days, starting from the morning of day 1 at 08:30 am, and ending on the afternoon of day 2 at 5:00 pm.

If the 10th of the month correspond to Saturday, Sunday or a public holiday, the procedure can be postponed to the next available working day.

The procedure is composed by several steps:

1. Day 1, T0 = 08.30 am - 09.00 am (VBA)

VBA verify presence of the CDI Volta layer (combined index for monitoring drought conditions) and the Drought Risk Volta layer (containing both information on risk for population and agriculture) in myDewetra-VOLTALARM.







Figure 22: Verification of availability of the CDI layer in myDewetra-VOLTALARM



Figure 23: Verification of availability of the Risk Volta layer in myDewetra-VOLTALARM

2. Day 1, T0 = 9.00 am (VBA)

VBA select the type of bulletins in the Bulletin tool (Drought Volta basin) and opens a new bulletin

-							
bassin Volta	10	Statut	Date de création 🗸	Dernière Modification	Publié T		Actions
bassin Volta - ABV	3	Fermé	23/11/2023, 16:35	23/11/2023, 16:35	Pas Publié	R, C	× 8 0 8
	(2)	Fermé	22/11/2023, 14:50	22/11/2023, 17:02	Pas Publié	2 C	× 🗉 🗛 🖻
		Fermé	22/11/2023, 10:31	22/11/2023, 10:31	Pas Publié	8 8	× 🖩 🗛 🖪
	t bassin Volta – ABV	ebassic Volta - ARV	2 Canada Adiy 2 Canada 3	2 Termit 22/11/2023, 16:35 2 Termit 22/11/2023, 16:35 1 Termit 22/11/2023, 10:31	3 Frendi 23/11/2023, 16:35 23/11/2023, 16:35 2 Frendi 22/11/2023, 14:50 22/11/2023, 17:02 1 Frendi 22/11/2023, 10:31 22/11/2023, 10:31	3 Formal 23/11/2023, 16:35 23/11/2023, 16:35 Found Acade 2 Formal 22/11/2023, 16:35 22/11/2023, 17:02 Found Acade 1 Formal 22/11/2023, 10:31 22/11/2023, 10:31 Pair Acade	23/11/2023, 16:35 23/11/2023, 16:35 23/11/2023, 16:35 Pais Public 2 Ferred 22/11/2023, 14:50 22/11/2023, 17:02 Feis Public 1 Ferred 22/11/2023, 10:31 22/11/2023, 10:31 Pais Public 22

Figure 24: Opening of a new drought bulletin in the Bulletin tool integrated within myDewetra-VOLTALARM.



3. Day 1 and Day 2, T1 = 09.00 am – 2.00 pm (National agencies)

National agencies analyse the Volta drought monitoring indexes for the three 10-day periods of the previous month (SPI, SPEI, SSMI, FAPAR, CDI). They can also consult daily soil water index (SWI) from Copernicus, available on myDewetra-VOLTALARM, and also other data available (local data, other indexes in use, etc...).



Figure 25: Drought monitoring layers available in myDewetra-VOLTALARM.

Furthermore, national agencies can also analyze the drought risk layer for the three ten-day periods of the same month to assess if certain risk conditions have persisted over time. This layer provides information on potential impacts due to drought conditions on population and agriculture and the drought risk conditions of the last ten days of the month feed the bulletin maps.



Figure 26: Drought risk layer available for Volta basin in myDewetra-VOLTALARM.



Furthermore, national agencies can also consider to analyse the rainfall forecast cumulated for next 10 days (ECMWF), GFS Volta rainfall forecast (next 5 days) and also other data available (local data, seasonal forecast, other model in use, etc...) if they want to provide an overview of any worsening of improving future trend for drought conditions.



Figure 27: Layers with rrainfall forecast available in myDewetra-VOLTALARM.

4. Day 2, T1 = 09.00 am – 2.00 pm (National agencies)

Every national meteorological, hydrological and agricultural agency make access to the opened bulletin (through the dedicated and customized Bulletin tool) and note down its own analysis and comments over the situation in its national portion

Bulletin sécheresse bassin Volta - SODEXAM					+ Nouveau	
ID T	Stato T	Data Creazione 🗸	Ultima Modifica	Pubblicato	Azioni	
2023-007	Aperto	14/06/2023, 16:51	14/06/2023, 17:09	Non Pubblicate	ß	
2023-006	Chiuse	14/06/2023, 16:33	14/06/2023, 16:41	Non Pubblicata	18 B	
2023-005	Chiuse	14/06/2023, 13:52	14/06/2023, 13:54	Nen Pubblicate	18° B	
2023-004	Chiuse	14/06/2023, 12:44	14/06/2023, 12:47	Non Pubblicata	121 8	
2023-003	Chiuse	10/06/2023, 15:26	14/06/2023, 08:41	Non Pubblicate	12 B	
2023-002	Chiuse	09/06/2023, 15:28	09/06/2023, 15:29	Nen Pubblicate	18 8	
2023-001	Chluse	09/06/2023, 13:44	09/06/2023, 15:19	Pubblicate	er 8	

Figure 28: Access to the edition mode of the opened drought bulletin from the Bulletin tool integrated into myDewetra-VOLTALARM (e.g. Côte d'Ivoire meteo agency configuration).





Figure 29: User interface for the edition of maps and text box for drought bulletin in the Bulletin tool for a customized version for a meteo agency (e.g. Burkina Faso one).

If a national agency does not consider necessary to include a dedicated analysis (e.g. no particular drought hazard or risk conditions highlighted), the bulletin will come out with a pre-defined sentence for the respective text box, saying that the drought monitoring indexes are derived from automated analysis based on satellite data.

