REPUBLIQUE DU CAMEROUN

Paix – Travail – Patrie

REPUBLIC OF CAMEROON

Peace – Work – Fatherland

VOLUME 1:

COMPENDIUM OF ENVIRONMENT STATISTICS

COMPONENT 4: EXTREME EVENTS AND DISASTERS

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ACRONYMS AND ABBREVIATIONS

CRED	:	Centre for Research on the Epidemiology of Disasters
DALA	:	Damage and Loss Assessment
DCSECC		Division of Mapping, Environment and Climate Change Statistics at the NIS
DCP	:	Directorate of Civil Protection
DGSN	:	General Delegation for National Security
DHS	:	Demographic and Health Survey
DHS-MICS	:	Demographic and Health Survey and Multiple Indicators Cluster Survey
ECAM	:	Cameroon Household Survey
EESI	:	Survey on Employment and the Informal Sector
ENEO	:	Energy of Cameroon
FAO	:	Food and Agriculture Organisation of the United Nations
FDES	:	Framework for the Development of Environment Statistics
GDP	:	Gross Domestic Product
GESP	:	Growth and Employment Strategy Paper
IGMR	:	Institute of Geological and Mining Research
INSEE	:	National Institute of Statistics and Economic Studies
MDG	:	Millennium Development Goals
MICS	:	Multiple Indicators Cluster Survey
MINADER	:	Ministry of Agriculture and Rural Development
MINAT	:	Ministry of Territorial Administration
MINATD	:	Ministry of Territorial Administration and Decentralisation
MINEE	:	Ministry of Water Resources and Energy
MINEPDED	:	Ministry of Environment, Protection of Nature and Sustainable Development
MINFOF	:	Ministry of Forestry and Wildlife
MINMIDT	:	Ministry of Mines, Industry and Technological Development
NA	:	Not available
NAPDES	:	National Action Plan for the Development of Environment Statistics
NDS30	:	National Development Strategy 2020-2030
NIS	:	National Institute of Statistics
NOR	:	National Observatory Risks
PDNA	:	Post-Disaster Needs Assessment
SDG	:	Sustainable Development Goals
SED	:	Sécrétariat d'Etat à la Défense
SNH	:	National Hydrocarbons Corporation
UNDRR	:	United Nations Office for Disaster Risk Reduction
UNECLAC	:	United Nations Economics Commission for Latin America and the Caribbean
UNSDG	:	United Nations Sustainable Development Group
WMO	:	World Meteorological Organisation

FOREWORD

This 2022 edition of the Compendium of Environment Statistics follows the 2016 Atlas. The statistics found therein are required for the implementation of Sustainable Development Goals (SDGs) 3, 6, 7, 11, 12, 13, 14, and 15, the African Union's Agenda 2063 first aspiration, as well as national strategies and programmes. They contribute to the evaluation of the implementation of policy instruments requiring strengthening and support for environmental protection; hence the need to develop a mechanism for the production of these statistics. In order to support national statistical systems in this task, the United Nations Statistics Division (UNSD) has developed a conceptual framework called "Framework for the Development of Environment Statistics" (FDES), approved in 2013 by the United Nations Statistical Commission (UNSC) at its 44th Ordinary Session.

This Framework is recognized as a useful tool to adequately respond to the growing demand for environmental information for the follow-up of the Rio Conference on Sustainable Development (Rio+20) resolutions and the post-development agenda2015, also known as the sustainable development agenda. The implementation of the FDES necessarily requires the implementation of a national action plan. It is in this context that Cameroon validated its National Action Plan for the Development of Environmental Statistics (NAPDES) during a high-level meeting held in December 2019, under the patronage of the Prime Minister, Head of Government.

The NAPDES covering the period 2020-2024, presents the strategic and policy framework for the environment, reviews and diagnoses the system for producing environmental statistics in Cameroon for all the thematic areas contained in the six components of the FDES. This plan also proposes a clear vision, strategic axes and operational objectives, an implementation mechanism, a monitoring and evaluation mechanism, the budgeting and financing of the multiannual action plan. It also includes the preparation of a compendium of environment statistics every 3 years.

This Compendium includes six thematic components of environment statistics, which are:

- component 1: "**Environmental conditions and quality**";
- component 2: "**Environmental resources and their use**";
- component 3: "**Residuals**";
- component 4: "**Extreme events and disasters**";
- component 5: "**Human settlements and environmental health**";
- component 6: "**Environmental protection, management and engagement**".

The plan to publish the compendium includes a first edition published in 2022 on components 2, 4 and 5. The second edition, to be published by 2025, will update the components already produced in addition to components 1, 3 and 6.

Indicators and information contained in the various components of the first edition of the Compendium come from the databases available at the NIS and from the collection of secondary data from other public and private administrations and institutions.

These components are designed to inform the choice of public policies in the various fields concerned, to help in development planning and the prioritization of projects and programmes. In short, they are developed to be reference documents for monitoring and evaluating the SDGs related to the environment and climate change.

The statistics and indicators used in this component 4 concern **extreme events and disasters**.

The NIS thanks all public and private administrations and institutions that participated in the production of this first edition by providing information, preparing statistics and analysing them for publication.

All suggestions for improvement in future editions will be greatly appreciated.

Director General

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INTRODUCTION

The United Nations Statistics Division (UNSD) has developed a conceptual framework called Framework for the Development of Environment Statistics (FDES) having as role to support national statistical systems in setting up a system for producing environment statistics. This framework, which provides information on the state of the environment as well as other information falling within its scope, groups environmental data into 06 components.

Information covered in this document concerns mainly component 4 of the FDES entitled "Extreme events and disasters".

This component organises statistics on the occurrence of extreme events and disasters and their impacts on human well-being and on the infrastructure of the human subsystem. In other words, this component brings together data that provides information on the frequency and impacts of extreme natural events, natural and technological disasters.

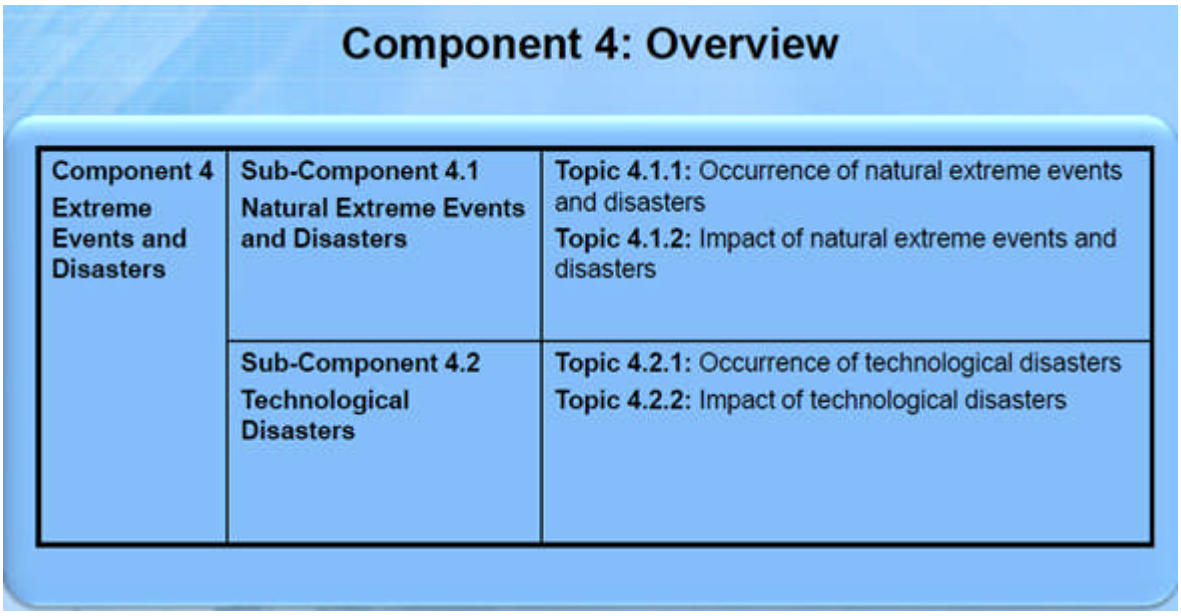
These statistics are decision-making tools in the hands of the government to help in forecasting some disasters. Floods, landslides, volcanic eruptions, mudslides, transport accidents, various accidents involving collapsing, explosions, fires and other disasters of various origins are classified as disasters.

This Component includes two subcomponents:

1. **Natural extreme events and disasters;**
2. **Technological disasters.**

The first subcomponent focuses on two topics: one on the occurrence of extreme events and disasters deriving from natural phenomena, and the other, on their impacts.

As for the second subcomponent, it also addresses two topics. The first is related to the occurrence of technological disasters and the second presents their impacts on the ecosystem, the economy and the well-being of populations.



Subcomponent 4.1: Natural extreme events and disasters

1) Strong winds in Limbe in 2019(up and to the left; 2) Landslide in Ngouache in 2019 (up and to the right); 3) Road break on the Yaounde-Douala highway (Manyai) in 2016(down and to the left), 4) 1999 Mount Cameroon volcanic eruption in the South West (down and to the right).

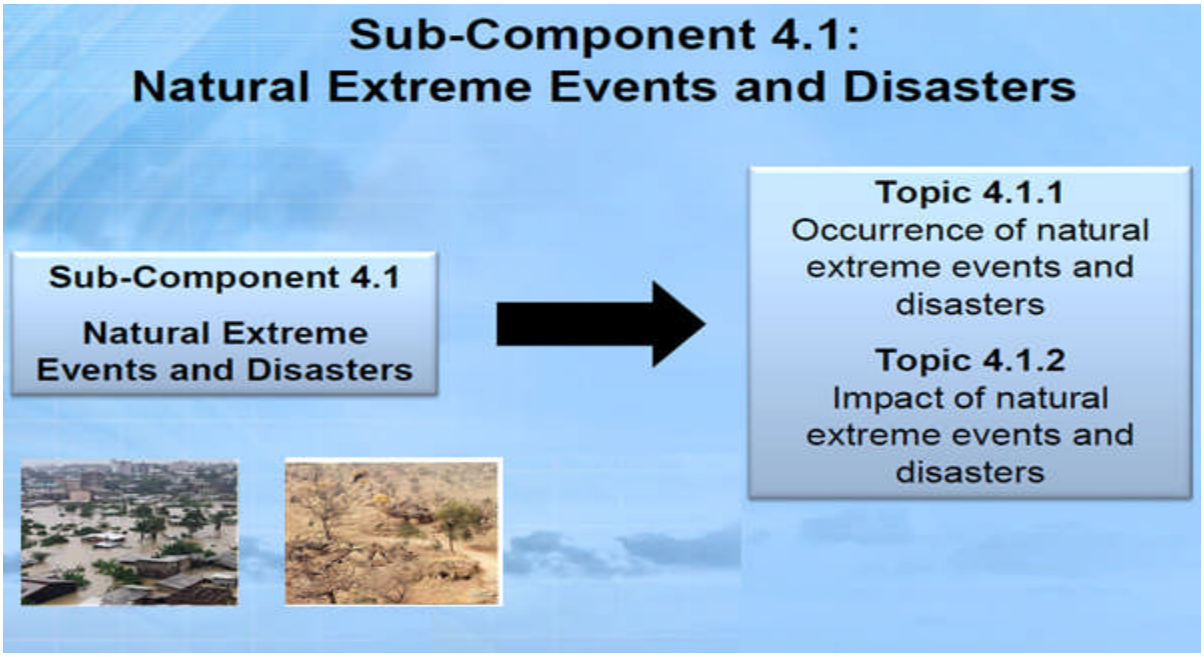
Sources: 1) stopblablacam.com, 2) griote.tv; 3) tchadpages.com; 4) lithotheque.lyceesaviodouala.org

Subcomponent 4.1 addresses two topics. One is related to the occurrence of natural extreme events and disasters and the other presents their impacts. Roughly, these statistics concern the frequency and intensity of extreme events and disasters deriving from natural phenomena, as well as their impact on human lives and habitats and the environment as a whole. These impacts are more damaging when these phenomena occur in an environment where populations live in a situation of extreme poverty and are less prepared to anticipate and to respond, as it is the case in most African countries. Specifically in Cameroon so far, the incivility of the population, the uncontrolled exploitation of mineral resources and the use of bush fires are deplored. All this destroys the environment and accentuates the above mentioned impacts.

