

HISTORICAL COLLECTION OF DISASTER LOSS DATA IN ALBANIA



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The main authors of this report are Mrs. Emanuela Toto and Mr. Marco Massabò of CIMA Research Foundation - International Centre on Environmental Monitoring. CIMA was formed in September 2007 by the Italian Civil Protection Department of the Presidency of the Council of Ministers, the University of Genoa, the Region of Liguria and the Province of Savona. CIMA has an operative branch in the Balkans with office located in Tirana. The fundamental objective of the Foundation is to preserve public health and well-being by limiting risks to both people and infrastructure. CIMA's aim is to 'predict to prevent', which means putting science at the service of mankind, translating research into practice through decisive action in order to protect lives and the environment worldwide.

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EXECUTIVE SUMMARY

The Hyogo Framework for Action foresees as one of the priority actions to identify, assess and monitor disaster risk. The risk assessment requires accurate recording of previous disasters and in particular the associated losses in terms of human casualties, property and environment damage as well as economic loss.

UNISDR, CIMA Research Foundation and the General Directorate for Civil Emergencies have completed the historical collection of disaster loss data for the entire Albanian territory. Disaster data has been collected by using the DesInventar methodology, a conceptual and methodological tool for the construction of databases of losses, damages and effects caused by emergencies or disasters.

The report describes the methodology adopted, the data used and the results obtained. The historical collection of loss data is a concrete example on how disasters data can enhance the understanding of the impacts of disasters and can provide information and knowledge to decision makers.

The sources used to collect data are multiple and range from institutional assessments, daily reports, state archive records and media. Data has been homogenized and archived in a digital database.

More than 4.000 events have been registered for Albania in the entire period from 1851 to 2013. The 74% of the total events in the database are recorded in the last 20 years with an average of 159 events per year. More than 95% of the Albanian communes have been affected by at least one disaster.

Albania is vulnerable to multiple disasters ranging from geophysical, hydrological, meteorological, climatological and technological.

Meteorological events are the most commons (33% of the total), followed by Climatological (22%), Hydrological events (21%) and Landslides (14%). These four disaster types cover 90% of total number of events during the period under review. About 10% of total number of events are Geophysical, Biological, and technological.

In the last 20 years more than 690,000 people have been affected by disasters with an average of around 34,000 affected persons per year. Relatively to the population of 2011, this represents an average of 1.2 % of the total population affected every year (more than 1 person over 100).

The total amount of recorded losses in the last 20 years is about 10,5 billions of LEK (92 mln \$) with an average loss per year of more than 500 mln of LEK (0.026 % of the medium GDP of the last 20 years).

Geophysical disasters have the highest mortality accounting for more than 50% of the total life losses. They are followed by hydrological events with 18% of total deaths. Geophysical events are also the disasters that mostly affect houses and account for about 68% of the total damages to buildings, followed by hydrological events with 27 %.

Hydrological and meteorological events are responsible for most of the damages to agriculture and crops. Damage to crops is mainly related to hydrological events that account for more than 70% of the total hectares affected by disasters.

The highest direct economic loss is due to hydrological events (mainly floods and flash floods) with 72 % of the total. Landslides also produce high level of economic losses.

The main disaster and losses statistics are summarized in the following table. The report describes the details of the analysis and reports trends, seasonal, temporal and spatial distributions of disasters and related losses in Albania.

MAIN DISASTER AND LOSSES STATISTICS

	Floods and flash flood (last 20 years)	Land-slides (last 20 years)	Forest fires (last 20 years)	Meteorological event (last 20 years)	Earthquakes (last 150 years)
Average events per year	22.4	25.6	43	51.5	0.8
Maximum event per year	109 (2010)	111 (2010)	192 (2007)	239 (2012)	17 (2009)
% of communes affected	39	53.7	67.4	66.6	25
Average mortality per year	1.05	0.95	0.1	5.9	5
Maximum mortality per year	9 (1995)	5 (1998)	1 (2001 and 2011)	38 (1999)	600 (1851)
Average houses destroyed/damaged per year	40/1,136	50/40	1.3/0.15	18.1/82.4	132/360
Maximum houses destroyed/damaged per year	539 (1995)/9672 (2010)	316 (2010)/258 (2005)	4 (2011)/2(2005)	53 (1996)/550 (1995)	16,802 (1982)/17,122(1979)
Average damaged crops per year (ha)	7,419	8.2	664	1,087	n.a.
Maximum Damaged crops per year (ha)	43,739 (2010)	44.2	3,131	7,577 (2005)	n.a.
Average economic losses per year (LEK)	370 mln (3.3 mln \$)	69 mln (606.6 x10 ³ \$)	0.9 mln (7.9 x10 ³ \$)	51.4 mln (451.9x10 ³ \$)	215 mln (1.9 mln \$) (last 20 years)
Maxim economic losses per year (LEK)	4,040 mln (38.9 mln \$) (2010)	471 mln (4.5 mln \$) (2010)	7 mln (50.8x10 ³ \$) (1999)	667.4 mln (6.7 mln \$) (in 2005)	154 mln (1.6 mln \$) (2009) (last 20 years)

1 INTRODUCTION

Disaster statistics are widely used for communicating risks; however, they must be based on a solid, systematic, standardized historical collection of loss data.

The need of reliable data is one of the priorities of the Hyogo Framework for Action (HFA) and it is intended to be included in the revised 2015 HFA. Data and statistic are important in understanding the impact and costs of disasters and can be used to inform disasters decision makers.

In a recent publication, *Wirtz et al.*¹, analyzed existing global databases and highlight the importance of using common standard and definition, transparent methods and enhance the quality of loss data need by improving the definition of loss categories.

Existing global disaster databases (for example, EMDAT, NatCat and Sigma) provide useful information on large scale intensive losses but do not capture a large proportion of losses to housing, local infrastructure and livelihoods that are associated with frequently occurring extensively distributed but low intensity losses. With reference to the specific experience of Latin America and Asia, nationally-owned disaster loss databases built using the data collected and validated by national and sub-national agencies have proved useful to analyze disaster trends and impacts, allowing policy makers and planners to make informed decisions. Making disaster data available is a first step towards assessing trends in disaster and climatic risks with implications for poverty reduction and achievement of development goals in the Europe region.

There has been significant progress improvement in recent years in the quality and accuracy of global disaster data and in risk assessment methodologies, indicators and indexes. The use of risk information in decision making in the context of international development programs, however, is still at an initial stage. There is potential for more effective use of the wealth of knowledge and information on disaster risk and losses to improve development outcomes. Historical loss data collection is necessary not only for risk assessment but also for measuring progress

¹ Wirtz, A., Krone, W., Low, P. nad M.. Steuer, 2014. The need for data: natural disasters and the challenges of database management. *Natural Hazards* 70:135-157 . DOI 10.1007/s11069-012-0312-4.

towards achieving the expected outcome of the Hyogo Framework of Action - the substantial reduction of disaster losses.

In this framework, DesInventar, with its conception that makes visible disasters from a local scale (town or equivalent), facilitates dialogue for risk management between actors, institutions, sectors, provincial and national governments. DesInventar is a conceptual and methodological tool for the construction of databases of loss, damage, or effects caused by emergencies or disasters. It includes:

- Methodology (definitions and help in the management of data)
- Database with flexible structure
- Software for input into the database
- Software for consultation of data (not limited to a predefined number of consultations) with selection options for search criteria.

Albania, under the responsibility of the General Directorate for Civil Emergency GDCE- Ministry of Internal Affairs, is one of the former countries in Europe that decided to adopt DesInventar and it is currently using the system an operational tool and methodology for collecting disaster loss and impacts.

In January 2013, GDCE with the support of UNISDR and CIMA Research Foundation initiated the implementation of the DesInventar system in Albania and the reconstruction of the historical database of disaster loss and impacts in Albania.

The results of the historical collection of loss data in Albania is reported in this publication and it is a concrete example on how disasters data can enhance the understanding of the impacts and costs of disasters and to inform decision makers.

The publication is translated in two languages, English and Albanian, in order to facilitate the circulation to both National and local authorities.

2. THE REPUBLIC OF ALBANIA

A brief history of Albania

Albania's independence was recognized by the Conference of London on 29 July 1913. The short-lived monarchy (1914–1925) was succeeded by the first Albanian Republic (1925–1928), and successively another monarchy (1928–1939). Albania was occupied by Fascist Italy and then by Nazi Germany during World War II. After the liberation of Albania from Nazi occupation, the country became a Communist state, the People's Republic of Albania (renamed «the People's Socialist Republic of Albania» in 1976), which was led by Enver Hoxha and the Party of Labour of Albania. The People's Republic was dissolved in 1991-92 after protests beginning in 1989 and reforms made by the communist government in 1990, and the Republic of Albania was founded. Now the Albanian republic is a parliamentary democracy established under a constitution renewed in 1998.

The history of Albania, with the disorders occurred in the last century, is also reflected in the availability of source of data and information in disaster losses. State Archive and mainly newspaper are not available continuously for the last century

Administrative units

Albania is divided into 12 administrative counties (Albanian: qark or prefekturë). These counties include 36 districts (Albanian: rreth) and 373 municipalities (Albanian: bashki or komunë). 72 municipalities have city status (Albanian: qytet). There are overall 2980 villages/communities (Albanian: fshat) in all Albania.

Population

According to the 2011 Census results, the total population of Albania is 2,821,977 with a low Fertility rate of 1.49 children born per woman. The fall of the Communist regime in 1990 Albania was accompanied with

massive migration. External migration was prohibited in Communist Albania while internal one was quite limited, hence this was a new phenomenon. Between 1991 and 2004, roughly 900,000 people have migrated out of Albania, about 600,000 of them settling in Greece. Migration greatly affected Albania’s internal population distribution. Population decreased mainly in the North and South of the country while increased in Tirana and Durrës center districts.

Albania urban population is about 52%(est. 2010) of total population, which is relatively low compared to European Countries such as Italy (68%), France (85%) and Germany (74%); on the contrary the annual rate of change is pretty high compared to European Countries and it is about 2.3% (estimation 2010-2015).²

BOX 1: Population in Albania³	
Year	Million
1971	2.2
1990	3.3
2008	3.1
2011	2.8

Geography and climate

Albania has a total area of 28,748 km², its coastline length is 611 km (380 mi). With its coastline facing the Adriatic and Ionian seas, its highlands backed upon the elevated Balkan landmass and the entire country lying at latitude subject to a variety of weather patterns during the winter and summer seasons, Albania has a high number of climatic regions relative to its landmass. The coastal lowlands have typically Mediterranean weather; the highlands have a Mediterranean continental climate. In both the lowlands and the Internal Affairs, the weather varies markedly from north to south.

² Source: the World Factbook <https://www.cia.gov/library/publications/the-world-factbook/geos/al.html>

³ Source: OECD/World Bank

Economy

Albania is a middle-income country that has made enormous strides in establishing a credible multi-party democracy and market economy over the last two decades. Albania has generally been able to maintain positive growth rates and financial stability, despite the ongoing economic crisis.

Albania's labor market has undergone dramatic shifts over the last decade, contributing to productivity growth. Formal non-agricultural employment in the private sector more than doubled between 1999 and 2011, fuelled largely by foreign investment. Emigration and urbanization brought a structural shift away from agriculture and toward industry and service, allowing the economy to begin producing a variety of services, ranging from banking to telecommunications and tourism.

Despite this shift, agriculture remains one of the largest and most important sectors in Albania. Agriculture is a main source of employment and income – especially in the country's rural areas – and contributes around 20 percent to GDP while accounting for about half of total employment.⁴

Albania Civil Protection

The Civil Protection is established under Albanian Law 8756 of 26th March 2001 and governed by the Albanian National Civil Emergency Plan of 3 December 2004.

The General Directorate of Civil Emergency, within Ministry of Interior, is a permanent and specialized structure, participating in all the stages of the civil emergency management cycle. GDCE has the lead responsibility for integrating national security and emergency preparedness through coordinating responses to national emergencies. This includes activities that reduce disaster vulnerability, support emergency preparedness and response efforts, and coordinates disaster recovery in the form of financial assistance to local governments after disasters.