5. Day 2, TI = 09.00 am – 2.00 pm (VBA)

Meanwhile the national agencies work on their contributions to the bulletin, the VBA make access to the setting tool for verifying, adding or modifying the email addresses of the recipients



Bulletin sécheresse bassin Volta 🛱							+	Nouv	eau
ID T	Statut T	Date de création 🗸	Dernière Modification	Publié T				Acti	ons
2023-008	Owert	15/06/2023, 09:57	15/06/2023, 11:14	Pas Publik	ß	0	×	0	B
2023-007	Fermi	14/06/2023, 16:51	15/06/2023, 09:33	Pes Publik	12	C	×I	۵	B
2023-006	Farma	14/06/2023, 16:33	14/06/2023, 16:41	Pas Publik	12	C	×I	۵	Đ
2023-005	Fermi	14/06/2023, 13:52	14/06/2023, 13:54	Pas Publik	18	0	×.1	0	Ð
2023-004	femi	14/06/2023, 12:44	14/06/2023, 12:47	Pes Publik	12'	С	×	۵	Ð
2023-003	Fernal	10/06/2023, 15:26	14/06/2023, 08:41	Pas Publik	(B)	Ċ,	×I	0	Ð
2023-002	Farmé	09/06/2023, 15:28	09/06/2023, 15:29	Pas Publik	18	C	×I	0	Đ
2023-001	Fermi	09/06/2023, 13:44	09/06/2023, 15:19	NUM	120	0	10.1	0	8

8 total

Figure 30: Button for accessing the setting tool for the recipient mailing lists for drought bulletin from the main user interface of the Bulletin tool.

BLLETTINI Version: 1.9.10209	027edf		() C+ Déconnation Mas	Anna Mapelli ter ABV Volta 🔻
Bulletin sécheresse b	assin Volta - ABV			
RETOUR Destinataires des e-mails	Destinataires des e-mails	anna.mapelli@cimafoundation.org		8
1	email@abc.com			
			Annuler B Enre	gistrer

Figure 31: The setting tool for recipient mailing list of the drought bulletin and functions for adding and saving new addresses.

6. Day 2, T2 = 2.00 pm - 4.00 pm (VBA)

VBA get access to the opened bulletin; it verifies that all national agencies have contributed to the bulletin (via the Preview function). If it's not the case, VBA can check if any agency might need extra-time to contribute via a dedicated whatsapp group created for transboundary EW coordination with national focal points.





Figure 32: Use of Preview function to verify if national agencies contributed to the drought bulletin.

Finally, VBA can note down its own contribution summarizing main elements from national contributions to provide a general overview of the situation for the entire Volta basin.

PAGE D'ACCUEIL / Bulletin sécheresse bassin Volta 2023-04	Draught Monitoring Bulletin (EN/FR) 📎 CACHER L'APERCU 🖪 GÉNÉRER PDF
Perspectives de l'ABV	ti fall Score (* Open Provide
Les indices de suivi de sécheresse sont dérivées d'une analyse automatisée à partir de donnée	S satellit
Agence Nationale de la Météorologie (METEO-BENIN)	Image: Control of the section of th
Les indices de sulvi de sécheresse sont dérivées d'une analyse automatisée à partir de donné Direction Générale de l'Eau (DG Eau)	Sees sate

Figure 33: User interface for comments from VBA on drought conditions within the Bulletin tool

7. Day 2, T3 = 4.00 pm – 5.00 pm (VBA)

VBA realizes the final review of the bulletin, it closes the bulletin (no more modification is possible) and it disseminate it via email to the recipients through the dedicated function for semi-automatic transmission, with same functions as per the extreme precipitation and flood bulletin.



As per the impact-based bulletin for extreme precipitation and floods, the Bulletin tool has been adapted and customized according to the stakeholders' roles and the defined procedure. All the stakeholders can access simultaneously to the Bulletin tool and contribute to the open document according to its own mandate and role, being able to visualize in real-time the contributions of the other stakeholders.

The defined procedure has been tested and implemented starting from December 2023 only focusing on hazard conditions (bulletin based on the CDI map) and every month a drought monitoring bulletin have been issued with a total so far of 6 bulletins.

After collecting feedback from local stakeholders in December 2023, CIMA team has been working to implement some improvements to the drought monitoring system:

- Further investigation on satellite data to be used as sources for indexes calculation to shorten as much as possible the time lag from the end of the month and the issuance of the monthly bulletin
- Development of automatic routines for the calculation of indexed at 10-days frequency instead of on monthly basis
- Elaboration of an upgraded version of the various indexes (SPI, SPEI, SSMI and FAPAR anomaly) and particularly of the Combined Drought Index, integrating also the FAPAR anomaly condition
- Analysis and identification of exposure and vulnerability data to be considered for implementing an impact-based methodology for drought monitoring in the Volta basin
- Implementation of an impact-based drought monitoring system providing information on potential impact for population and agricultural sector with 10-days
- Adaptation and update of the drought bulletin template and the Bulletin tool according to technical and scientific improvements implemented.

The different improvements have been presented and discussed with local stakeholders through online meetings and communications from January to May 2024. The full configuration of the impact-based drought monitoring system and the corresponding updated version of the Bulletin tool and bulletin issuance procedures has been officialized in the final training in June 2024.

Starting from June 2024, the impact-based assessment for drought monitoring is available and operational and the template and procedure for



the co-production and issuance of bulletins have been adjusted accordingly as per the description provided above.

The bulletins can be produced autonomously by national stakeholders under the coordination of VBA and they are shared via email by the VBA, throughout the dedicated functionality of the Bulletin tool, to all the national meteorological, hydrological, agricultural and civil protection agencies plus other relevant stakeholders.