As a matter of fact, in recent decades, Cameroon experienced more frequent, more intense, more destructive and deadly natural disasters, including landslides, mudslides, recurrent floods, the release of toxic gases, volcanic eruptions, droughts, epidemics, etc.

At a time when Cameroon is starting its 2030 National Development Strategy (NDS30), it is essential to have reliable statistics that can permit to better take into account environment in the development plans of Regional and Local Authorities (RLA), major actors in the harmonious socio-economic development of the entire national territory. These statistics, with varied uses, not only enable researchers and the public to be aware of the impact of environmental phenomena, but they also enable to propose solutions aimed at improving the living conditions of populations through actions that mitigate the occurrence and/or the impacts of these phenomena.

The data presented for this subcomponent are based on the definitions of the United Nations Office for Disaster Risk Reduction (UNDRR). According to UNDRR, a disaster is a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.



Topic 4.1.1: Occurrence of natural extreme events and disasters

This topic highlights the types of natural extreme events and disasters that have occurred in Cameroon over time and space, together with their frequency and their intensity.

The data collection methodology adopted consisted in using the reports of the Directorate of Civil Protection of MINAT for 2013 to 2019period.

Specifically, various disaster newspapers produced by the Directorate of Civil Protection and covering the above-mentioned period were exploited. The indicators presented here include notably:

- The types of natural disasters in Cameroon;
- The evolution of types of disasters per region;
- The various earthquakes recorded in Cameroon from 1911 to 2009 with their intensity;
- The types of risks per region.

Limits

It is difficult to produce an exhaustive list of natural disasters at the national level, insofar as information on disasters in some localities at risk is often unknown.

1) Lake Nyos degassing device in 1995(left); 2) Deadly floods of June 2015 in Douala (right).

Sources: 1) ingoknopf.eu ; 2) afrique.le360.ma.

Table 4.1-1: *Trends in the number of natural extreme events and disasters in Cameroon by type from 2013 to 2019*

Natural event	2013	2014	2015	2016	2017	2018	2019
Floods	6	10	3	8	12	4	8
Strong winds	11	6	3	2	5	2	4
Lightning	8	1	2	0	0	2	0
Landslides	5	6	5	1	6	7	9
Mudslide	0	0	0	0	5	0	1
Tornadoes	5	1	1	5	0	2	1
Thunderstorm	9	2	5	1	1	5	6
Earthquake	0	0	0	0	0	0	0
Volcanic eruption	0	0	0	0	0	0	0
Gas release (IGMR)	0	0	0	0	0	0	0
Pandemics	0	0	0	0	0	0	0

Source: MINAT/DCP, Compilation of data from disasters newspapers

Table 4.1-2 : *Trends in the number of strong winds per region from 2013 to 2019*

Region	2013	2014	2015	2016	2017	2018	2019
Adamawa	0	0	0	0	0	0	0
Centre	2	2	2	0	2	2	2
East	0	0	0	0	0	0	0
Far-North	1	3	0	1	1	0	0
Littoral	1	0	0	0	0	0	0
North	0	0	1	1	0	0	0
North-West	2	0	0	0	0	0	0
West	0	0	0	0	0	0	1
South	5	1	0	1	2	0	1
South-West	0	0	0	0	0	0	0
Cameroon	**11**	**6**	**3**	**2**	**5**	**2**	**4**

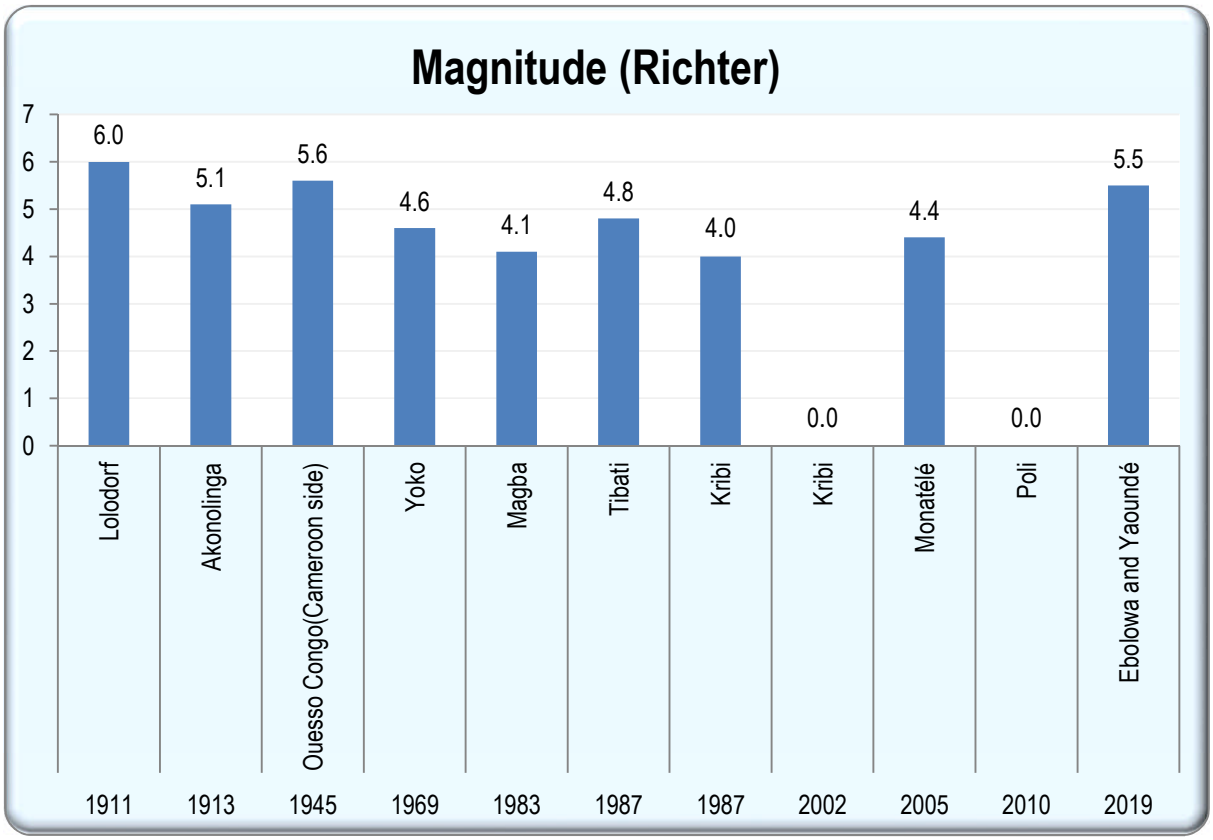
Source: MINAT/DCP, Compilation of data from disasters newspapers

Table 4.1-3 : *Trends in the number of floods that occurred per region from 2017 to 2019*

Region	2017	2018	2019
Adamawa	0	0	0
Centre	1	1	1
East	0	0	0
Far-North	1	1	4
Littoral	2	1	1
North	0	0	0
North-West	3	0	0
West	2	0	2
South	0	0	0
South-West	3	1	0
Cameroon	**12**	**4**	**8**

Source: MINAT/DCP, Compilation of data from disasters newspapers

Figure 4.1-1 : *Earthquakes recorded in Cameroon since 1911*



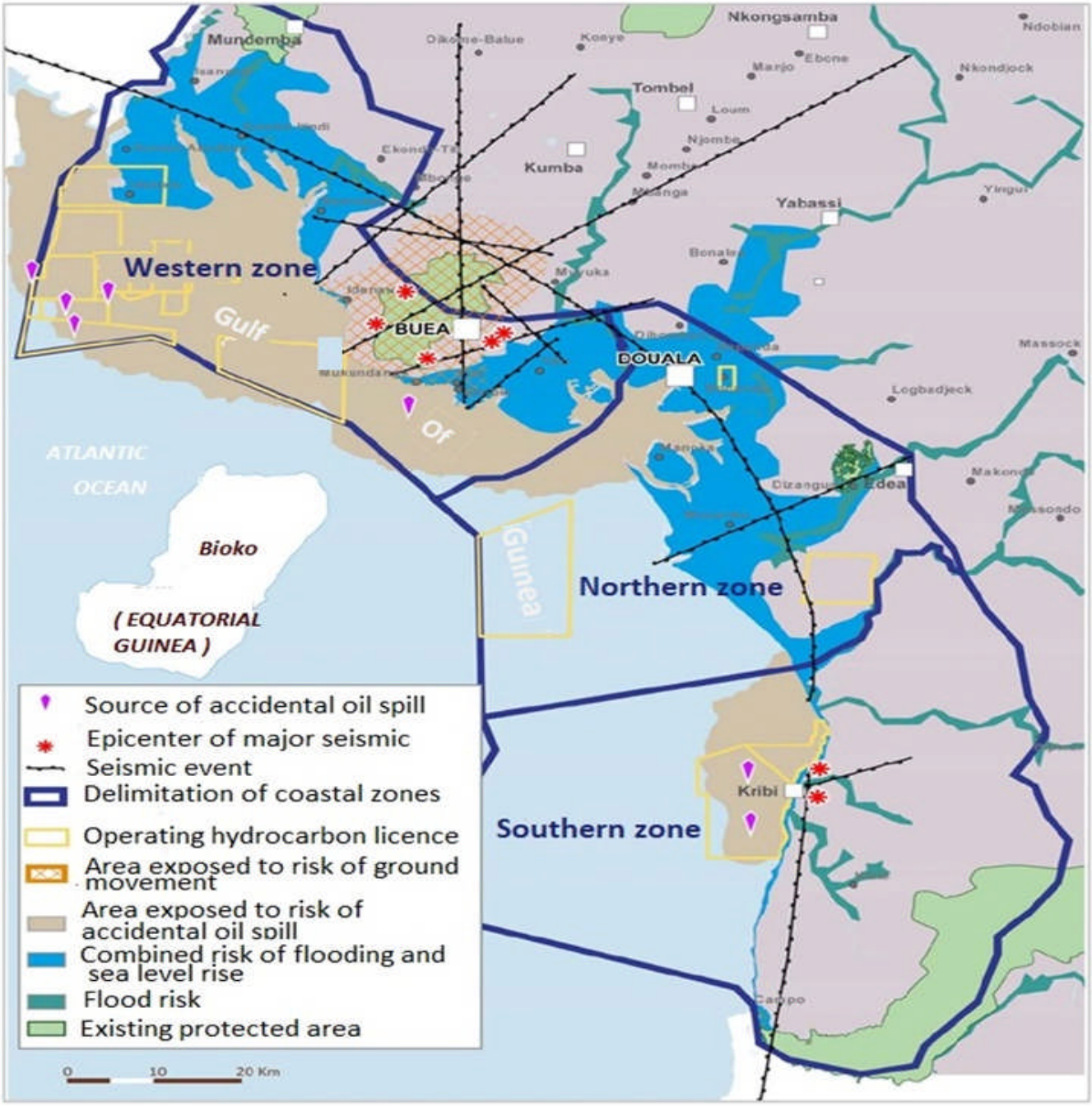
Source: MINAT/DCP

Table 4.1-4 : *Volcanic eruptions of "Mount Cameroon" since 1900*

Year of eruption	1909	1922	1954	1959	1982	1999	2000
Interval duration between two eruptions (year)		13	32	5	23	17	1