⁴ Source: <http://www.worldbank.org/en/country/albania/overview>

The General Director of Civil Emergencies manages the department through three structures:

- The Directorate for Civil Emergency Planning and Coordination.
- The Directorate for Fire fighting and Rescue (FFR) Operations.
- The Directorate for Coordination and Management of Emergencies (inside of this directory is National Operational Centre).

At top these three permanent structures, but only in cases of severe emergencies that threaten national security, is the Prime Minister, who has the authority to declare a National Emergency Situation. For the duration of the National Emergency Situation, usually 10 days, an Inter-Ministerial Committee for Civil Emergency is established by key ministers (i.e., the Minister of Interior, Minister of Defence, Minister of Environment and Minister of Health). The General Director of Civil Emergency is designated as Head of the Operations.

At regional level is the Prefect and the Head of Municipalities/ Communes is responsible for civil emergency planning and crisis management within the Qark, Municipalities or Commune

In calm or non-emergency situations, through the Directorate Operations of Command Control of Civil Emergency, the Directorate of Civil Emergency Planning and Response and will:

- Maintain the overview of the civil emergency situation in the entire territory of the country.
- Maintain constant contact with the civil emergency offices in each of the 12 regions of Albania, as well as with the liaison units in the institutions concerned with civil emergency issues.

In the stages of Alert, Standby and initial Response, the General Directorate of Civil Emergency will:

- Support the Directorate Operations of Command Control of Civil Emergency with additional staff to monitor the situation or handle an emergency situation that has already emerged. The permanent staff of GDCE is 13 persons.

- Maintain constant contact with the monitoring, assessment, preparedness, response and rehabilitation structures in situations of civil emergencies.
- Maintain constant contact with the relevant concerned bodies of local government.
- Assess the damage incurred and the emerging needs, provide consolidated information and determine possible ways to handle and overcome the civil emergency situation.
- Coordinate the structures involved in the civil emergency response and take measures to facilitate their work in alleviating the situation.
- Analyse and provide estimates on the degree of the full impact of the civil emergency situation.

3 DESINVETAR METHODOLOGY AND DEFINITIONS

3.1 Methodology

DesInventar has been originally developed in Latin America and then adopted by several other countries in Asia, North America. In Latin America, until the mid-1990s, systematic information about the occurrence of daily disasters of small and medium impact was not available. From 1994, the creation of a common conceptual and methodological framework was begun by groups of researchers, academicians, and institutional actors linked to the Network of Social Studies in the Prevention of Disasters in Latin America (Red de Estudios Sociales en Prevención de Desastres en América Latina - LA RED). These groups conceptualized a system of acquisition, consultation and display of information about disasters of small, medium and greater impact, based on pre-existing data, newspaper sources and institutional reports in nine countries in Latin America. The developed conceptualization, methodology and software tool is called Disaster Inventory System - DesInventar (Sistema de Inventario de Desastres DesInventar). DesInventar leads to the systematic collection documentation and analysis of data about losses caused by disasters of small, medium and greater impact associated to natural hazards. Information about disasters is based on pre-existing official data, academic records, newspaper sources and institutional reports.

The DesInventar methodology includes a software product with two main components (DesInventar module and DesConsultar module). The DesInventar module is a relational and structural database through which the database is fed by filling in predefined fields (space and temporal data, types of events and causes, sources) and by both direct and indirect effects (over life, houses, infrastructure, economic sectors). The DesConsultar module allows access to the database by queries that may include relations among the diverse variables of effects, types of events, causes, sites, dates, etc. This module allows at the same time to represent those queries with tables, graphics and thematic maps.

3.2 Basic definition

Event

Event is defined by DesInventar as a phenomenon, whether natural or not, which, once triggered, produces adverse effects on human lives, health and/or social and economic infrastructures.

Geography

DesInventar “geo-reference” the information. This process assumes the existence of geographical units to which the information will be “anchored”. The research team of DesInventar suggests using the political-administrative divisions of each country as the basis to geo-referencing the disaster information entry cards.

Disaster

Disaster is defined as the set of effects caused by an event (whether natural or not) on human lives and economic infrastructure on a geographical unit of minimum resolution. This definition contrasts openly with the traditional concepts of disaster, in which:

- the total effects caused by an event are considered.
- Conditions like “the ability of a community to cope with the effects” are imposed in order to be considered a disaster

No thresholds on the amount of damages are imposed (for example “10 or more people killed” or “more than 100 affected” or ‘a call for international help”)

Hazards

DesInventar considers several types of threatening phenomena or hazards of natural, anthropic or technological origin. BOX 2 reports the description of each specific hazard.

Disasters are grouped in eight categories in order to simplify the discussion and presentation. The categorization is very similar to EM-DAT⁵ classification, with the exception of Landslides that are maintained as a separate category that include both wet and dry mass movement. The general classification here used is the following:

1. Geophysical: earthquake, avalanche and sedimentation;
2. Meteorological: snowstorm, rain, storm, windstorm, hailstorm, thunderstorm, fog, cold wave, heat wave and frost;
3. Hydrological: flood, flash flood and surge;
4. Landslides: dry and wet mass movement
5. Climatological: forest fire and drought;
6. Biological: epidemic and plague;
7. Technological: leak, structure, contamination, explosions, accident and fire;
8. Other – events that can not be included in the previous categories

Effects

DesInventar considers effects of population, on structure and infrastructure, agriculture and livestock. BOX 3 reports the operational definition that is adopted by DesInventar Methodology.

⁵ <http://www.emdat.be/classification>

BOX 2: Hazard definition according DesInventar methodology

Avalanche	Swift sliding of loosened ice and/or snow masses
Flash-flood	Torrential freshet. Violent water flow in a watershed, overflowing or as torrent. Flash-floods usually carry tree trunks and/or abundant fine to bulky sediment. They can be caused by rain, dam bursting or abundant landslides on a watershed or basin.
Biological Event	Destruction of biological species for known or unknown reasons. In the end, these events may be associated to pollution or drastic changes in environmental parameters. An example could be the "red tide".
Pollution/Contamination	Concentration of polluting substances in the air, water or soils, at levels harmful to human health, crops or animal species.
Landslide	All mass movements other than surface erosion of a hillside. This event includes terms such as precipitation of earth, settling, horizontal land thrust, mass movement, displacement, subsidence, collapse of caves or mines, rock falls, (slow or quick) detachment of soil masses or rocks on watersheds or hillsides.
Epidemic	Disease attacking many individuals in a same community during short terms (days, weeks, months maximum), such as cholera, typhoid, bubonic plague, etc
Leak	Leak of harmful liquid, solid or gas substances, whether radioactive or not, generated by technological accidents, human fault or transportation accidents
Structural Collapse	Damages or collapse of any type of structure for reasons such as excess weight in public places, bridges, etc. Damages in structures caused by natural phenomena are reported as an effect of these phenomena
Explosion	Explosions of any type, but limited to those induced or highly connected to natural phenomena, such as electrical storms, earthquakes, droughts, etc.
Forest fire	Forest fire. The event includes all open-air fires in rural areas, natural and artificial forests, plains, etc.
Hailstorm	Precipitation of hail. Frozen raindrops that fall violently in the form of hard pellets.
Frost	Temperature low enough to cause freezing, with damaging effects on population, crops, properties and services.
Fire	Urban, industrial or rural fires, but not including forest fires. Limited to those induced or highly connected to natural phenomena, such as electrical storms, earthquakes, droughts, etc.
Flood	Water that overflows river-bed levels and runs slowly or quickly on small areas or vast regions. Tidal flooding in coastal zones will be reported as "Tidal wave".
Coastal erosion	Variations of the coast line and/or maritime zones near the coast. Includes formation and destruction of islands, beaches and sand banks and erosion of cliffs affecting populations, navigation, etc.
Rain	Precipitation. Includes punctual, persistent or torrential rain, or rain exceeding the rainfall averages of a specific region; also, unusual long rain periods. Rain includes terms such as downpour, cloudburst, heavy shower, deluge, persistent drizzle, squalls, etc.
Surge	Great sea waves breaking on the littoral. Includes reports caused by Tidal waves, gales, storms -other than tsunami or seaquake.
Snowfall	Anomalous fall and accumulation of snow, especially when it occurs in zones not subject to seasonal changes. This term refers to events where precipitation exceeds the average multi-annual values, causing especially serious effects.
Heat/Cold Wave	Rise/Drop of atmospheric average temperature well above the averages of a region, with effects on human populations, crops, properties and services.
Plague	Proliferation of insects or animal pests affecting communities, agriculture, cattle or stored perishable goods; for example, rats, locusts, African bees, etc
Earthquake	All movements in the earth's crust causing any type of damage or negative effect on communities or properties. The event includes terms such as earth tremor, earthquake and vibration.
Sedimentation	Deposits of solid material on hillsides and river beds produced by mass movements or surface erosion with damages on crops, utilities or other infrastructure.
Drought	Unusually dry season, without rain or with rain deficit. As a whole, these are long periods (months, years, and even decades) typical in limited continental areas or on regional scales.
Storm	Rain accompanied by strong winds and/or electric discharges (lightning). Due to regional connotations, sometimes there is no difference between "storm" and "gale".
Thunderstorm	Electrical Storm: concentration of atmospheric static discharges (lightning), with effects on people, cattle, domestic properties, infrastructure (mains, for example, causing blackouts), and industries. It is different from "storm" in that thunderstorms are not accompanied by rain and gusty winds
Tsunami	The term is applied only to waves generated by undersea movements (caused by earthquakes, volcanic eruptions or landslides)
Gale/Tornado	All atmospheric disturbance generating strong and destructive winds, usually without rain or little rain. The term is synonym of hurricane-type winds, whirlwind, squall, cyclone, strong wind, blizzard, wind-blast, gust, and <i>tornado</i> .
Boat Capsize	Overturning of a boat due to hitting the water-bed or due to sea-disturbances

BOX 3: Effects definition according to DesInventar methodology

Persons	
Deaths	Corresponds to the number of people who died due to direct causes, whether immediately or time after the disaster.
Injured	Corresponds to the number of persons with bodily injuries. Bodily injuries, and, if the cause is plague or epidemic, the sick must be included.
Missing	Number of persons whose whereabouts as from the effects of the disaster are unknown. It includes people presumed dead without physical evidence
Victims	Number of persons whose individual or collective property and/or services have suffered serious damage directly associated to the event.
Evacuees	Number of persons temporarily evacuated from their homes. If the information is available by family, the number of persons must be estimated based on indicators available.
Relocated	Number of persons who have been moved from their homes to new permanent sites. If the information is available by family, the number of persons must be estimated based on indicators available.
Affected	Number of persons who suffer indirect or secondary effects associated to a disaster. These persons, different from "victims", suffer the impact of secondary effects of disasters for reasons such as deficiencies in the provision of public services, the hampering of trade and work, isolation, or their mental health may be affected.
Infrastructure	
Destroyed houses	Houses that have collapsed, or have been swept, submerged or damaged in such a manner that they are not habitable.
Damaged houses	Number of houses that suffered minor damage other than structural or architectural, and continue to be habitable, although requiring basic repairs and cleaning.
Quantitative	
Roads - Mts.	Extension in meters of road networks destroyed and/or unfit for use.
Hectares	Crop, pasture or forest areas destroyed.
Livestock	Number of animals lost.
Education Centers	Number of nurseries, schools, universities, training centers, etc that were destroyed and/or affected.
Hospitals	Number of local and regional health centers, clinics and hospitals.
Indicators	
Transport	Road networks, railways, transport terminals, airports, river and seaports.
Agricultural	Crops, farms, pasture zones.
Communications	Telephone plants and networks, radio and television stations, mail and public information offices.
Power	Dams, substations, transmission lines, generation plants, processing plants, fuel deposits, oil and gas lines.
Education	All related to this sector: nurseries, schools, universities, training centers, etc.
Rescue Departments	Fire departments, Civil Defense, Red Cross and public order entities.
Water Supply Systems	Intakes, treatment plants, aqueducts and canals conducting drinking water.
Sewerage	Networks for disposal of waste and/or rain water; treatment plants.
Industry	Industries of all types and sizes, including agricultural and livestock industries.
Health	Local and regional health centers, clinics, hospitals.
Economic Losses	
Loss Value	Amount of direct losses in present value (local currency).
Loss Value in US dollars	Amount in dollars equivalent to the losses entered in the previous field, based on the exchange rate in force the date of the disaster. This value is useful to make comparative evaluations.
Other losses	Estimated value of losses due to indirect or induced effects attributable to interruptions or deficiencies in the provision of public services, the hampering of trade and work, and geographical isolation.

4. IMPLEMENTATION OF DESINVENTAR IN ALBANIA

4.1 Methodology

The implementation of DesInventar in Albania focused on five main activities: organization of an initial workshop, installation of DesInventar system, identification of source of data, collection of historical data and training of future users.

The four day workshop was jointly organized by GDCE, UNISDR and CIMA with two aims: the former was to illustrate to line-ministries, national and local institutions the DesInventar system as a tool for collecting and analyzing data on disaster loss; while the second was the training of data collectors and disaster center officers on the operational and daily usage of the system. The workshop was held by GDCE at the Ministry's headquarters. GDCE selected the participants from line-ministries, rescue services, prefectures, national hydro-meteorological and geological services, and also provided the material for all case studies. Over 50 official representatives from national and local governmental institutions and civil society organizations participated in the workshop.

The workshop was organized in three different sections, with different participants: the first section lasted two days and was directed to line ministries, national authorities and institutions, the second section on the third day was more devoted to disaster officers of national and local authorities that would be responsible for the collection of loss and damage data; the third and last section, on the fourth day of the workshop, was dedicated to ICT experts of the GDCE that will be reasonable for system maintenance.

4.2 Source of data

The data was collected from several sources, from official daily reports to media and National Archive and newspaper. The discontinuity and heterogeneity of data reflect several factors: the presence of a regime where information was segregated, the political instability of Albania and the modification of the institutional framework of the Albanian Civil Protection.

When available, official data has been preferred to media source. Media and newspaper has supplemented the official data. Figure 1 summarizes the time coverage of the sources of data used in the historical collection.

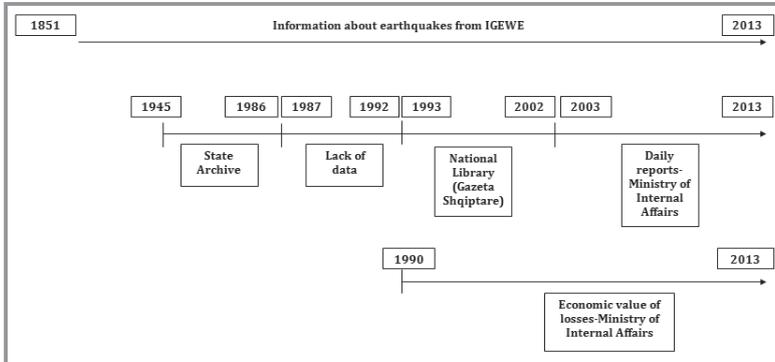


Figure 1: Schematic representation of source of data

National Operational Centre - Ministry of Internal Affairs

The National Operational Centre (Figure 2) of the Ministry of Internal Affairs collects data on disaster events and register the information on damages, impacts and efforts required for emergency response in daily reports. Data and information from local civil protection authorities, national ministries (i.e. Ministry of Health, Ministry of Agriculture, Ministry of Transportation and Public Works, Ministry of Finance) are collected in the daily reports of the National Operational Centre.



Figure 2: National Operational Centre- Ministry of Internal Affairs

The Ministry of Internal Affairs archived the daily reports from 2003. The reports are not archived in electronic form and are stored as hard copies in the National Operational Centre.

A second important source of data available at the Ministry of Internal Affairs is the archive of the requests of compensations. When an event with consequences on human life, buildings or infrastructure occurs, then the persons or municipalities that have been affected can present a request for compensation to the Ministry of Internal Affairs. The requests are archived from 1995 to now and have been used for the estimation of economic damage.

Figure 3 shows the archive of the Ministry of Internal Affairs where the hard copies of daily reports and the requests of compensations are stored. Though important information has been transferred in digital form into DesInventar, there is an urgent need to digitalize the entire documentation and material and avoid the lost of historical information.



Figure 3: Hard copies of daily reports and request of compensation – National Operational Centre.

National Archive

The National Archive has three important sources of data, namely:

1. archive of floods, flash floods, rain, storms and hailstorm from 1945-1986
2. Archive for economic damage from natural disasters from 1947-1985
3. Archive for fire and forest fires from 1946-1985.

Data were very detailed and comprehensive; however they are not digitalized and are registered in microfilms such as jackets and needle rollers. Figure 4 shows the procedure for extracting the data from microfilms: microfilm is placed on a transparent support; a lamp, below the support, projects the content of the microfilms over a screen, and an operator can visualize the data and record them on the database.



Figure 4: Microfilms used by the National Archive to register disaster data

National Library

The National Library gives access to almost all types of national newspapers. One of the most popular national newspaper is the “Gazeta Shqiptare”, it has many pages (about 20) and, compared to other newspapers, has much more information and it is not sponsored by specific political party. It is published 6 days a week.

The newspaper information has been used for covering the lack of data of specific periods, i.e. from 1993 to 2002. Figure 5 shows the archive of the National Library and a sample of the newspaper used as source of data.



Figure 5: National library of Albania

The Institute of Geoscience, Energy, Water and Environment (IG-EWE)

IGWE has a database containing historical data on occurrence and loss due to earthquake. This data include earthquakes from 1851-now.

Prefectures

Disaster manager from the Prefectures have also database, usually personal database that contains information on local disasters.

Disaster manager for the prefecture of Lezhe has a personal database from 2003, and disaster manager of the prefecture of Berat has a personal database from 1995.

Other sources

Other sources of data are present in Albania. Fire departments archive data on emergency losses.

Ministry of Defense has historical records of disaster data for years before 2003, when Civil Emergency was under its jurisdiction the Ministry of Defense. The access to this Data and information is limited. Furthermore, the Ministry of Defense is currently continuing to archive data and information on events that required their intervention.

5. DISASTERS STATISTICS

More than 4.000 events have been registered for Albania in the entire period from 1851 to 2013). Figure 5 shows the historical distribution of disasters in Albania.

Meteorological events are the most common (33% of the total), followed by Climatological (22%), Hydrological events (21%) and Landslides (14%). These four disaster types cover 90% of total number of events during the period under review. About 10% of total number of events are Geophysical, Biological, and technological.

Analysis of disaster trend

Few records of disasters are available for the period from 1851 to 1945 and most of them are related with the historical database of earthquake. Despite the irregularity of the data from 1945-2013, it can be observed from Figure 7 that exists a clear increasing trend of disaster in the last 20 years.

The 74% of the total events in the database (3180 over 4305) are recorded in the last 20 years (1993-2013) with an average of 159 events per year.

The number of events is higher during the period from 2003 to 2012; meteorological events were the most frequent (especially in 2012 and 2005), followed by climatological events (more frequent in 2007, 2011 and 2003), hydrological events (more frequent in 2010) and landslides (more frequent in 2010 and 2005).

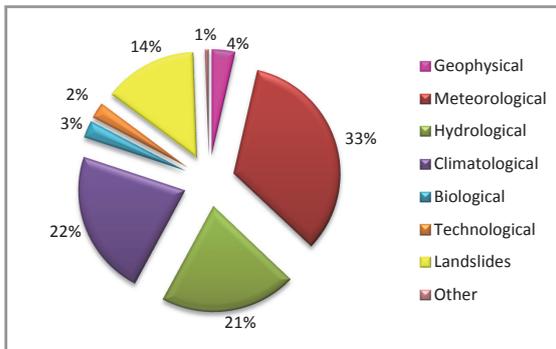


Figure 6. Distribution of events for different categories (data from 1851-2013). 4305 events.

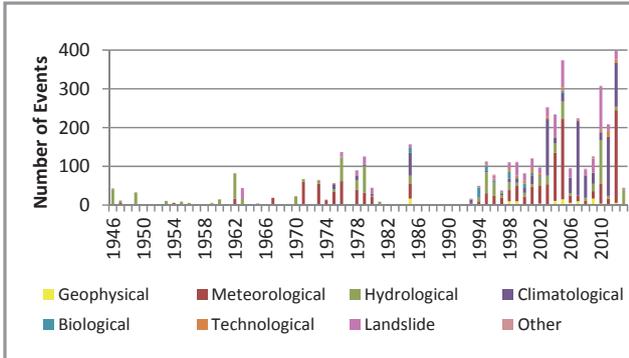


Figure 7: Chronological trend of disasters groups: 1946-2013.

Seasonal Distribution of Events

The seasonal distribution of disaster categories during the period from 1851 to 2013 is shown in Figure 8.

Disasters occur throughout the entire year, however the frequency has seasonal influence. The meteorological events occur mostly during the winter season (December, January and February) and the climatological events occur mostly during July, August and September. The hydrological events occur more frequently during October, November and December. Landslides have a higher frequency in February and March.

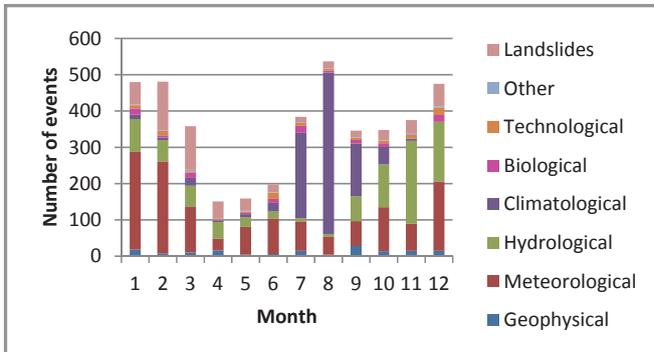


Figure 8: Seasonal distribution of disaster groups: 1851-2013.

Spatial Distribution of Events

Figure 9 illustrates the geographical distribution of disasters across districts and communes in the country. The spatial distribution of disaster events is uneven, ranging from more than 179 to less than 43 at district level and from more than 16 to less than 3 at Communes level. The most affected districts are: Shkoder, Lezhe, Puke, Kukes and Diber in the North and Fier and Vlone in the South. The communes with the largest occurrences of disaster events are found within the above mentioned districts. The municipalities with the highest number of occurrences are: Qender (69 events), Tirane (64 events), Durres (56 events) and Berat (48 events).

There are only 12 municipalities without any occurrence of events.

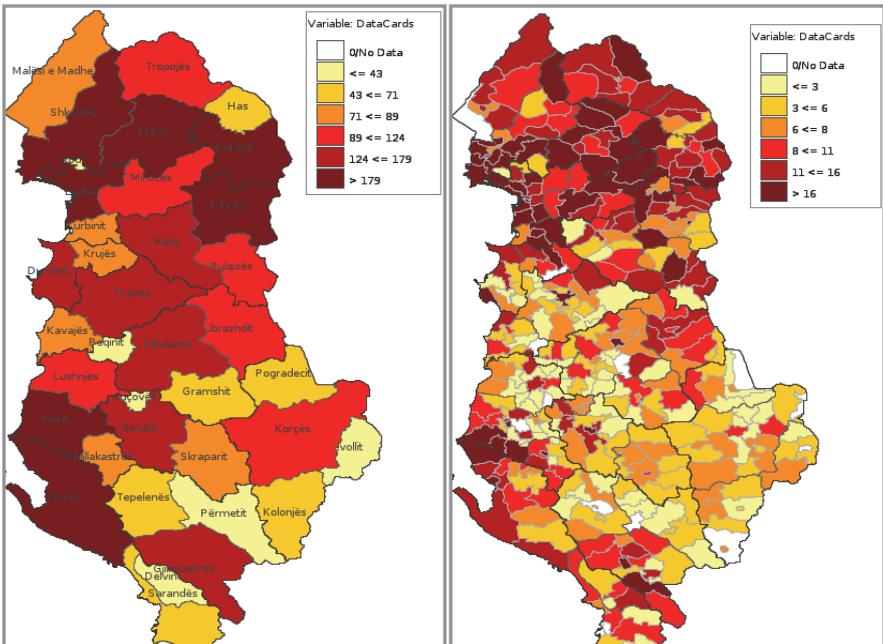


Figure 9: Spatial distribution of events by Districts and Communes: 1851-2013.