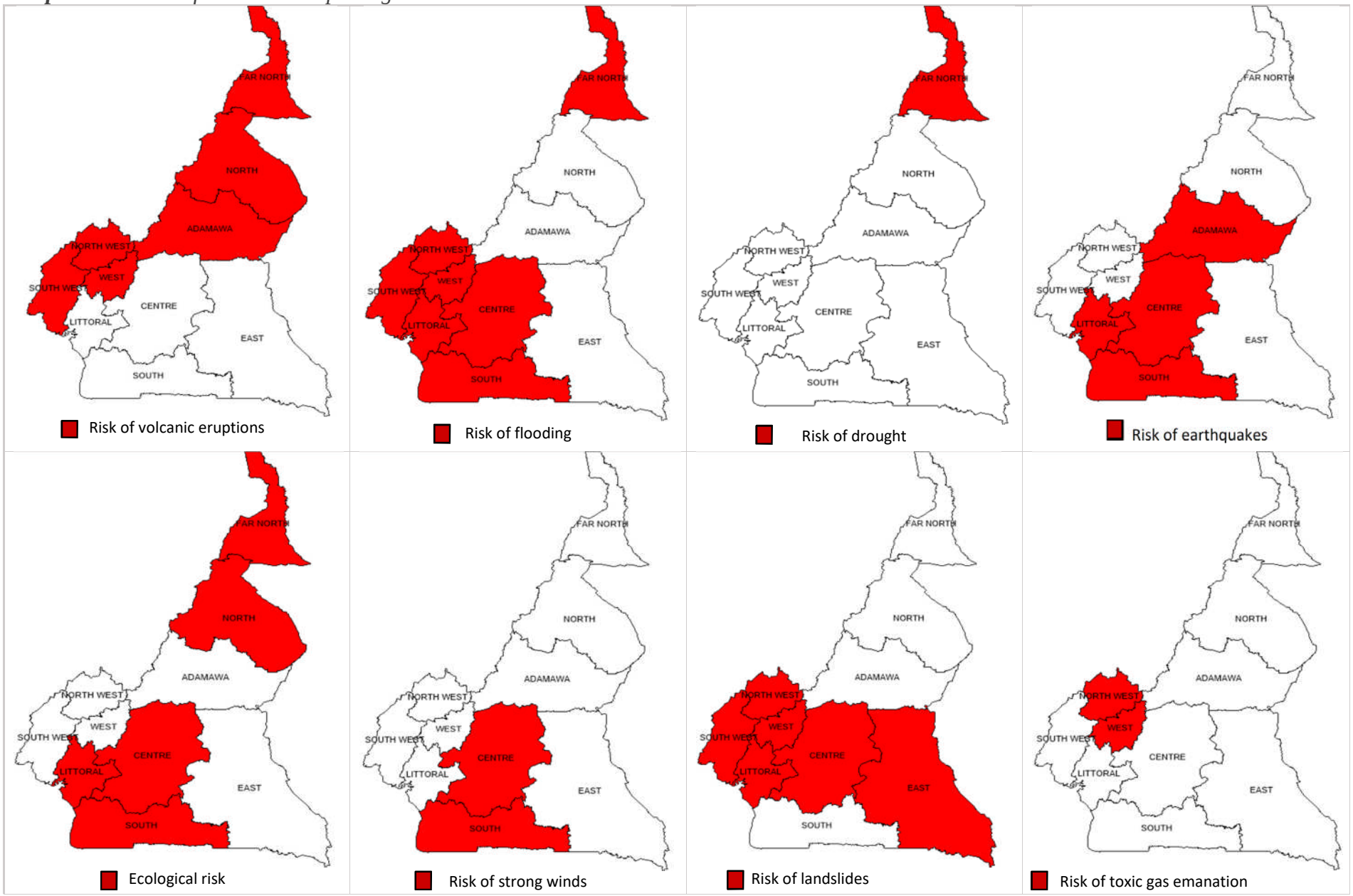
Source: Calculation from information from MINAT/DCP

Map 4.1-1 : Exposure of the coastline to nuisances and risks



Source: SNH, 2016

Map 4.1-2 : *Atlas of natural risks per region*



Source: Maps elaborated from information from MINAT, Contingency plan 2011

Topic 4.1.2: Impact of natural extreme events and disasters

This topic covers information on the impact of a natural extreme event or disaster. Impact can be measured in a many ways. Common dimensions include the number of people killed, injured, homeless and affected, as well as economic losses.

Economic loss can refer to damages to buildings and other economic assets, number of transportation networks affected, economic disruption or loss of revenue to commercial services, and utility disruption.

Physical loss or damage refers to the magnitude of the impact of the event or disaster on the quantity and quality of land, crops, livestock, aquaculture and biomass.

The specific impact of each natural disaster on the integrity of the local ecosystem may also be reported on, if statistics exist. In addition, the external assistance received for disaster relief may also be measured.

Data for this subcomponent was obtained, on the one hand, from the data processing of database from household surveys realised by NIS and, on the other hand, from information of the Directorate of Civil Protection as well as data from the *Global SDG Indicators Platform* of the United Nations Statistics Division.

1. Data from the National Institute of Statistics (NIS).

These data from household sample survey databases concern particularly the DHS-MICS 2011, ECAM 4 and EC-ECAM4 surveys. Information collected in this context concern the following indicators:

- Proportion (%) of household's victims of floods during the last 12 months before the survey;

- Proportion (%) of households exposed to some environmental risks (landslide, flood, etc.);

- Proportion (%) of households located in risk areas.

These indicators represent the ratio between the population concerned by the event and the total population.

2. Data from the Ministry of Territorial Administration.

Two types of information were used in this context. They are:

a. **Data coming from the Directorate of Civil Protection**.

These data concern the following indicators:

- The number of deaths caused by floods;

- The number of homeless people caused by floods;

- The number of deaths caused by landslides;

- The number of building collapses and the related loss of human life;

- The number of deaths and homeless due to strong winds.

b. **Data from the *Global SDG Indicators Platform* of the United Nations Statistics Division (https://unstats.un.org/sdgs/indicators/database/)**.

The indicators here cover the 2005 to 2019 period and are taken from Cameroon's online SDG database. They concern:

- The number of deaths and missing people attributed to disasters;

- The number of deaths and missing people attributed to disasters per 100,000 inhabitants;

- The number of people directly affected by disasters per 100,000 inhabitants;

- The number of injured or sick people attributed to disasters;

- The number of people affected by the disaster;

- The number of people whose damaged houses were attributed to disasters;

- The number of people whose destroyed houses were attributed to disasters.

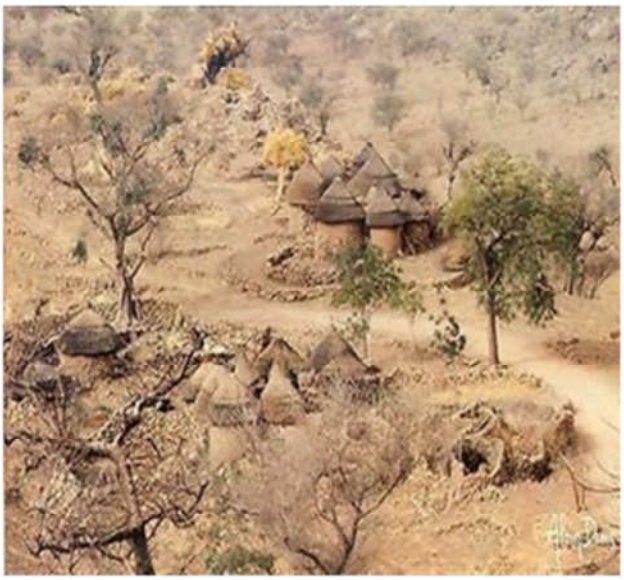
For the above-mentioned indicators, Cameroon has a focal point for the Sendai Framework who carries out data collection at the national level and provides the said information under the supervision of the Director of Civil Protection.

The collection of primary data is carried out each time a disaster occurs, by the institutions in charge of emergency first aid, which usually counts the affected population. This operation generally takes place in shelters. Data is compiled annually.

Limits

People can be affected in different ways, so it is extremely difficult to eliminate double counting. Some people could be both directly and indirectly affected; for example, they can be injured, evacuated, and lose assets, even businesses.

It is not always easy to make a clear distinction between those who died as a result of the disaster and those who died not as a result of the disaster, but whose death occurred during the disaster.



1) Floods in the Far-North in 2019 (left); 2) Drought in Mozogo in the Far-North of Cameroon (right).
Sources: 1) Actucameroun.com; 2) Picclick.f.

Table 4.1-5 : *Trends in the proportion (%) of households victims of floods per region and residence during the last 12 months before the survey in 2014 and 2016.*

	2014	2016
Residence		
Douala	29.6	8.8
Yaounde	12.0	4.0
Other urban	13.6	6.3
Total urban	18.4	6.4
Rural	10.7	4.4
Survey region		
Douala	29.6	8.8
Yaounde	12.0	4.0
Adamawa	5.7	3.6
Centre (excluding Yaounde)	4.8	1.7
East	6.0	1.9
Far-North	20.1	8.3
Littoral (excluding Douala)	11.4	4.4
North	16.0	7.6
North-West	4.7	1.8
West	5.4	1.8
South	13.3	4.7
South-West	15.0	7.3
Cameroon	**14.1**	**5.3**

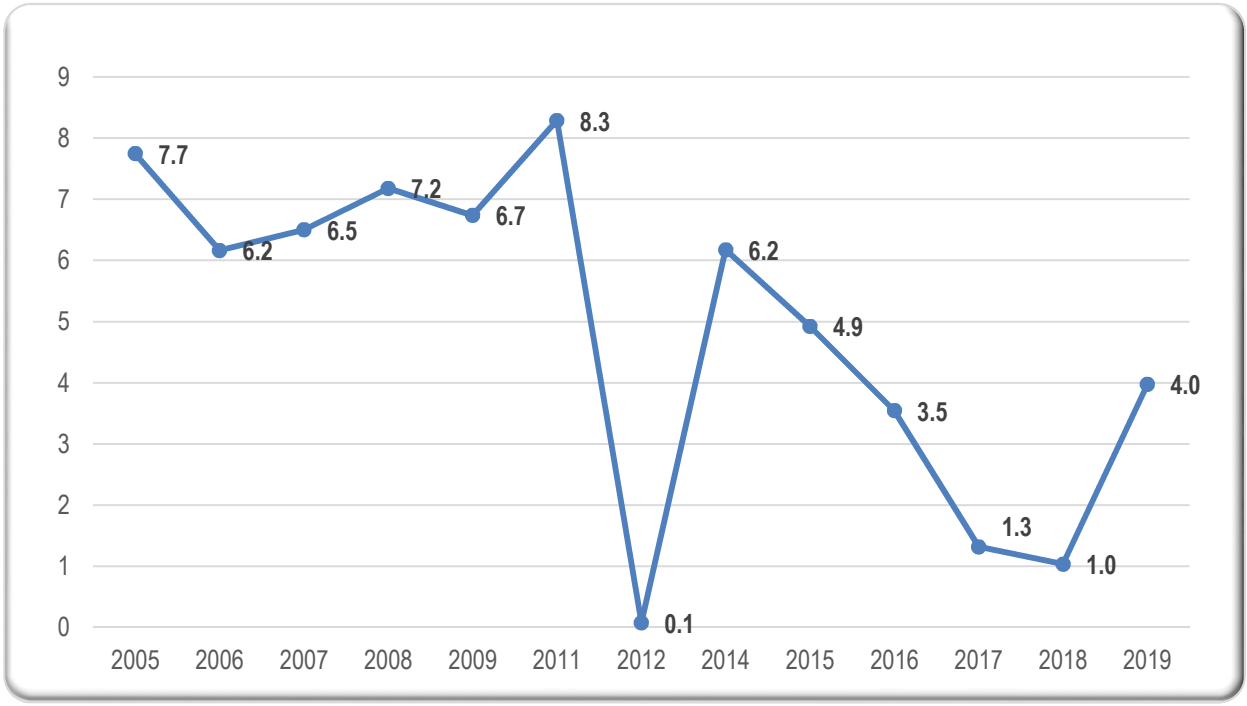
Source: NIS, ECAM 4 and EC- ECAM 4

Table 4.1-6 : *Trends in the number of disaster impacts from 2005 to 2019*

Year	Number of dead and missing people	Number of injured or sick people	Number of people whose houses were damaged	Number of people whose houses were destroyed	Number of people affected
2005	1,353	6,874	170	15	7,059
2006	1,095	6,153	400	102	6,561
2007	1,185	5,042	833	60	6,140
2008	1,342	5,706	5,235	2,500	11,001
2009	1,291	5,345	1,309	200	9,154
2011	1,669	4,980	219	222	5,399
2012	15	45	57,651	765	57,918
2014	1,337	4,067	20,250	153	25,082
2015	1,091	4,058	NA	NA	4,058
2016	838	3,056	300	32	3,388
2017	319	142	233	100	548
2018	257	1,200	3	256	1,459
2019	1,013	2,012	4	38,432	78,717

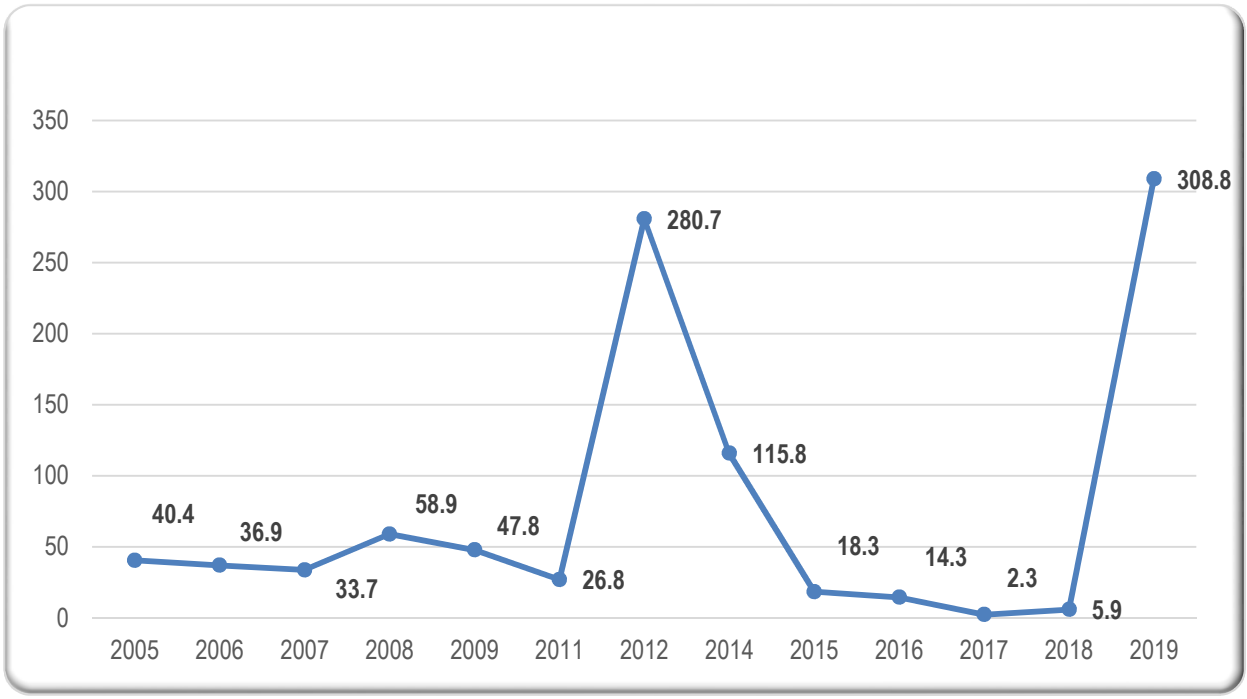
Source: UNDRR data from MINAT/DCP

Figure 4.1-2 : *Trends in the number of deaths and missing people attributed to disasters per 100,000 inhabitants*



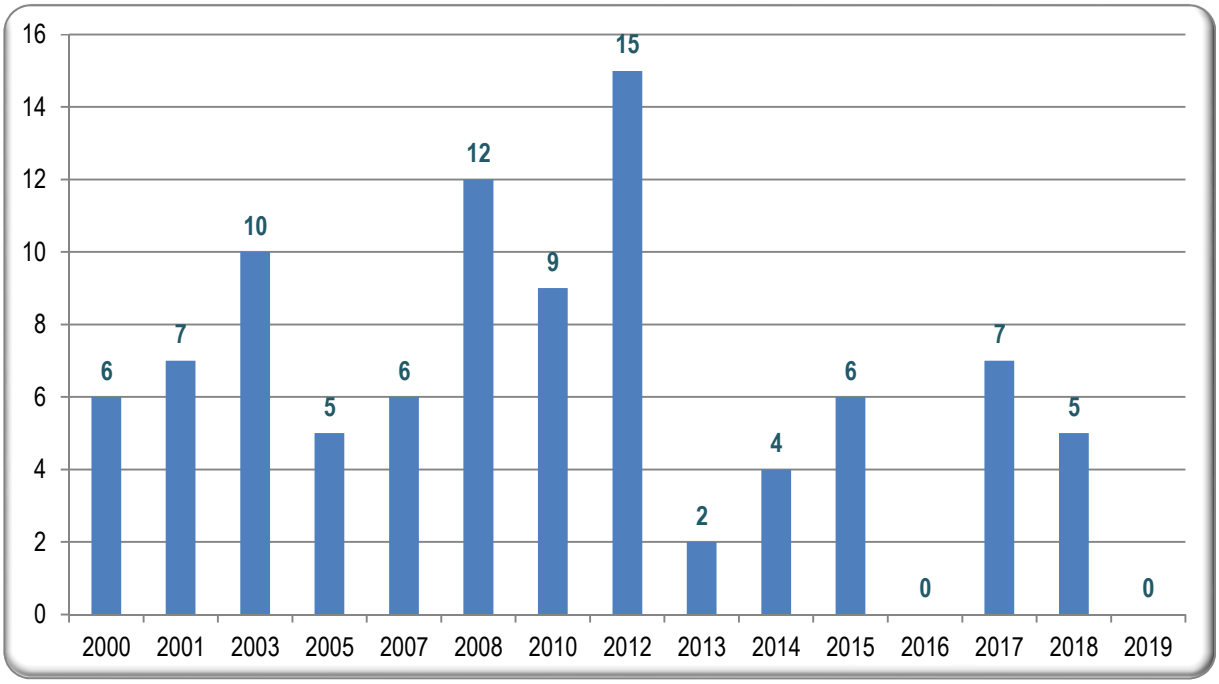
Source: UNDRR data from MINAT/DCP

Figure 4.1-3 : *Trends in the number of people directly affected and attributed to disasters per 100,000 inhabitants*



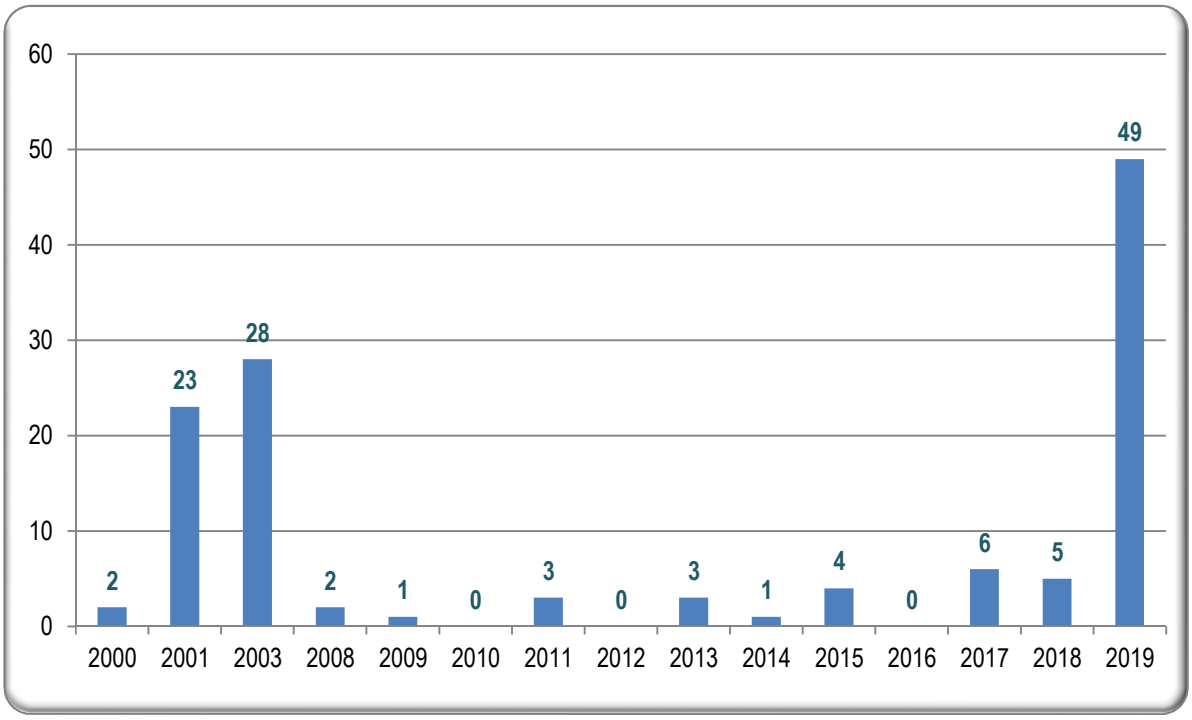
Source: UNDRR data from MINAT/DCP

Figure 4.1-4: *Trends in the number of deaths caused by floods from 2000 to 2019*