6 ANALYSIS OF LOSSES

This section reports the analysis of losses and damages from disasters. The analysis focus on the temporal trends, seasonal and spatial distribution of the following indicators: people affected, loss of life, house destroyed or damaged, agricultural losses and economic losses.

6.1 People affected

Records show that in the past 162 years nearly 800,000 people have been affected by disasters. Figure 10 shows the percentage distribution of people affected by different disaster type: nearly half are related with meteorological events (45%), followed by Hydrological events with 25 %, Geophysical with 14%, landslides with 12% and technological with 4%. of people affected by technological events.

The number of people affected every year is highly variable and fluctuate from 0 to nearly 200,000 (windstorm of 2000). In the last 20 years (from 1993 to 2013) more than 690,000 have been affected with an average of around 34,000 affected every year. Relatively to the population of 2011, this represents an average of 1.2 % of the total population affected every year.

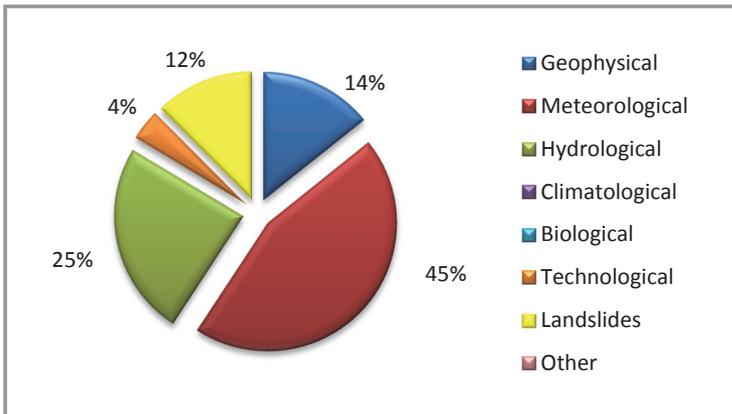


Figure 10: distribution of people affected by different disaster type: 1851-2013.

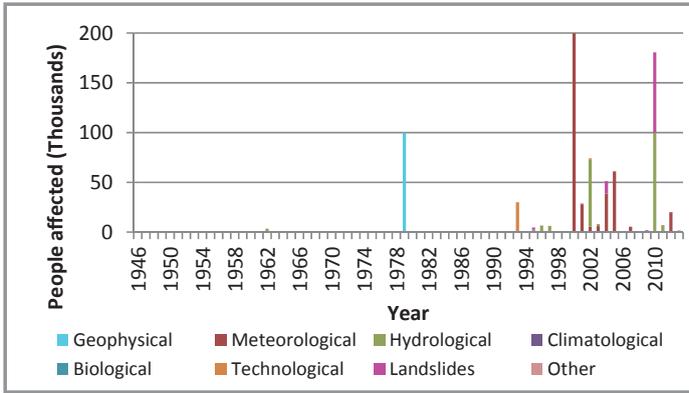


Figure 11: People Affected by disasters - Annual Time Series Distribution: 1946-2013

The seasonal distribution of people affected is highly related with the disaster type and reflect the importance of weather related risk in Albania. Figure 12 shows that, as expected, meteorological and hydrological disasters affect citizens in autumn and winter (September to February) with the maximum in January.

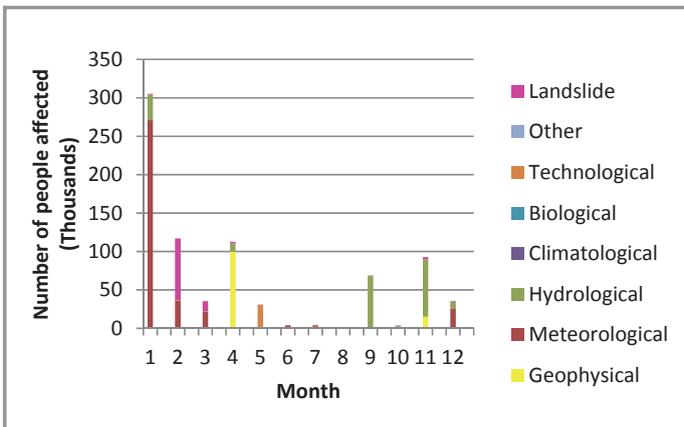


Figure 12: Seasonal distribution of people affected by Disasters

Figure 13 illustrates the geographical distribution of people affected by disaster across Districts and Communes. It shows the uneven spatial distribution of human impact of disaster from less than 36 to more than 14,012 (upper limit) disaster affected persons by districts and from less than 1 to more than 117,569 (Upper limit) by Communes. The highest numbers of persons affected by disaster are recorded in the districts Shkodra, Puke, Kukes, Diber and Kurbin in the North and in Tepelene and Skrapar in the South. Generally, fewer districts have been affected in the south compared with the centre and the north of Albania.

The municipalities that experienced the most number of affected people are, in decreasing order, Bogove (80,000 affected), Lac (Lezhe, 30,072 aff.), Berdice (Shkoder, 23,629 aff.) and Dajc (Shkoder, 22,287 affected).

Disasters with at least 1 affected person have been recorded for more than 200 municipalities that correspond nearly to 60% of the total municipalities.

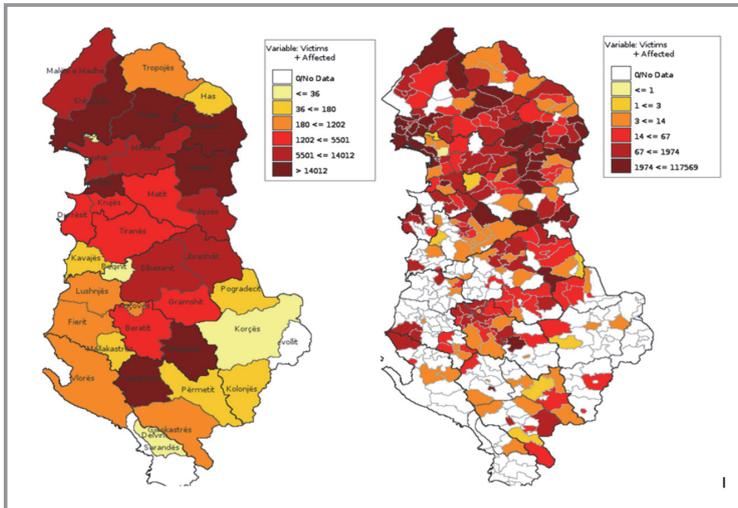


Figure 13. People affected due to disasters - Spatial Distribution (Districts and Communes): 1851-2013

6.2 Mortality

Figure 14 shows the distribution of loss of lives with respect to disaster type. The average of deaths for events is $1652 \text{ (total number of deaths)} / 4305 \text{ (total number of events)} = 0.38 \text{ deaths/event}$. The higher number of deaths is reached in 1851 with 600 deaths due to two earthquakes. Geophysical disasters has the highest mortality accounting for more than 50% of the total life losses. Hydrological events cause 18% of deaths followed by meteorological with 15%, technological with 6% and Climatological, Biological and landslides with 4%.

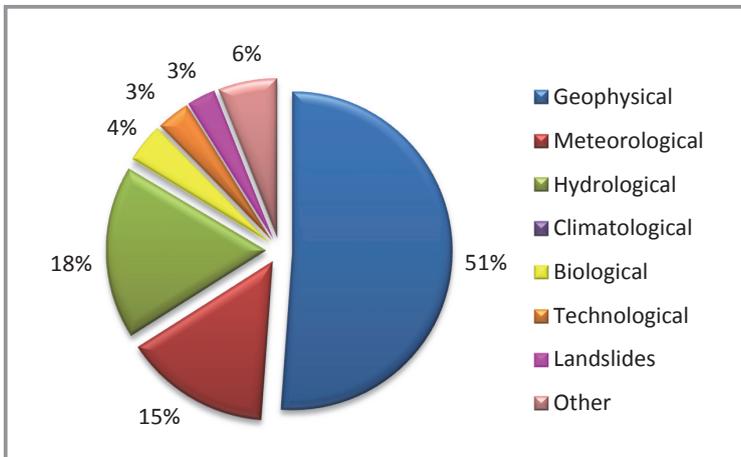


Figure 14: Mortality distribution by disasters in Albania (1851-2013)

The mortality trend is highly influenced by major disasters such as the earthquakes of 1851, in the municipalities of Vlore and Berat, that caused nearly 600 loss of life and the flood of 1905 with about 200 people deaths in the region of Shkoder.

Figure 15 shows the temporal trend of mortality caused by disasters. From 1946 till 2013 the number of deaths reached the maximum year value of 100, with two peaks: in 1985 (due to geophysical, meteorological and biological events) and in 1999 (due mainly to meteorological and other events).

Until 1993 the data are sparse and it is difficult to derive general conclusions; however, in the last 20 years mortality shows a decrease even though the average of deaths per year is around 20 persons. In the last 20 years, mortality is mainly related to following disaster categories: meteorological, technological and biological. It is worth to underline that the low mortality rate of geophysical events in the last 20 years can be a statistical artefact (return period of high intensive earthquake greater than 20 years) and not a real decreasing of buildings vulnerability or human exposure.

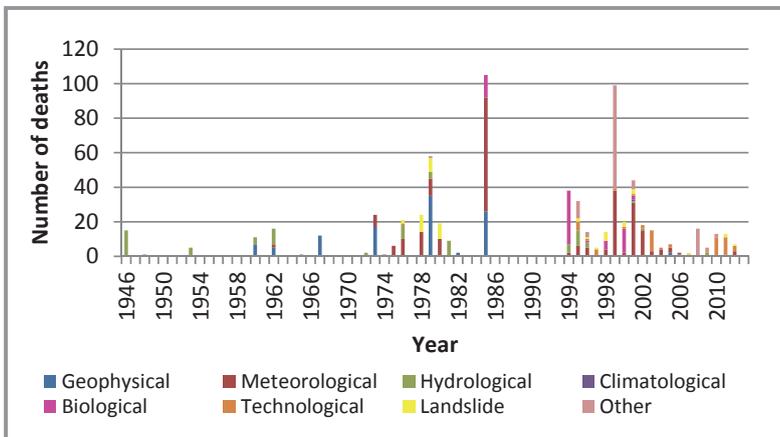


Figure 15: Time series of loss of life due to disaster (1946-2013)

Figure 16 illustrates the spatial distribution of mortality due to disasters across Districts and Communes. The spatial distribution is highly variable and range from less than 4 deaths to more than 44 deaths in 7 districts: Shkoder, Kukes, Diber, Tirane, Berat, Tepelene, Vlore. Berat has the highest number of recorded loss of life due to disasters.

Spatial distribution at commune level shows high variability with mortality that reaches a maximum of 402 deaths in Berat.

The municipalities with the highest number of deaths are, in decreasing order:

- Berat 402 deaths (401 caused form earthquakes and 1 from thunderstorms)
- Vlore 262 deaths (200 caused from earthquakes, 60 from other events, 1 from forest fires and 1 from heat waves)
- Shkoder 52 deaths (35 from earthquakes, 13 from other events, 1 from accidents, 1 from cold waves, 1 from landslides, 1 from wind-storms)

The total number of municipalities that experience at least one death because of disasters is 111 over 374, representing around 30 % of total municipalities of Albania.