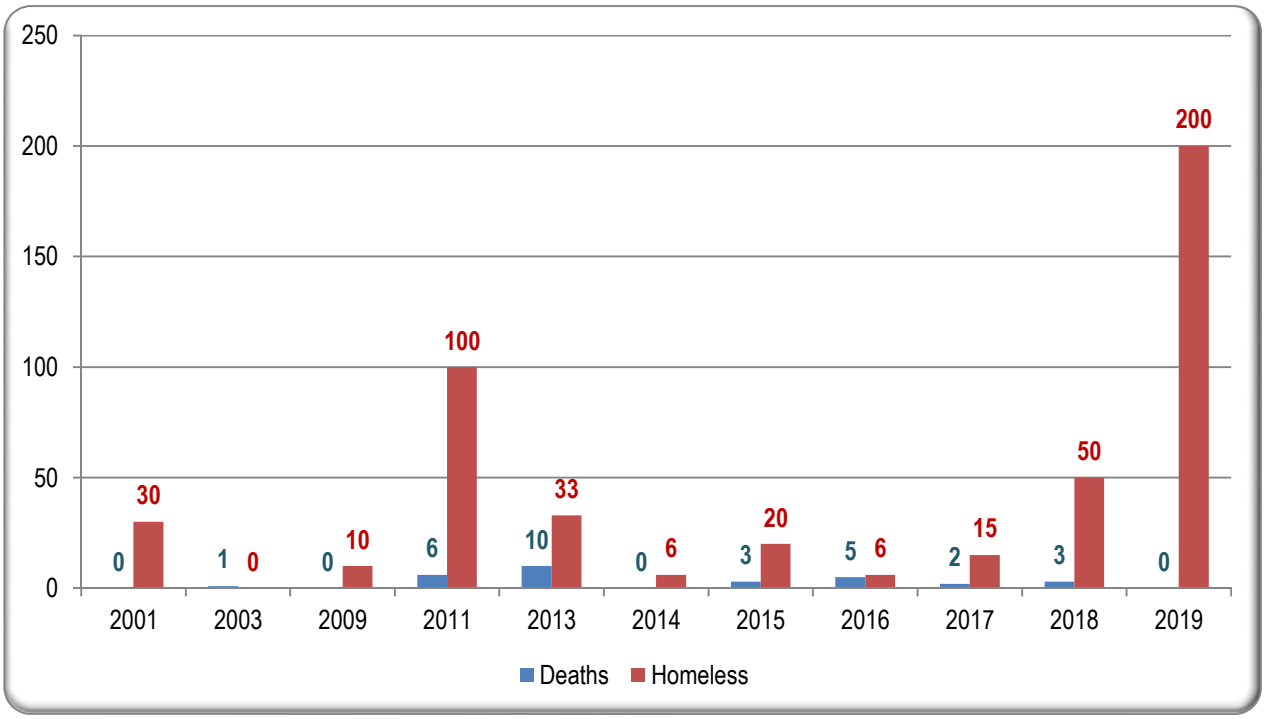
Source: *MINAT/DCP, Compilation of data from disasters newspapers*

Figure 4.1-5 : *Trends in the number of deaths caused by landslides from 2000 to 2019*



Source: *MINAT/DCP, Compilation of data from disasters newspapers*

Figure 4.1-6 : *Trends in the number of deaths and homeless people due to strong winds from 2001 to 2019*



Source: MINAT/DCP, Compilation of data from disasters newspapers

Table 4.1-7 : *Proportion of households located in risk areas in 2011*

	Landslide area	Flood-prone area	Riverside	Steephill
Survey region				
Adamawa	3.1	1.9	5.6	1.6
Centre (excluding Yaounde)	0.5	0.2	1.4	7.0
Douala	1.9	24.8	4.9	3.3
East	0.2	1.8	6.1	1.6
Far-North	6.2	27.8	7.7	8.5
Littoral (excluding Douala)	1.3	7.2	8.3	5.2
Nord	5.0	7.7	11.0	6.7
North-West	1.1	1.8	4.3	18.6
West	0.9	1.2	0.8	11.7
South	0.7	4.0	3.8	6.0
South-West	1.2	5.0	1.4	6.4
Yaounde	10.0	11.4	6.9	20.5
Residence				
Yaounde and Douala	10.0	11.4	6.9	20.5
Other urban	1.6	9.7	4.5	5.6
Total urban	3.5	11.3	5.2	8.8
Rural	3.1	9.6	5.4	9.4
Cameroon	**3.3**	**10.5**	**5.3**	**9.1**

Source: NIS, DHS-MICS, 2011

Table 4.1-8 : *Proportion (%) of households exposed to some environmental risks, according to some characteristics, 2016*

	Landslide area	Flood-prone area	Within a 100 m radius from a non-harnessed watercourse (stream, river, swamp, lake, etc.)
Survey region			
Adamawa	1.5	0.7	16.8
Centre (excluding Yaounde)	1.1	0.7	20.4
Douala	2.1	14.3	30.2
East	0.3	0.9	22.1
Far-North	5.9	5.8	16.2
Littoral (excluding Douala)	1.7	3.7	26.3
Nord	10.4	11.3	16.1
North-West	0.8	0.6	22.9
West	1.8	0.9	18.5
South	1.5	1.9	35.8
South-West	2.3	2.7	22.4
Yaounde	2.5	5.0	34.8
Residence			
Yaounde and Douala	2.2	9.8	32.4
Other urban	3.4	3.3	28.1
Total urban	2.6	7.9	31.1
Rural	3.6	3.7	18.6
Cameroon	**3.2**	**5.3**	**23.5**

Source: NIS, EC ECAM4, 2016

Table 4.1-9 : *Percentage of households exposed to some environmental risks in 2014*

	Within a 100 m radius from an uncleared farm or land	Within a 100 m radius from a non-harnessed watercourse (stream, river, swamp, lake, etc.)
Residence		
Douala	39.6	45.5
Yaounde	44.7	41.8
Other urban	51.4	35.6
Total urban	45.5	40.7
Rural	68.3	35.1
Survey region		
Douala	39.6	45.5
Yaounde	44.7	41.8
Adamawa	65.1	33.9
Centre (excluding Yaounde)	66.6	29.6
East	66.7	30.2
Far-North	49.3	33.5
Littoral (excluding Douala)	67.4	39.6
North	64.9	33.1
North-West	82.0	41.1
West	59.5	29.1
South	78.3	54.1
South-West	66.7	38.2
Cameroon	**58.2**	**37.6**

Source: NIS, ECAM4, 2014

Subcomponent 4.2: Technological disasters

1) Deadly road accident at the cliff of Dschang in 2019 (top left); 2) Plane crash in Mbanga Pongo in 2007 (top right); 3) Sinking of a ship offshore Bakassi in 2019 (bottom left); 4) 2016 Eséka rail crash (bottom right).
Sources: 1) Journalducameroun.com; 2) 1001crash.com; 3) bbc.com; 4) actucameroun.com.

Subcomponent 4.2 is divided into two topics, one of which relates to the occurrence of technological disasters and the other to the impacts due to these disasters. This subcomponent addresses in a comprehensive manner statistics on disasters resulting from human action, negligence or error, or faulty or failed technological applications.

According to the Centre for Research on the Epidemiology of Disasters (CRED), there are three types of technological disasters:

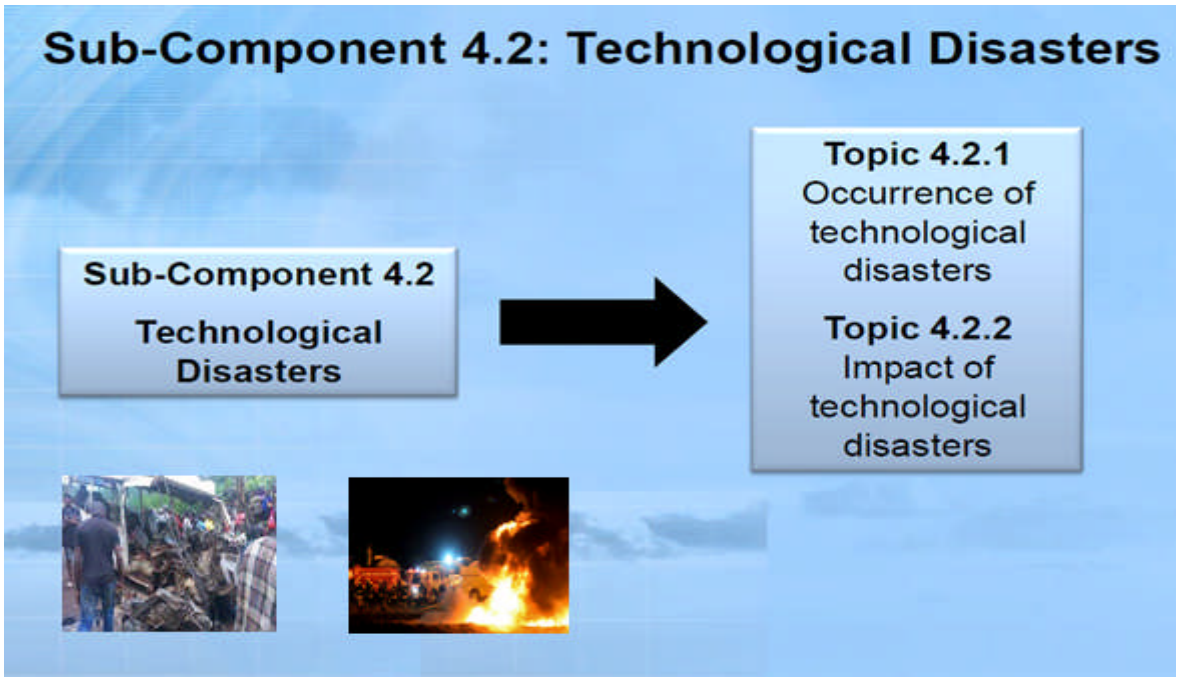
- Industrial accidents, occurring after the release of chemicals into nature, technological infrastructure collapses, explosion, fire, gas leaks, poisonings, radiation, etc.;

- Transport accidents, involving air, road, rail, and marine routes;

- Other accidents, related to collapses, explosions, fires and other disasters of various origin.-

All these types of disasters can negatively impact the environment and human security in the short and long term.

In its new development strategy set out in the NDS30, Cameroon is aiming for an industrialisation rate of about 60%. All this exposes the country to technological disasters. The statistics presented here will very opportunely be a useful tool for decision-makers enabling them to take decisions aimed at anticipating and preparing the response in case such disasters occur.



Topic 4.2.1: Occurrence of technological disasters

This topic deals with the frequency of occurrence of technological disasters. It includes information on the identification of different types of events, their location and their date of occurrence.

In recent years, Cameroon has experienced many technological disasters, the most recurrent being: transport accidents, fires, epizootics and building collapses.

The indicators selected for this topic concern particularly the number of fires, building collapses, transport accidents, etc.

The data on the occurrence of technological disasters come from the collection of statistical data, 2014 edition, by the National Gendarmerie and from the disaster newspapers of the Directorate of Civil Protection through the National Observatory of Risks (NOR) which systematically records each occurrence of these events.