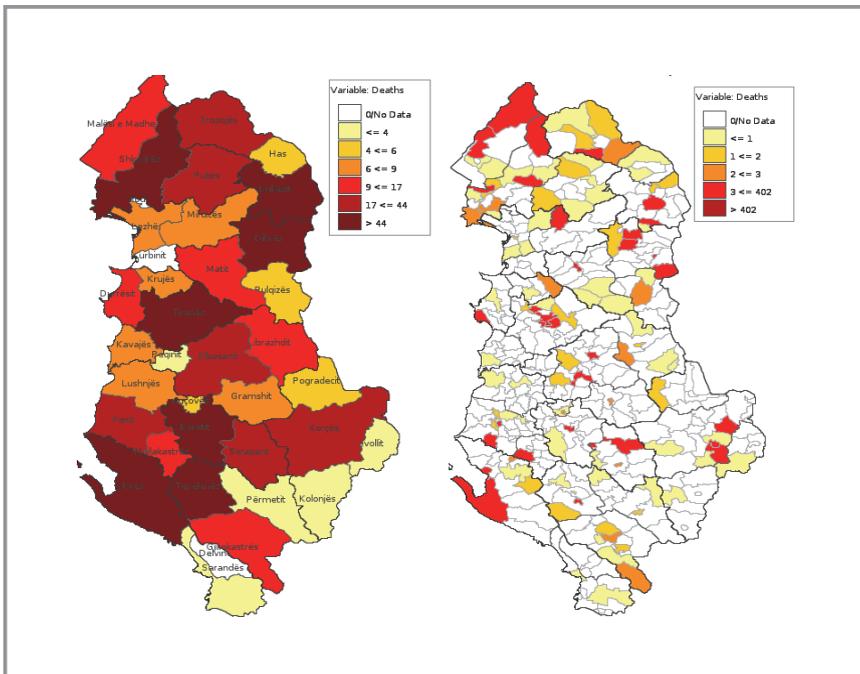


Figure 16: Spatial distribution of mortality by disasters (1851-2013)

6.3 Houses Destroyed and Damaged

The impact of disasters on houses is a major indicator from disaster statistics. Figure 17 shows the distribution of damages to houses due to different categories of disasters. Geophysical events are the disasters that mostly affect houses and account for about 68% of the total, followed by hydrological events with 27% and meteorological events with 3%. Less damage has been produced by other disaster types such as climatological, biological, technological and landslides.

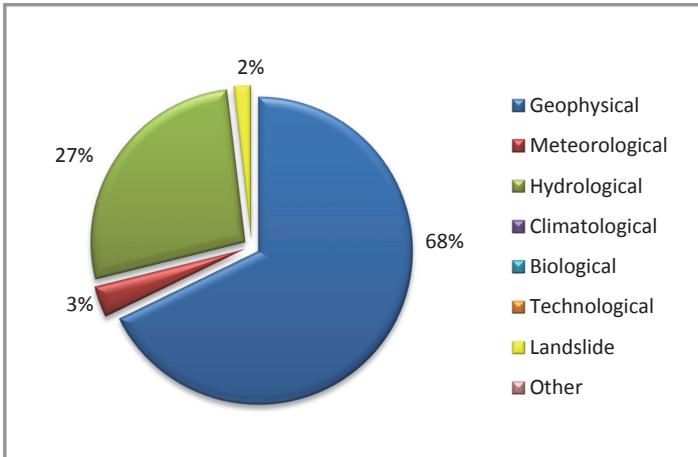


Figure 17: distribution of houses destroyed and damaged by disasters (1851-2013).

The analysis of temporal trend of damages to houses from 1946 to 2013 (Figure 18) shows that two major earthquakes have destroyed/damaged more than 50,000 of houses (35,000 in 1982 and 17,000 in 1979). Two major hydrological events, in 2002 and 2010, have damaged/destroyed nearly 10,000 houses each.

The total number of houses destroyed and damaged in the last 20 years (1993-2013) is about 30,000 with an average of 1.500 per year destroyed or damaged by disasters. The total number of events with 1 or more houses destroyed or damaged is 968.

The average of houses destroyed and damaged for every event is nearly 31.

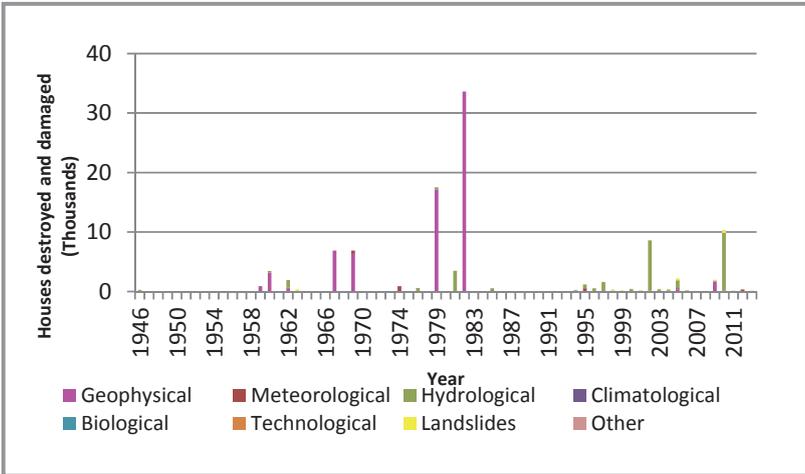


Figure 18: Temporal trend of number of houses destroyed or damaged by disasters

Figure 19 shows the spatial distribution of damage to houses. Shkoder (28,180) and Diber (10,955) are the more affected districts in the North of the country with 28,180 and 19,995 houses destroyed/damaged, while in the South Lushnje (3,770), Fier (18,826), Berat (17,505), Vlore (4,216) and Mallakaster (6,263) are the more affected districts. Shkoder is the district with the highest number of building affected/damaged followed by Fier and Berat. The analysis at commune level shows that the number of houses damaged or destroyed reached a maximum of 19,499 in Shkodra city. Berat (17,086) and Roskovec (16,857) rank the second and third commune with highest number of houses destroyed/damaged. In the last 20 years the 70 % of the total communes have experiences losses in houses (291 communes over 374). If we consider the entire records from 1851 to 2013, more than 80% of communes have registered losses to houses.

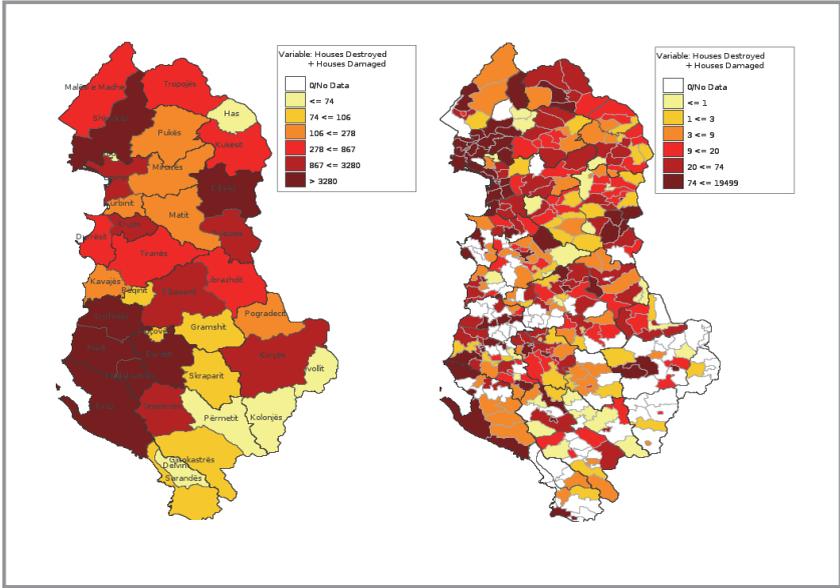


Figure 19: Spatial distribution of number of houses damaged or destroyed (1851-2013)

6.4 Losses to Agricultural Crops

Damage to agricultural crops is measured as hectares of crops affected by the disaster events. Figure 20 shows the distribution of records of damage to agricultural crops due to various disaster categories. Hydrological events are responsible for most of damages to crops, they account for more than 70% of the total losses. This category is followed by the meteorological with 23 % of total damages, biological with 4% and climatological with 3%.

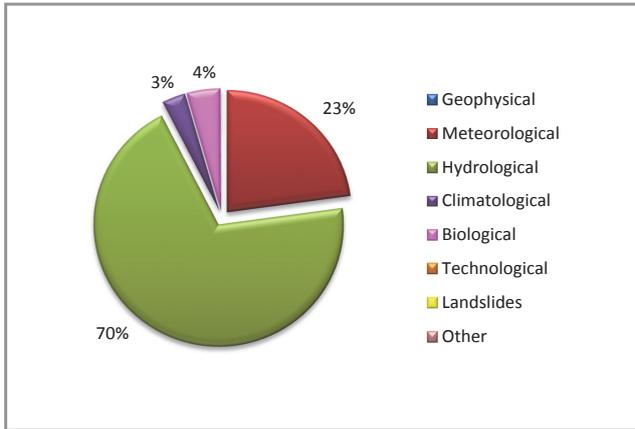


Figure 20: Agricultural losses due to different disaster types.

The annual time series distribution of Figure 21 shows the existence of two types of events: frequent but less intensive and less frequent and very damaging events that caused more than 70,000 hectares of losses (i.e. meteorological events of 1971 and 1976, and the flood of 2010 in Shkodra). In the last 20 years (from 1993) the average of hectares per year is around 10,352. The year with the highest damage is the 2010 with 45,535 ha mainly due to the Shkodra flood.

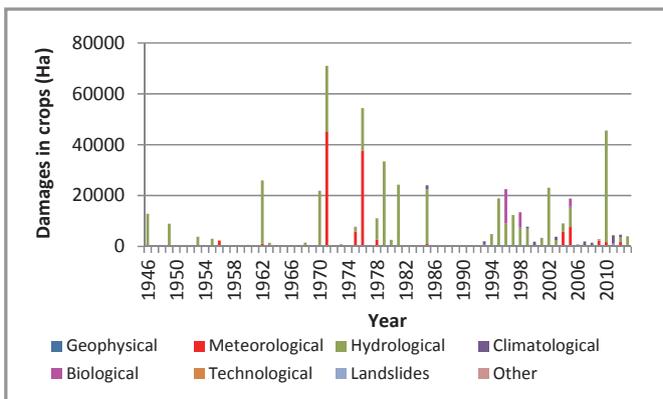


Figure 21: Temporal time series of crop damage in terms of hectares damaged

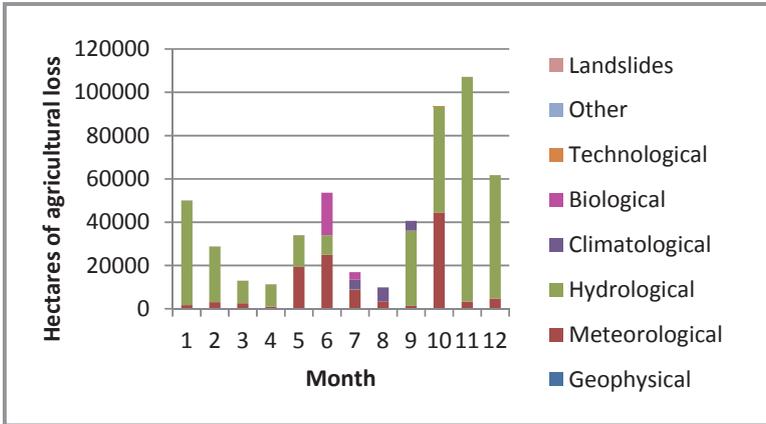


Figure 22: Profile of agricultural losses due to disasters (in Hectares): 1851-2013.

The seasonal distribution of agricultural losses follows the seasonal distribution of weather related disasters (see Figure 22). The months with more damages are October, November, December and January; hydrological and meteorological events mostly occur during these months. During summer, agricultural losses are mainly related with fires.

The Figure 23 shows the spatial distribution of the damages in crops within Districts and Communes. Most of the affected districts and communes are those of west Albania. This is mainly related with geomorphological factors and land use. Most of the river basins flows toward the Adriatic Sea, hence hydrological events mostly occur in the coastal areas; moreover crops and agricultural activities are mostly concentrated in the coastal areas.

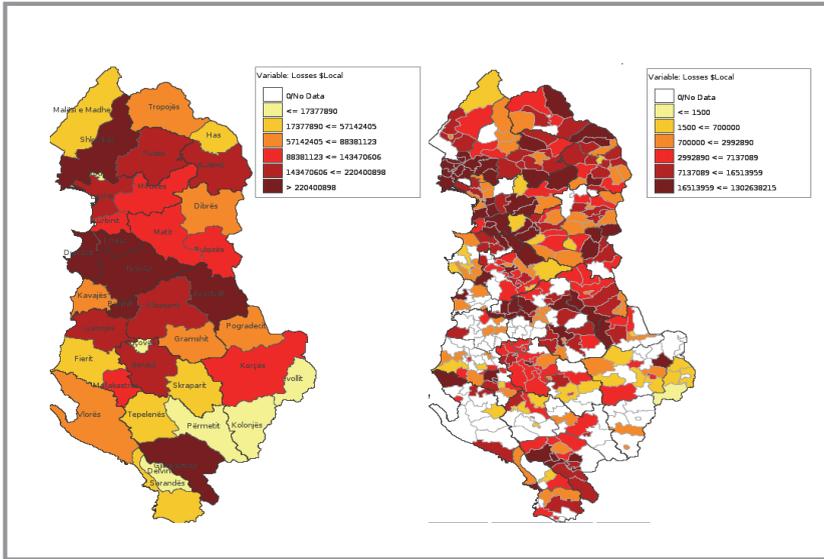


Figure 23: Agricultural loss due to disasters (in Hectares) – Spatial Distribution: 1851 – 2013

6.5 Economic losses

Data on direct economic losses have been collected by the Ministry of Internal Affairs from 1995 to 2013; other data on economic losses were collected from the media and they cover the period from 1993 to 2002. Though data from media are less reliable, they cover a large number of disasters, especially the frequent and less intensive disasters.

Figure 24 shows the composition of economic losses with respect to different disaster categories. The highest direct economic loss is due to hydrological events (mainly floods and flash floods) with 72 % of the total. The floods in 2002 and 2010 contribute very highly to the direct economic losses. Landslides also produce high level of losses; though no big events occurred during the years, the high value of losses is related to many small events that caused damages to a few houses, accounting up to the 13 % of all economic loss recorded by any kind of disaster.

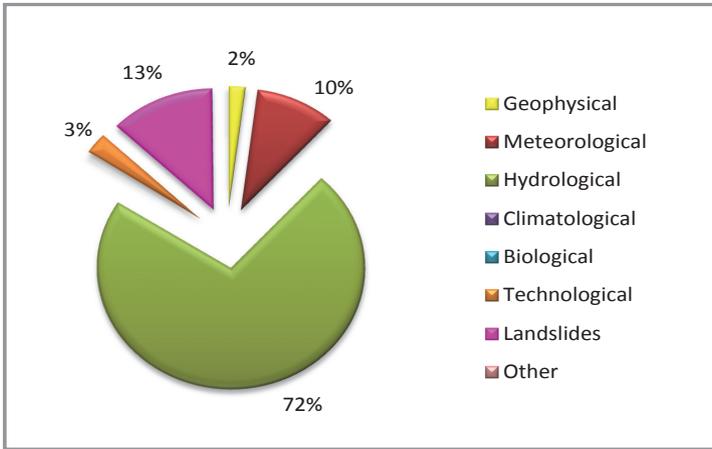


Figure 24: Composition of economic losses for different disaster categories (the original data are in local currency –LEK).

The temporal trend of economic losses is represented in Figure 25. Data before the 1993 are scarce, while for the last 20 years the data are comprehensive and they show an increasing trend. The total amount of recorded losses in the last 20 years is about 10.5 billions of LEK (92,305,500 \$) with an average loss per year of more than 500 million of LEK (0.026 % of the medium GDP of the last 20 years).

The temporal trend is influenced by two major floods: floods of 2002 and 2010 in Shkodra. The losses were 2,8 billion LEK (20 mln \$) for flood in 2002 and 4 billion LEK (40 mln \$) in 2010. The two disasters account for the 67% of the total direct economic losses of the last 20 years.

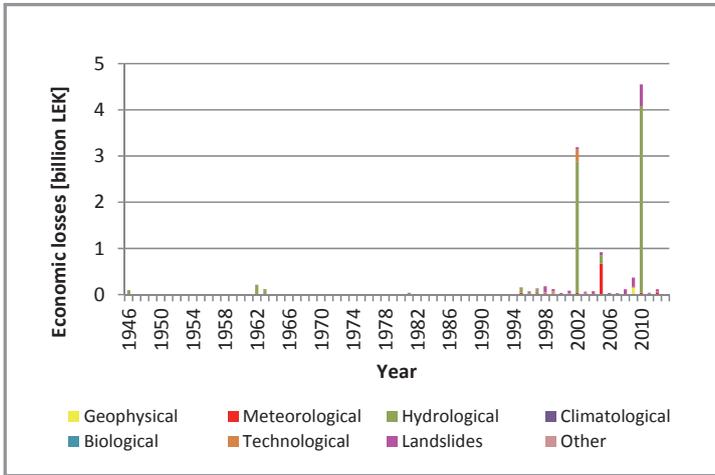


Figure 25: Temporal trend of the losses in LEK for the period from 1946-2013.

The spatial distribution of economic losses highlights the presence of hotspots in all the regions. Figure 26 shows the spatial distribution of the losses in LEK for the districts and the municipalities.

The Districts with more recorded losses are situated in the North of the country: Shkoder has a record of about 4 billion LEK. A second hot spot of economic damage is recorded for the central area of the country in the following districts: Tirane (650 mln LEK=5.7 mln \$), Peqin (550 mln LEK=4.8 mln \$), Kruje (300 mln LEK=2.6 mln \$), Librazhd (310 mln LEK=2.7 mln \$). In the South of Albania, the district of Gjirokaster has recorded about 290 mln LEK=2.5 mln \$ of economic losses.

The communes with more losses are: Dajc with 1,3 billion LEK=11.5 mln \$, Berdise and Bushat with nearly 610 mln LEK=5.4 mln \$ each.

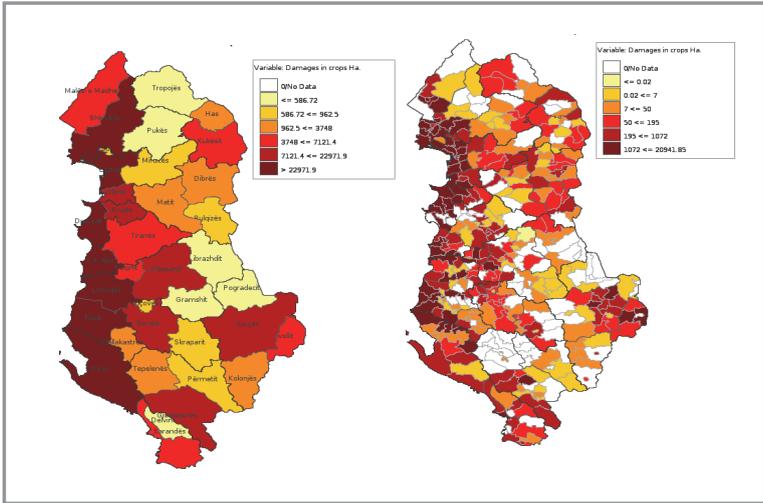


Figure 26: Spatial distribution of the losses in LEK for the districts and the municipalities.

7 HAZARD PROFILES

7.1 Floods and flash floods

Spatial distribution

Albania is vulnerable to floods and flash floods. All districts have experienced at least one flood in their territory. Figure 27 shows the spatial distribution of floods and flash floods by Districts and Communes for the period from 1851 till 2013.

The Districts with more floods and flash floods are Shkoder (160 events) and Lezhe (117 events) situated in the Northwest Albania. With respect to municipalities the most affected ones are Ana e Malit-Shkoder district (22 events), Velipoje-Shkoder district and Baldren i Ri-Lezhe district (18 events). The percentage of communes that experienced at least one flood is about 54 % of the total communes.

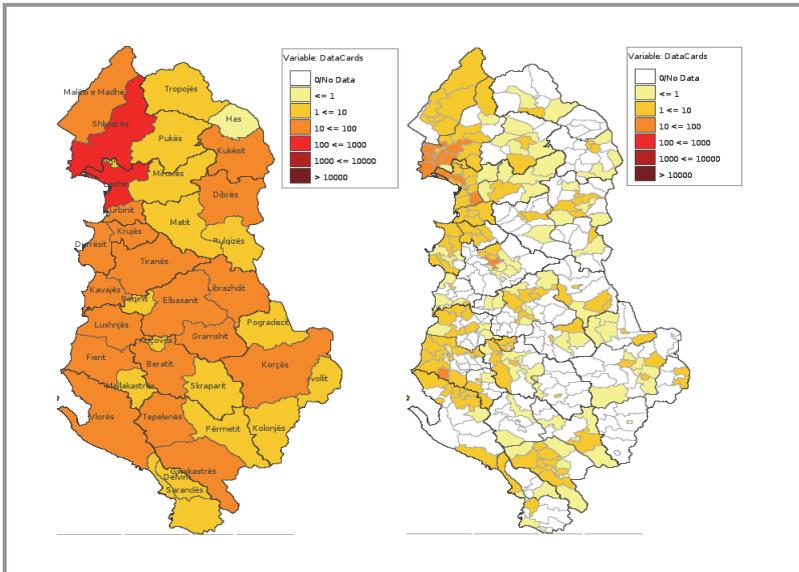


Figure 27. Spatial distribution of floods and flash floods by Districts and Communes for the period 1851-2013.

Temporal trend

Figure 28 shows the temporal behaviour of floods and flash floods for the period from 1946 to 2013. Generally, the number of events is increasing with a maximum in 2010 (110 events). In the last 20 years at least one flood occurred every year in the country, with an average of is nearly 23 events per year.

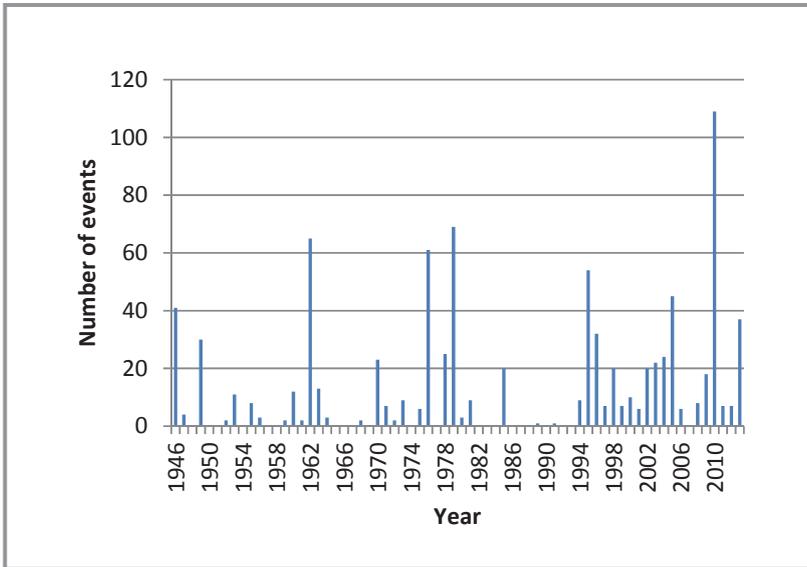


Figure 28: Temporal trend of floods and flash floods for the period 1946-2013.

Mortality

Figure 29 shows the mortality trend of floods and flash floods. Though mortality is decreasing in the last 20 years, floods are still continuing to cause deaths at an average rate of more than one person per year with a maximum of 9 persons killed in 1995 (see BOX 4 for a summary of statistics).

The statistics for the last 20 years show an average mortality of 0.05 per event, with a maximum of 5 deaths per event (flash flood of the commune of Kacinar-Mirdite district in 1995).

The most affected communes are Bushtrice and Kacinar with 5 deaths and Gramsh with 2. Just in 1905 there are a lot of deaths due to floods and flash floods in the region of Shkoder. The number of fatalities during this year is 200.

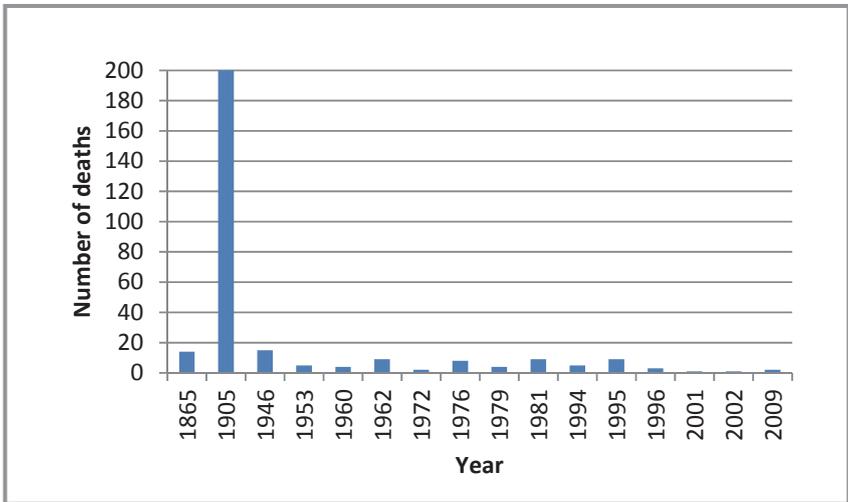


Figure 29: Number of deaths caused by floods and flash floods (only years with at least one person death are reported).