1) Collapse of a building in Douala – Ndogbom in 2016 (left); 2) Road accident in June 2019 at the "col Batié" in the West Region (right).
Sources: 1) 237actu.com ; 2) Journalducameroun.com

Table 4.2-1 : *Trends in the number of some technological disasters in Cameroon from 2013 to 2019*

Causes	2013	2014	2015	2016	2017	2018	2019
Fires	69	30	42	54	25	23	20
Epidemics	2	2	3	1	1	4	2
Food poisonings	0	2	1	4	3	3	7
Road accidents	3,071	3,135	2,908	2,954	2,341	1,898	2,023
Railway accidents	0	0	0	1	0	0	0
Maritime accidents/shipwreck	20	0	0	2	3	2	1
Air accidents	0	0	0	0	1	0	0
Collapse of buildings	10	2	1	4	04	3	3
Asphyxia	0	0	0	0	1	3	0
Epizootic	0	1	0	1	0	0	5

Source: MINAT/DCP, Compilation of data from disasters newspapers

Table 4.2-2 : *Trends in the number of building collapses per region from 2013 to 2019*

Region	2013	2014	2015	2016	2017	2018	2019
Adamawa	0	0	0	0	0	0	0
Centre	0	0	1	2	2	3	2
East	0	0	0	0	0	0	0
Far-North	0	0	0	0	0	0	0
Littoral	3	3	1	1	2	0	2
North	0	1	0	1	1	0	0
North-West	0	0	0	0	0	0	0
West	0	6	0	0	2	0	0
South	1	0	0	0	0	0	0
South-West	0	0	0	0	0	0	0
Cameroon	**4**	**10**	**2**	**4**	**7**	**3**	**4**

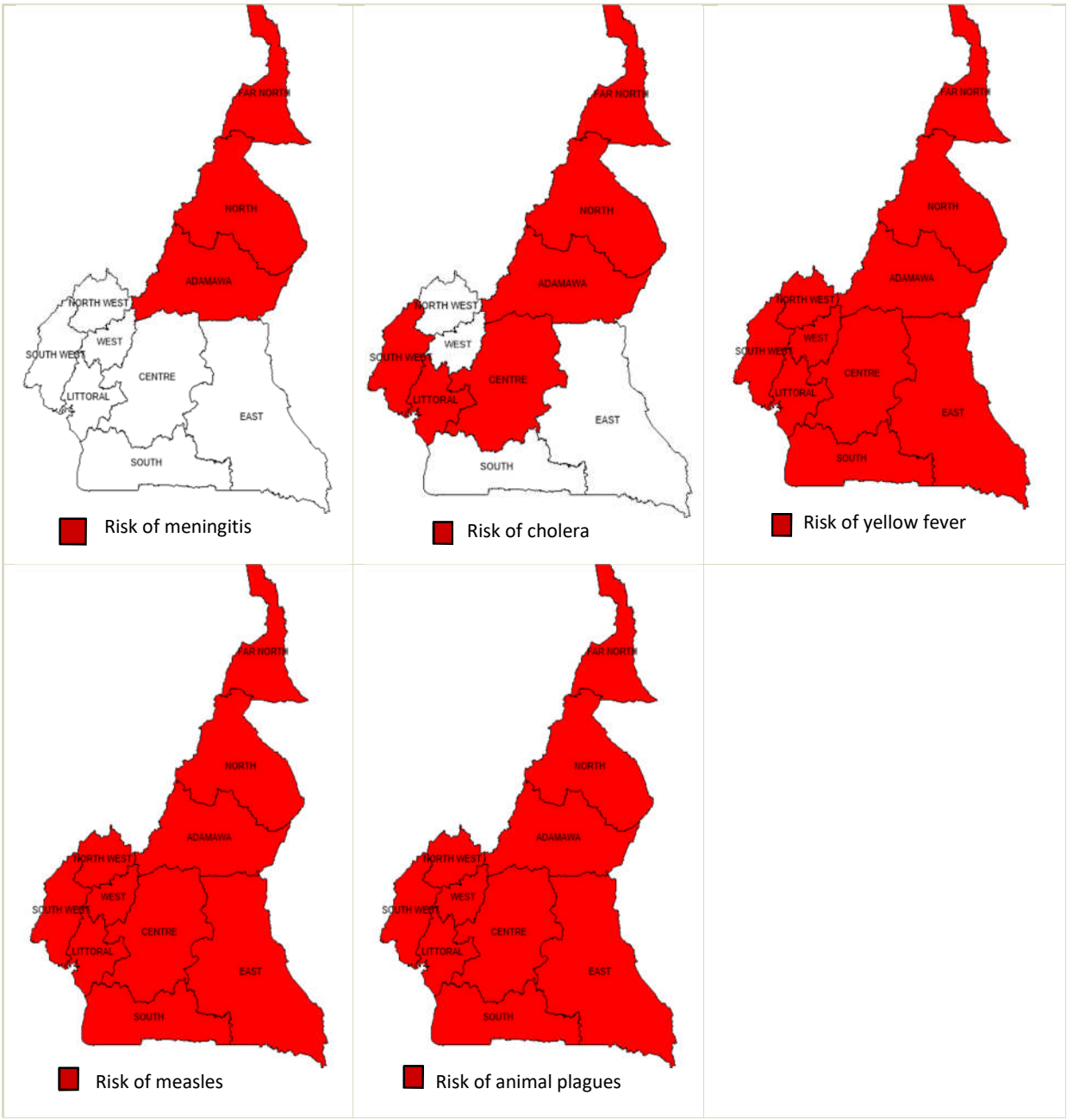
Source: MINAT/DCP, Compilation of data from disasters newspapers

Table 4.2-3 : *Trends in the number of shipwrecks per region from 2013 to 2019*

Region	2013	2014	2015	2016	2017	2018	2019
Adamawa	0	0	0	1	0	0	0
Centre	0	0	0	1	1	0	0
East	0	0	0	0	0	0	0
Far-North	0	0	0	0	1	0	0
Littoral	0	0	0	0	0	1	0
North	0	0	0	0	0	0	0
North-West	0	0	0	0	0	1	0
West	0	0	0	0	0	0	1
South	0	0	0	0	0	0	0
South-West	0	1	0	0	1	0	0
Cameroon	**0**	**1**	**0**	**2**	**3**	**2**	**1**

Source: MINAT/DCP, Compilation of data from disasters newspapers

***Map 4.2-1**: Atlas of some health risks by region*



Source: Maps elaborated from information from MINAT, Contingency plan 2011

Topic 4.2.2: Impact of technological disasters

Topic 4.2.2 presents the impacts of technological disasters on humans, on the economy and ecosystems. These impacts can be assessed by indicators such as the number of people killed, injured, rendered homeless or affected, and related economic loss.

In this document, economic losses refer to damages to buildings, transportation networks, commercial activities, services and other economic assets.

Methodology for the evaluation of economic losses

Detailed economic loss assessments are routinely carried out by governments and multilateral organisations in the aftermath of large-scale disasters, using methodologies such as PDNA (Post-Disaster Needs Assessment) and DALA (Damage and Loss Assessment).However, the economic losses associated with small and medium-scale disasters, which are more numerous, are rarely assessed or even documented.

a. Economic losses due to technological disasters (damage to buildings, transportation and communication networks, loss of revenue for businesses, utility disruption, infrastructure (energy, water and sanitation)).

They are assessed in three steps:

i. Data collection on all damaged or destroyed physical assets;
ii. Conversion of physical value to economic value at replacement cost or rehabilitation cost or reconstruction cost;
iii. Conversion of national currency into US dollars for global aggregation.

b. ***Direct agricultural losses due to technological disasters (including livestock, fishery, beekeeping, aquaculture and forestry, as well as associated facilities and infrastructure.)***

Their evaluation focuses mainly on estimating the surface area damaged and the quantity of crops destroyed. With regard to livestock and aquaculture, the aim is to estimate losses in number (sheep, goats, pigs, poultry, cattle and non-conventional livestock).

c. Effect of technological disasters on ecosystems integrity

The aim here is to make an inventory and to estimate the area affected by technological disasters, the surface area of the damaged vegetation cover, the area of affected watershed and the volume of hydrocarbons released into the environment.

The methodology consisted in exploiting the databases of household surveys produced by NIS, MINAT reports on disasters, reports on the general statistics of the judicial and traffic police services and annual crime summaries..

Information presented in this topic comes from the ECAM4, DHS-MICS survey databases, disaster journals produced by the Directorate of Civil Protection, results of statistical data collection , 2014 edition, of the Ministry of Defense through the National Gendarmerie and the annual crime summaries from the General Delegation for National Security, 2012 to 2016 editions.

Limits

- Difficulty of an exhaustive inventory of damaged or destroyed physical assets;
- Difficulty in estimating surface areas and replacement costs;
- Difficulty in estimating the quantities of crops and livestock destroyed, in the absence of a real agriculture and livestock census.

1) Avian flu on a farm in Yaoundé in 2016 (left); 2) Explosion of oil depots in Nsam in 1998 (right)
Sources 1) Afrique-agriculture.org ; 2) Camer237.com

Table 4.2-4 : *Percentage of households located in risk areas in 2011*

	Pile of garbage	Industrial production area	Railway	Power plant	Air lift
Survey Region					
Adamawa	1.4	0.0	0.0	0.1	0.1
Centre (excluding Yaounde)	1.4	0.0	0.8	0.0	0.4
Douala	2.0	3.7	0.4	0.1	5.5
East	1.8	0.5	1.7	0.1	0.1
Far-North	0.5	0.1	0.0	0.0	0.0
Littoral (excluding Douala)	9.2	0.1	0.6	0.1	0.0
North	4.9	1.0	0.0	0.0	0.0
North-West	0.7	0.0	0.0	0.1	0.0
West	0.8	0.6	0.0	0.1	0.2
South	0.8	2.5	0.0	0.2	0.0
South-West	3.2	0.4	0.0	0.1	0.0
Yaounde	6.9	1.8	0.1	0.2	0.4
Residence					
Yaounde and Douala	6.9	1.8	0.1	0.2	0.4
Other urban	3.1	1.2	0.3	0.1	1.3
Total urban	4.2	1.5	0.2	0.1	1.2
Rural	0.9	0.2	0.2	0.0	0.1
Cameroon	**2.6**	**0.9**	**0.2**	**0.1**	**0.7**

Source: NIS, DHS-MICS, 2011

Table 4.2-5 : *Percentage of households exposed to some environmental risks in 2014*

	Within 100 m radius from a petrol station, oil depot or gas depot	Within 200 m radius from a railway	Within 50 m radius from a high or medium voltage electric line	Within 100 m radius from a pylon or a relay antenna (MA) of a phone operator
Residence				
Douala	16.2	10.1	48.1	22.5
Yaounde	17.0	6.8	43.7	14.0
Other urban	6.4	1.9	45.0	15.1
Total urban	12.8	6.1	45.6	17.3
Rural	2.7	1.2	22.9	6.4
Survey region				
Douala	16.2	10.1	48.1	22.5
Yaounde	17.0	6.8	43.7	14.0
Adamawa	13.6	2.1	26.6	13.9
Centre (excluding Yaounde)	2.2	1.7	41.0	6.3
Est	2.0	5.4	26.4	9.2
Far-North	1.2	0.5	13.5	8.7
Littoral (excluding Douala)	1.2	7.0	42.9	6.9
North	1.4	0.3	15.9	5.5
North-West	3.8	0.1	30.2	6.7
West	3.1	0.2	27.2	4.0
South	1.8	0.7	39.4	9.6
South-West	6.6	2.1	45.3	14.8
Cameroon	**7.2**	**3.4**	**33.0**	**11.2**

Source: NIS, ECAM4, 2014

Table 4.2-6 : *Proportion (%) of households exposed to some environmental risks, according to some characteristics in 2016*

	Percentage of households in the vicinity (50 m) from a garbage pile	Percentage of households in the vicinity of a railway	Percentage of households within 50 m radius from a high or medium voltage power plant	Percentage of households under the airlift
Survey region				
Douala	23.8	7.3	22.2	3.7
Yaounde	25.1	4.0	14.9	0.7
Adamawa	15;8	1.9	7.8	0.0
Centre (excluding Yaounde)	32.5	2.5	14.0	0.3
East	28.8	2.0	5.9	0.7
Far-North	8.9	0.0	5.0	0.1
Littoral (excluding Douala)	22.1	3.3	22.6	0.0
North	20.3	0.0	6.8	0.8
North-West	4.1	0.1	7.6	0.4
West	6.9	0.1	20.1	0.5
South	33.4	0.1	26.4	0.4
South-West	10.0	0.9	14.5	0.4
Residence				
Douala and Yaounde	24.4	5.8	18.7	2.3
Other urban	22.9	1.0	21.4	0.7
Total urban	24.0	4.3	19.5	1.8
Rural	13.8	0.7	9.4	0.3
Total	**17.8**	**2.1**	**13.4**	**0.9**

Source: NIS, EC-ECAM4, 2016

Table 4.2-7 : *Number of road accidents registered by the Gendarmerie from 2001 to 2019*

Year	Body accidents	Number of injured	Deadly accidents	Number of deaths	Material accidents	Total accidents
2001	2,085	5,982	680	876	922	**3,687**
2002	1,897	5,540	716	939	935	**3,548**
2003	1,879	5,187	712	1,058	898	**3,489**
2004	2,300	6,526	863	1,102	1,016	**4,179**
2005	2,290	6,631	887	1,150	902	**4,079**
2006	2,140	6,149	806	1,085	780	**3,726**
2007	1,829	5,016	791	1,018	697	**3,317**
2008	1,979	5,608	933	1,253	869	**3,781**
2009	1,728	5,038	947	1,189	827	**3,502**
2010	1,809	5,038	941	1,206	889	**3,639**
2011	1,629	4,980	1,065	1,588	828	**3,522**
2012	1,524	4,284	1,014	1,058	860	**3,398**
2013	1,407	4,544	897	1,412	767	**3,071**
2014	1,425	4,262	866	1,102	844	**3,135**
2015	1,290	4,165	843	1,361	775	**2,908**
2016	1,230	4,431	896	1,261	828	**2,954**
2017	1,068	3,435	582	929	691	**3,435**
2018	841	2,801	578	782	479	**1,898**
2019	685	2,197	538	627	800	**2,023**

Source: SED and MINAT, DCP

Table 4.2-8 : *Number of road accidents registered by the police service from 2007 to 2019*

Year	Body accidents	Number of injured	Deadly accidents	Number of deaths	Material accidents	Total accidents
2007	2,160	2,160	288	338	5,697	**8,145**
2008	3,772	3,772	443	493	7,947	**12,162**
2009	3,973	3,973	504	554	8,979	**13,456**
2010	3,279	3,279	611	661	10,321	**14,211**
2011	3,450	3,450	722	772	11,225	**15,397**
2012	4,606	4,606	991	141	13,210	**18,807**
2013	3,361	3,361	625	675	10,576	**14,562**
2014	942	942	542	592	4,232	**5,716**
2015	2,935	2,935	885	995	7,629	**11,449**
2016	2,175	2,886	607	721	6,066	**8,849**
2017	1,792	1,792	435	619	6,394	**8,621**
2018	691	1,759	398	583	5,163	**6,252**
2019	1,656	1,988	333	513	5,210	**7,199**

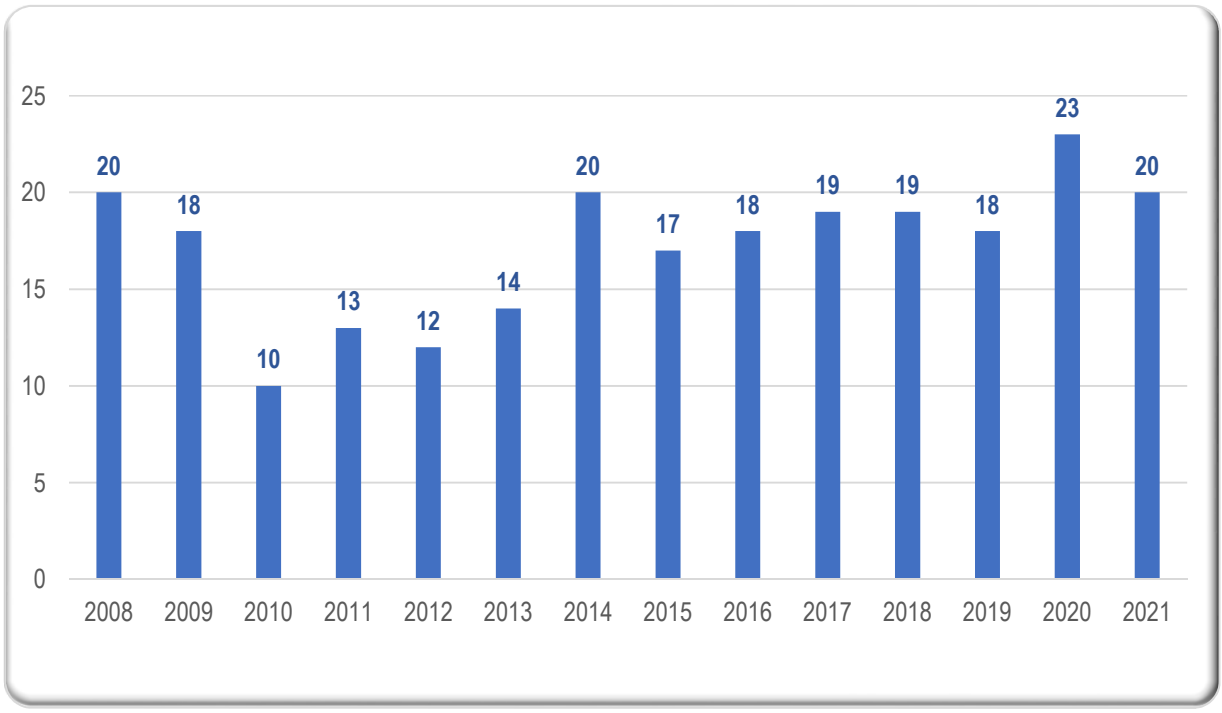
Source: DGSN, Annual crime summaries from the General Delegation for National Security in 2020

Table 4.2-9 : *Other transport accidents recorded*

Type	Place or stretch	Result		Date
		Number of injured	Number of deaths	
Railway accidents	Yaounde-Belabo	300	7	2009
	Belabo-Ngaoundere	NA	NA	2009
	Eseka	600	79	2016
Maritime accidents	Campo (South)	0	30	June-2005
	Tiko	10	21	February-2007
	Guene	6	19	October-2019
Air crashes	Mbanga Pongo	0	114	04-May-2007
	Cameroon Congo Border	0	11	June-2010
	Bogo (Far-North)	0	4	22-January-2017

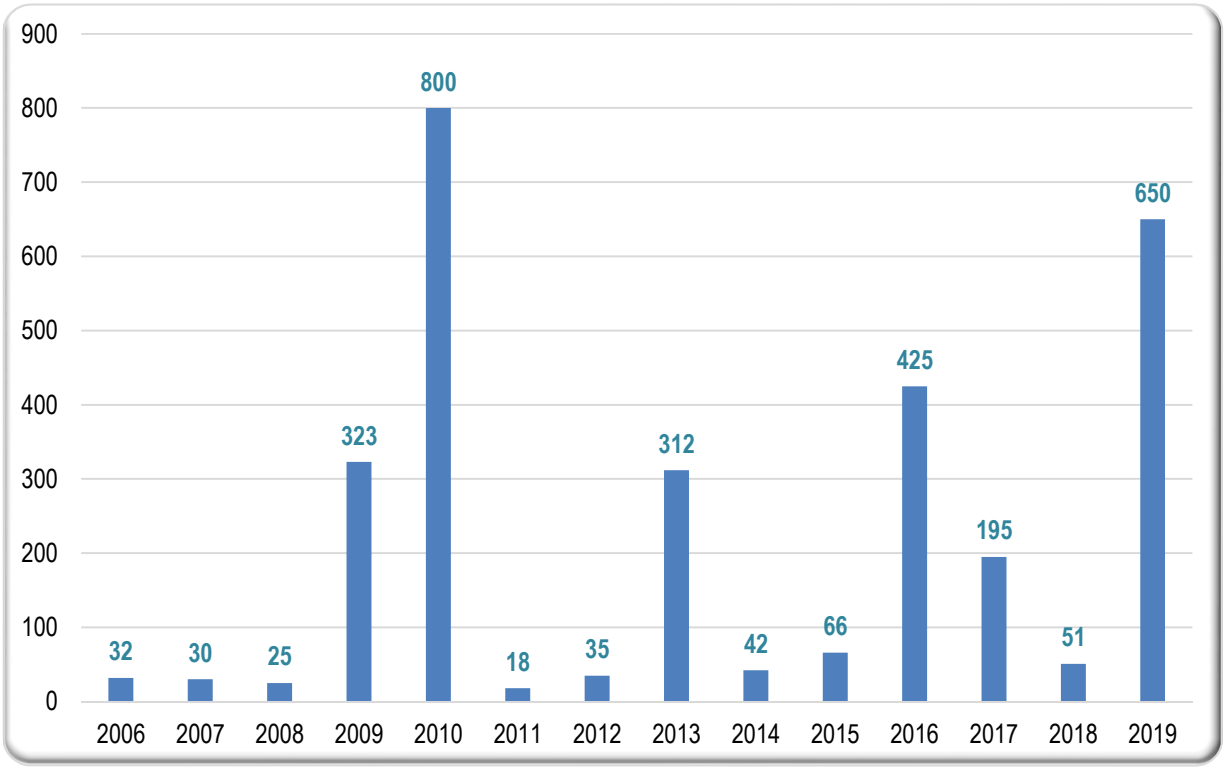
Source: MINAT/DCP, Compilation of data from disasters newspapers

Figure 4.2-1 : *Number of markets having recorded fires from 2008 to 2021*



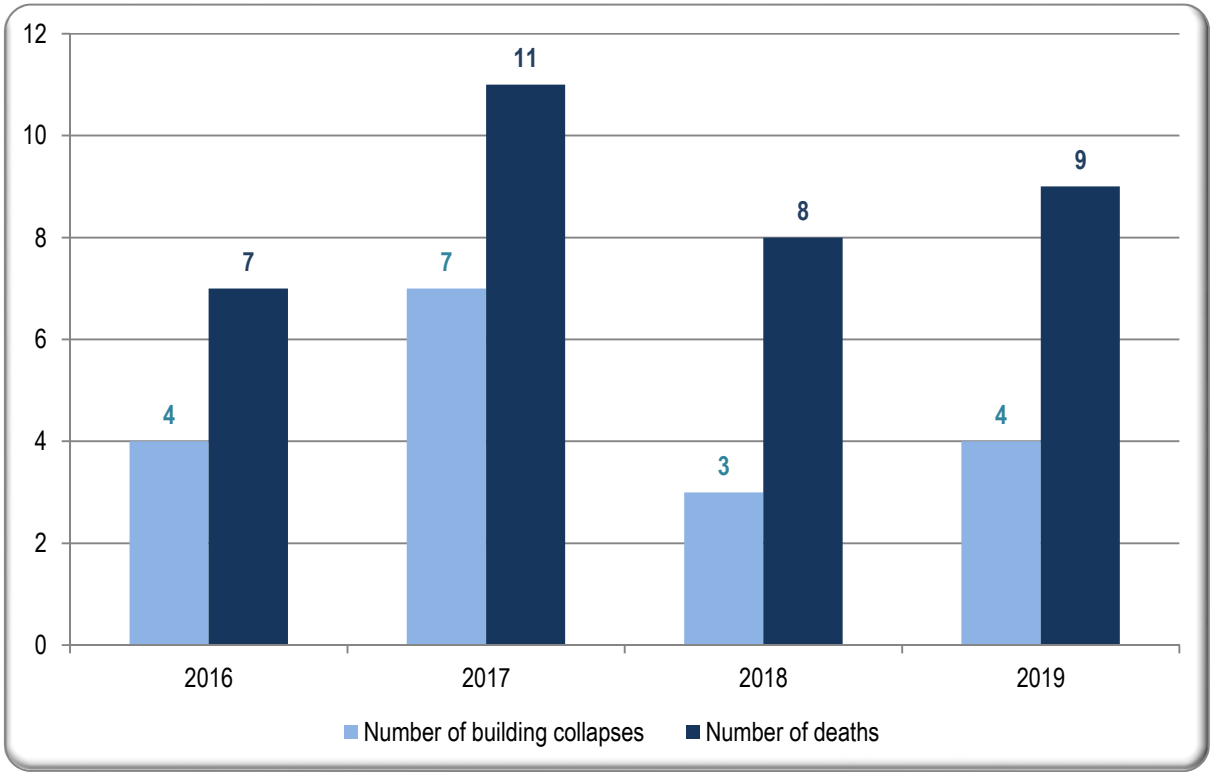
Source: MINAT/DCP, Compilation of data from disasters newspapers