Economic losses

Figure 30 shows the fraction of GDP that is lost as a cause of floods and flash floods over the last 20 years. There are two main peaks in 2002 and in 2010 in which the losses reaches nearly 0.15 % of the GDP of the country.

The average expected losses per year is estimated to be around 370 mln of LEK (3.2 mln \$), with a maximum of 4 billion LEK (35.2 mln \$) in 2010.

More than 17% of the communes of Albania have registered economic losses in the last 20 years; Dajc has records for 1 billion LEK (8.8 mln \$) of losses, while Berdice and Bushat have registered about 0,5 billion LEK (4.4 mln \$) of losses; all these communes are located in Shkoder district.

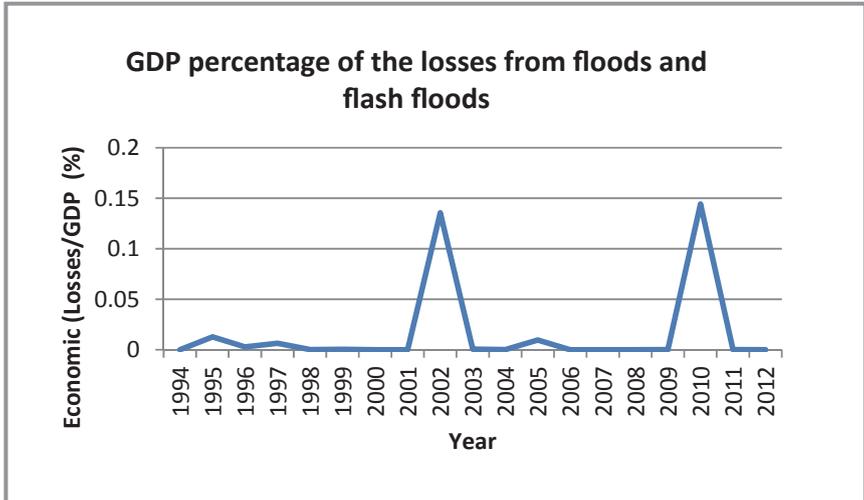


Figure 30. GDP percentage of the losses from floods and flash floods.

Summary of Statistics

BOX 4 summarizes the statistics of floods occurrence and related effects. The statistics refers to the last 20 years. There are 39 % of the total municipalities affected by these events .

Floods and flash floods have high impacts on the building sector with a high number of houses damaged and destroyed.

Floods and flash floods also have a big impact in the agricultural sector causing an average of more than 7,000 hectares of land damaged every year with a maximum of more that 40,000 hectares damaged in 2010.

The average hectares damaged per event is around 300 ha with a maximum of 20,000 ha for a single commune in a single event.

Box 4: Floods and flash floods

(for the last 20 years, from 1993)

	Average for year	Maximum for year	Average for event	Maximum for event	% of communes (%)	Most affected communes
Events	22.4	109 (in 2010)	n.a.	n.a.	39	Ballëdren i Ri (14), Ana e Malit (11), Zejmen (11)
Mortality	1.05	9 (in 1995)	0.05	5	1.6	Bushtrice (5), Kacinar (5), Gramsh (2)
Houses destroyed/damaged	40/ 1,136	539 (in 1995)/ 9,672 (in 2010)	1.8/ 50.7	300/ 7,000	11/ 21.1	Gur i Zi (300), Shkoder (150), Dushk (46)/ Dajc (2,977), Shkoder (2,221), Berdise (1,352)
Agriculture (Hectares)	7,419	43,739 (in 2010)	331	20,000	16.3	Levan (7,000), Ballëdren i Ri (3,000), Gradishte (2,600)
Economic losses	370 mln LEK	4,040 mln LEK (in 2010)	16.5 mln LEK	1,100 mln LEK	17.6	Dajc (1,000 mln LEK), Berdise (540 mln LEK), Bushat (480 mln LEK)

7.2 Landslides

Spatial distribution

Figure 31 shows the spatial distribution of the landslides from 1946 to 2013 (as there are no data about landslides before 1946). The most affected region of Albania is the east part.

The most affected districts are (in decreasing order): Mirdite (45 events), Mat (42 events), Librazhd (42 events), Kukes (40 events), Puke (40 events).

The municipalities with the highest number of landslides are Rreshen-Mirdite district (19), Baz-Mat district (14) and Gjegjan-Puke district (11). More than 50 % of commune has experiences at least one landslide in the last 20 years while more than 59% for all recorder years.

Temporal trend

Figure 32 shows the temporal behaviour of the landslides during the period from 1993 to 2013. The peak is in 2010 with nearly 110 landslides recorded. More than 25 events per years occurred, on average, in the last 20 years, however there is evidence of an increasing trend in the number of events.

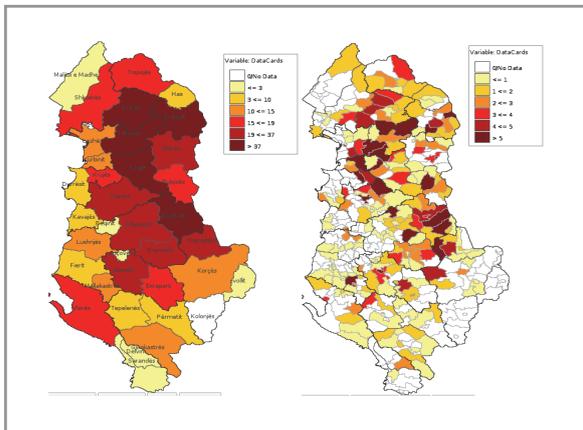


Figure 31. Spatial distribution of the landslides from 1946 to 2013 in the districts and municipalities.

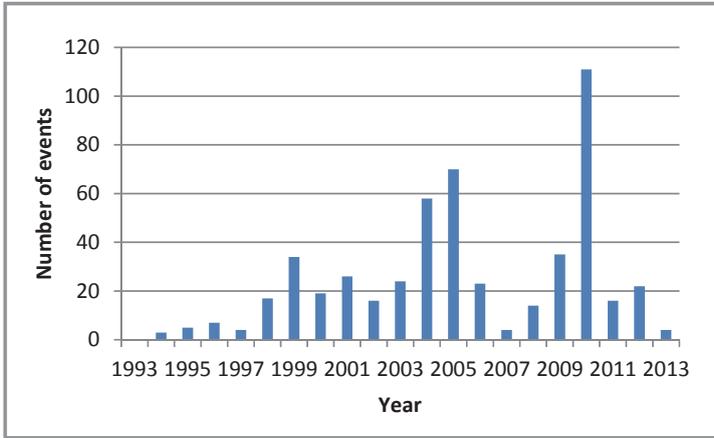


Figure 32. Temporal behaviour of the landslides during the period from 1993 to 2013.

Seasonal trend

Figure 33 shows the seasonal trend of the number of landslides. The landslides seem persistent over the year but the most affected months are February and March that are also months with high number of precipitation events (the primary trigger of landslides in Albania).

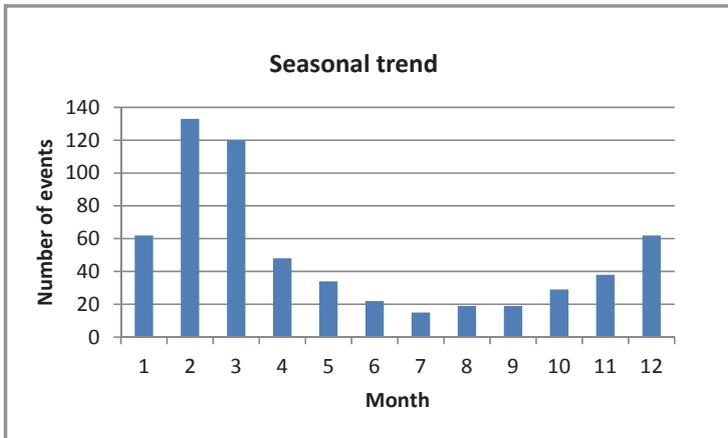


Figure 33. Seasonal trend of the number of landslides during the period 1946-2013.

Economic losses

Figure 34 shows the losses in local currency (LEK) for the years 1993-2013. The average economic losses for the last 20 years is about 69 mln LEK (695 k\$), however there is an increasing trend of economic losses due to landslide and the year with the highest losses caused by landslides was 2010 with 471 mln LEK (4.5 mln \$).

The statistics per events show an average loss per event of 2.7 mln LEK (23.7 k\$) with a maximum of 94 mln LEK (826 k\$). The event with the highest loss in LEK in the last 20 years happened in 1998 in the commune of Zall Bastar-Tirana district. In this event 43 houses were destroyed.

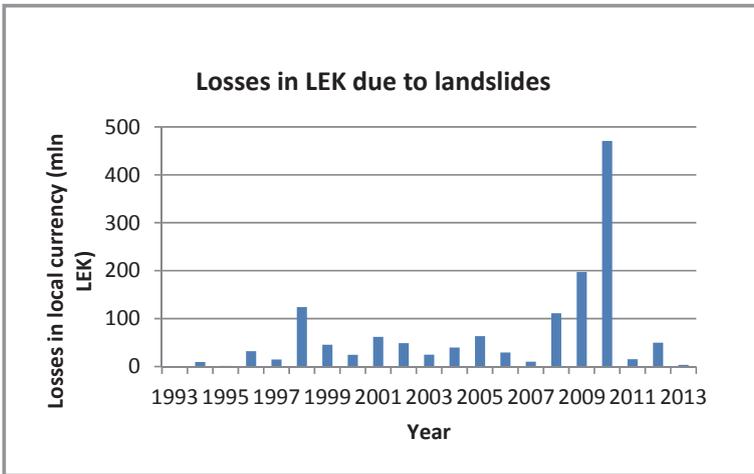


Figure 34: Losses in local currency (LEK) due to landslides for the period 1993-2013.

Summary of Statistics

Box 5 reports a summary of the statistics computed for number of events, mortality, house destroyed and damaged, impacts on agriculture, economic losses some statistical queries done to the database focused on the more important variables (mortality, houses destroyed/damaged, hectares, economic losses in LEK).

Mortality of landslide is about 1 per year with a maximum of 5 deaths in 1998. There is an average of 4 persons killed over 100 events with a maximum of 5 deaths for one single event. The highest number of deaths occurred in a landslide of 1998 in the commune Bicaj-Kukes district.

The landslides cause more houses destroyed than damaged with an average of 50 and 40 houses per year respectively. On average, more than 3 houses are either destroyed or damaged for each specific event with a maximum of about 110 houses. Nearly 40% of communes have experienced at least one house destroyed or damaged by landslides in the last 20 years.

The average of economic losses is about 69 mln LEK per year (607 k\$) with a maximum of 471 mln in 2010 (4.5 mln \$). 2.7 mln LEK (24 k\$) are lost, on average, per each landslide.

The maximum economic loss has been recorded for landslides in the commune Zall Bastar in 1998-Tirana district- with nearly 95 mln LEK (826 k\$). More than 50 % of the communes suffered economic losses due to landslides in the last 20 years.