Figure 4.2-2 : *Number of shops burnt down from 2006 to 2019*



Source: MINAT/DCP, Compilation of data from disasters newspapers

Figure 4.2-3 : *Number of building collapses and human losses from 2016 to 2019*



Source: MINAT/DCP, Compilation of data from disasters newspapers

APPENDICE

Glossary

Accident: Unforeseen and sudden event resulting in damage and loss.

Anthropogenic disaster: Man-made event, which generates immediate or long-term consequences that can lead to material and human losses. It is an incident related to an activity of production, consumption, transformation, transport, etc.

Body accident: Accident with human damage.

Conflagration: Uncontrolled fire, neither in time nor in space. The characteristic of a conflagration is to be able to spread rapidly and generally cause significant damage. Its consequences are destructive both on the environment in which it evolves and on the living beings it encounters.

Damaged houses: Houses with minor non-structural or architectural damage that may continue to be inhabited, although they may require repairs or cleaning.

Destroyed houses: Houses razed, buried, collapsed or damaged to the point that they are no longer habitable.

Direct economic losses: The translation into monetary value of the total or partial destruction of material assets in the affected area. Direct economic losses are almost equivalent to property damage. They usually occur during the event or in the first few hours after the event and are often evaluated shortly after the event to estimate the recovery costs and the amount of insurance benefits. They are tangible and relatively easy to measure.

Disaster: A serious disruption to the functioning of a community or a society, involving widespread human, material, economic and/or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources to face a potentially damaging hazard or other phenomenon.(UNDRR).

Disaster risk: The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period (UNDG).

Drought: Unusual dry season, showing a big deficit in rain. Generally, it extends over a long period (months, years and even decades).

Earthquake: Vibrating and trembling motion of the earth's surface as a result of plate movements along a fault plane or as a result of volcanic activity

Economic loss: Total economic impact that consists of direct economic loss and indirect economic loss.

Emergency situation: A situation that presents an immediate risk of serious harm to health, life, property or the environment**.**

Epidemic: Widespread outbreak of a disease that affect a large number of individuals in the same community at a particular time (days, weeks, months maximum), such as cholera, typhoid fever, bubonic plague, etc. (UNDRR).

Epizootic: Disease affecting, in a more or less extensive region, an animal species or a group of species as a whole. If the epizootic affects a continent or the world, it will be called panzootic, whereas if it hits a region in a constant way (stable incidence) or at certain times, it will be called enzootic.

Extreme events: Rare event in its reference statistical distribution at a particular location.

Flood: Submersion by water overflowing the normal bed of a stream or other body of water, or accumulation of water on areas not normally submerged. This includes river floods, flash floods, urban floods, storm floods, sewer overflows, coastal floods and glacial lake break floods.

Food poisoning: It is a disease, often infectious and accidental, contracted following the ingestion of contaminated food or drink. Such contamination usually results from inadequate methods of handling, preparing, storing, preserving or cooking food (non-compliance with storage or cooking temperatures, cross-contamination).

Ground Shaking: Earthquake ground shaking is the movement of the Earth's surface produced by seismic waves that are generated when an earthquake occurs (UNDRR).

Indirect economic loss: A decline in economic value added as a consequence of direct economic loss and/or human and environmental impacts. Indirect economic loss includes microeconomic impacts (e.g., decrease of revenues due to operating losses, impacts on natural goods, loss of revenue due to missing goods, interruptions in transport networks, supply chains or temporary unemployment)and macroeconomic impacts (e.g., price increases, increases in government debt, negative impact on stock market prices and decline in GDP). Indirect losses can occur inside or outside of the hazard area and often have a time lag. As a result they may be intangible or difficult to measure.

Injured/ill persons: Persons whose health or physical integrity is affected as a direct result of the disaster. This figure does not include deceased victims. Those suffering from injury and/or disease, if the event is related to a plague or epidemic, they should be included here.

Landslide: Any movement of masses other than that caused by surface erosion. This event includes terms such as precipitation of earth, fixation, horizontal thrust of masses, movement of masses, displacement, subsidence, cave or mine collapse, falling from slow or rapid rocks, detachment of masses of earth or rocks in basins or on hillsides.

Lightning: Electrical discharge that occurs in a thunderstorm between two clouds or between a cloud and the ground with lightning and a bang. Lightning is universally recognized as a dangerous phenomenon, likely to cause the melting of metal parts of the affected conductors (its temperature reaches 30 000 °C) or the bursting or vaporization of their surface elements; it is the cause of many short circuits, but also of forest fires, loss of livestock, and electric burns and concussions that it strikes a human being can be fatal.

Material accident: Accident with damage to equipment.

Missing people: People whose fate since the disaster is unknown. It includes people presumed deceased, although there is no physical evidence. Data on the number of deaths and the number of missing are mutually exclusive and should not be mixed.

Movers: People who have been permanently displaced from their homes to new sites.

Mudflow: Rapid movement of a mass of modified materials, with a high water content and a more or less viscous consistency. It frequently originates in the lower part of a landslide.

Natural disaster: Event of natural origin, sudden and brutal, which causes major upheavals. A natural disaster can cause loss of life or damage property and typically leaves some

economic damage in its wake. Some natural disasters that have occurred in Cameroon in recent decades are: flood, mudflow, earthquake, avalanche, drought, landslide, etc.

Natural hazards (Risk of natural origin): Risk linked to natural phenomena such as avalanches, forest fires, floods, droughts, landslides, cyclones, storms, earthquakes and volcanic eruptions, etc. According to the World Meteorological Organisation (WMO), a natural hazard means a violent or extreme natural phenomenon, of meteorological or climatic origin, which can occur anywhere on the Earth, knowing that some regions are more exposed than others.

Number of deaths: Number of people who died during the disaster, or immediately after, as a direct result of the hazardous event.

Pandemic: Epidemics present over a large international geographical area. In the common sense, it affects a particularly important part of the world population.

People evacuated: People that have been moved temporarily (from their homes, workplaces, schools, hospitals, etc.) to safer places before, during or after the occurrence of a hazardous event in order to protect them (UNDRR).

Persons affected by the disaster: Persons who have suffered injury, illness or other effects on their health; those who have been evacuated, displaced or resettled and those whose livelihoods and economic assets, physical, social, cultural and environmental were directly damaged. People directly affected by a disaster: Those who have suffered injury, illness or other health effects; who were evacuated, displaced, relocated or have suffered direct damage to their livelihoods, economic, physical, social, cultural and environmental assets.

Richter Scale/Magnitude: Magnitude is the number that characterises the relative size of an earthquake and represents the energy released by a seismic source in the form of waves during an earthquake. It is estimated from the recording of ground motion during an earthquake by seismometers. The Richter scale is one measures of the magnitude of earthquakes. It has, by definition, no theoretical limit (neither lower nor upper). Based on physical criteria (maximum size of a telluric earthquake and corresponding radiated energy), it is nevertheless estimated that a limit value must exist: the magnitude of the most violent earthquakes known to date does not exceed 9.5. From a magnitude of 5.5, an earthquake with a shallow focus can cause significant damage to buildings. (usgs.gov)

Road traffic injury accident: Any accident involving at least one road vehicle in motion on a public road or private road to which the public has right of access, resulting in at least one injured or killed person. Intentional acts (intentional homicides, suicides) and natural disasters are excluded. Accident victims who died instantly or within thirty days after the accident are counted as "killed". Are counted as "injured" the victims of accidents who have suffered a trauma requiring medical treatment (with or without hospitalisation) (INSEE).

Shipwreck: It is the total or partial loss of a ship by accident. A shipwreck can occur not only at sea, but also in river or lake navigation. For an air transport device (aeroplane, helicopter, ULM, etc.) the official term is “seacrash”.

Strong winds: In marine meteorology, they generally designate storm winds, that is to say winds whose speed exceeds force 9 by reaching or exceeding 48 knots, or 89 km/h. In fact, the gusts are very often very violent there. Below 56 knots (103 km/h), a wind of this type is force 10 and corresponds to a storm proper; beyond, and as long as its speed does not reach 64 knots (118 km/h), it is a force 11 wind, associated with a violent storm; from 64 knots, the wind blowing, force 12, is a hurricane wind.

Technological disasters: Disasters that may arise as a result of human intent, negligence or error, or from faulty or failed technological applications. (FDES)

Thunderstorm: Rain accompanied by strong winds and/or electric shocks (lightning)It is defined as one or more sudden electrical discharges, manifested by a flash of light (lightning) and a sharp or rumbling sound (thunder). (UNDRR)

Tornado: Any atmospheric disturbance that generates strong and destructive winds, usually without rain, or with very little rain. The term is synonymous with hurricane-type wind, whirlwind, strong wind, snow wind, squall, gust, tornado.

Volcanic eruption: Activity of a volcano during which it emits various materials such as lava, tephras, gases or ashes.

References

1. **NIS**, National Action Plan for the Development of Environmental Statistics (NAPDES), 2019;
2. **NIS,** Atlas des statistiques de l'environnement, 2017;
3. **NIS,** Cameroon Statistical yearbook, 2017;
4. **INS**, Demographic and Health Survey and Multiple Indicators Cluster Survey (DH-MICS), 2011;
5. **NIS**, Fourth Cameroon Household Survey (ECAM 4), 2014;
6. **INS**, Complementary survey to the Fourth Cameroon Household Survey (EC-ECAM 4), 2016;
7. **MINAT**, Contingency plan, 2011
8. **MINATD**, Statistical yearbook of MINATD, 2013;
9. **MINATD/DCP**, Disasters newspaper, 2013;
10. **MINATD/DCP**, Disasters newspaper, 2014;
11. **MINATD/DCP**, Disasters newspaper, 2015;
12. **MINATD/DCP**, Disasters newspaper, 2016;
13. **MINATD/DCP**, Disasters newspaper, 2017;
14. **MINATD/DCP**, Disasters newspaper, 2018;
15. **MINATD/DCP**, Disasters newspaper, 2019 ;
16. **MINEPDED**, Rapport National sur l'état de l'environnement, 2018;
17. **SED**, Rapport sur les statistiques générales du service de la police judiciaire et de la police de la route en 2014 ;
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