Box 5:Landslides

(for the last 20 years, from 1993)

	Average for year	Maximum for year	Average for event	Maximum for event	% of communes	The most affected communes
Events	25.6	111 (in 2010)	n.a.	n.a.	53.7	Rreshen (18), Baz (14), Zall Bastar (10)
Mortality	0.95	5 (1998)	0.04	5	2.7	Bicaj (5), Korce (3), Dajt (2)
Houses destroyed/damaged	50/40	316 (in 2010)/258 (in 2005)	1.93/1.51	43/72	39.6/ 20.6	Zall Bastar (84), Velcan (56), Funare (45)/ Funare (120), Lezhe (81), Labinot Fushe (72)
Hectares	8.2	44.2 (2010)	0.32	44.2	2.9	Armen (44.2), Lumas (36.2), Vendreshe (30)
Economic losses	69 mln LEK	471 mln LEK (in 2010)	2.7 mln LEK	94 mln LEK	53.7	Zall Bastar (147 mln LEK), Gjirokaster (81 mln LEK), Synej (60 mln LEK)

7.3 Forest fires

Spatial distribution

Figure 35 shows the spatial distribution of forest fires by districts and municipalities for the period from 1946 to 2013. The most affected districts are those located in the South: Fier (70 events), Vlore (70 events), Berat (66 events), Gjirokaster (58 events). Diber (47 events) is the most affected in the North of the country. The municipalities with more forest fires from 1946 are Berat (23 events), Levan (15 events) and Selishte (14 events). In the last 20 years the municipalities with more fires are Berat (23), Qender (13) and Poshnje (13).

Forest fires affect a large part of the territory; indeed nearly 70% of the communes have experienced at least one forest fire in the last 20 years.

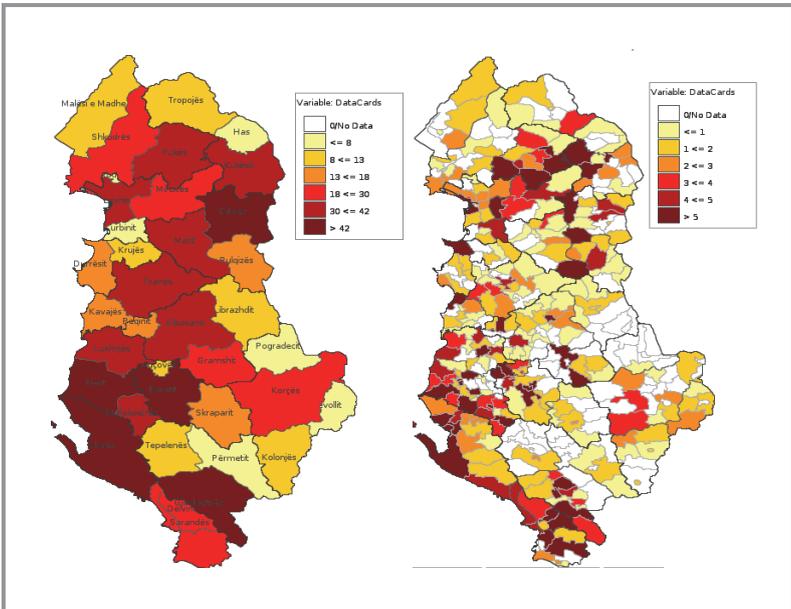


Figure 35. Spatial distribution of forest fires for the period 1946-2013.

Temporal trend of forest fires

Figure 36 shows the temporal trend of forest fires during the period from 1993 to 2013 with an average 43 forest fires per year. The year with highest number of events is 2007 with nearly 200 of occurrences.

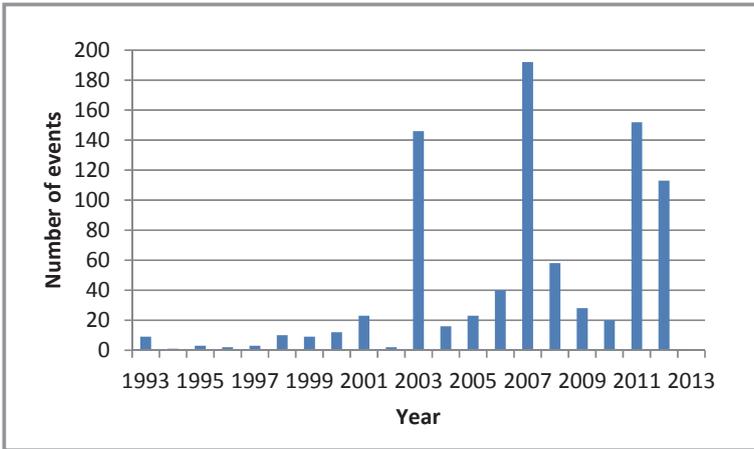


Figure 36: Temporal behaviour of forest fires for the period 1993-2013.

Seasonal trend

Forest fires are highly affected by the season and they occur mostly from June to September. Figure 37 reports the seasonal distribution of forest fires for the period 1946-2013.

As expected the highest number of forest fires occur in August with 450 events recorded, it follows July and September. More than 90% of forest fires occur in the period from July to September.

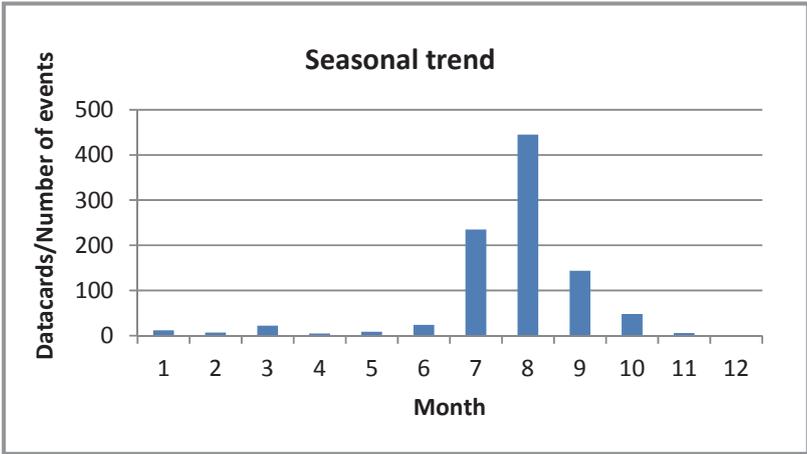


Figure 37: Seasonal trend of forest fires for the period 1946-2013.

Summary of Statistics

Box 6 shows a summary statistics for occurrence and impacts (mortality, houses destroyed/damaged, hectares, economic losses). Statistics are computed by using data of the last 20 years, which has been collected continuously.

Compared to other hazards, forest fires have smaller mortality, with records showing approximately 1 death over 10 years and over 500 recorded events.

Impact on houses is also smaller, though significant, with respect to other hazards: nearly 1.5 houses destroyed or damaged per year with a maximum of 4 houses destroyed in 2011.

Economic losses reach nearly 1 mln LEK per year with a maximum of 7 mln LEK (51 k\$) in the summer of 1999. The average losses per event are about 21x103 LEK (185 \$) and a maximum of 3.4 mln LEK (36x103 \$) for the event of 1993 in the district of Mat with 624 hectares damaged.

Forest fires have high impact on agriculture and environment that are not accounted in the economic losses. 664 hectares are burned in an average year corresponding to nearly 1,700 soccer fields. The maximum number of hectares burned was recorded in 2011 with 3,131 hectares. About 15 hectares (40 soccer fields) are burned by an average event.

There are 29 events with an agriculture damage of 100 or more hectares. The total damage that these events caused is 8,172 hectares that represent the 62 % of the total agricultural losses in the last 20 years. There are 532 events with an agricultural loss of 99 or less hectares. The total amount of hectares damaged from these events is 5,117, representing the 38.5 % of the total damage in agriculture.

Box 6: Forest fires

(for the last 20 years, from 1993)

	Average for year	Maximum for year	Average for event	Maximum for event	% of communes	The most affected communes
Events	43	192 (in 2007)	n.a.	n.a.	67.4	Berat (23), Qender (13), Poshnje (13)
Mortality	0.1	1 (2001, 2011)	0.002	1	0.53	Gruemire (1), Vlore (1)
Houses destroyed/damaged	1.3/0.15	4 (2011)/ 2 (2005)	0.03/0.003	4/2	3.5/1	Aliko (4), Bytyc (3)/ Dhiver (2), Rreshen (1)
Hectares	664	3,131 (2011)	15.4	920	55.9	Terthore (700), Hocsisht (700), Aliko (500)
Economic losses	0.9 mln LEK	7 mln LEK (1999)	21x10 ³ LEK	3.4 mln LEK	1.3	Qafe Mali (4.7 mln LEK), Dropull i Siperem (2.8 mln LEK), Lunxheri (2 mln LEK)

7.4 Earthquakes

Spatial distribution

Figure 38 shows the spatial distribution of earthquakes in the districts and municipalities. The most affected districts are Tropoje (12 events) and Diber (14 events). The top affected communes are Peshkopi (4 events) and Fierze, Himare, Berat, Margegaj, Hekal, Polis (with 3 events each). Earthquakes affect nearly 20% of the communes, confirming the high seismicity of the area.

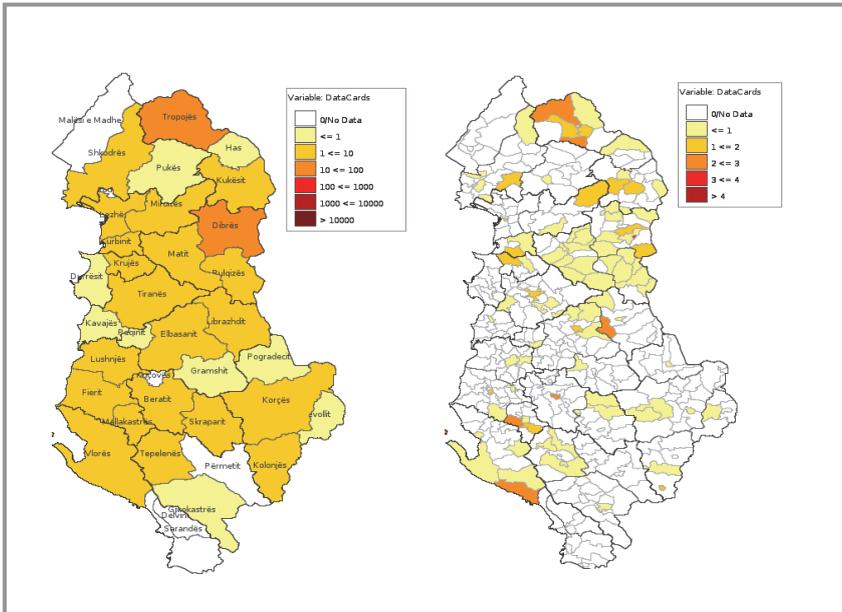


Figure 38. Spatial distribution of earthquakes in the districts and municipalities.

Temporal trend

Figure 39 shows the temporal trend of earthquakes for the period from 1851 till 2013. The series of records show a high number of registered events in the last 20 years. However, this may be a reflection of the scarcity of data before 1993 when only major disasters were reported and recorded. There is no evidence of temporal trend.

The average number of events per year is 4.5 with a maximum of 17 in 2009.

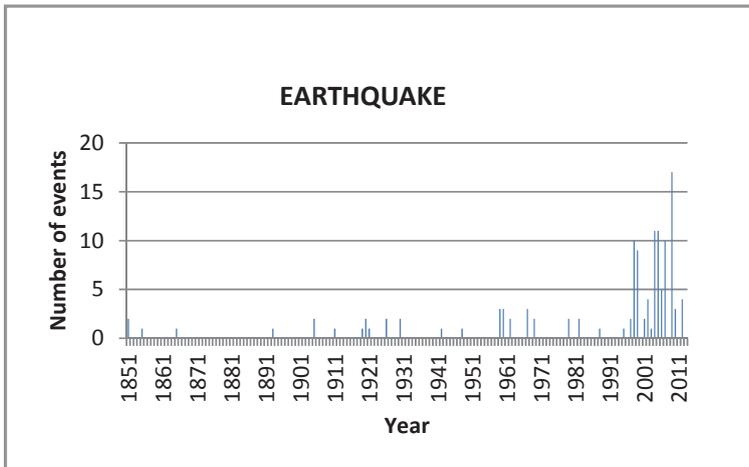


Figure 39. Temporal trend of earthquakes for the period 1851-2013.

Mortality

Figure 40 shows the mortality of due to earthquakes over the years from 1851 till 2013 (only the years with deaths are represented). Though the number of events of the last 20 year is high, there are no deaths in this period.

The highest number of deaths is reported in 1851 due to two big earthquakes, in the municipalities of Vlore and Berat with 200 and 400 of deaths respectively.

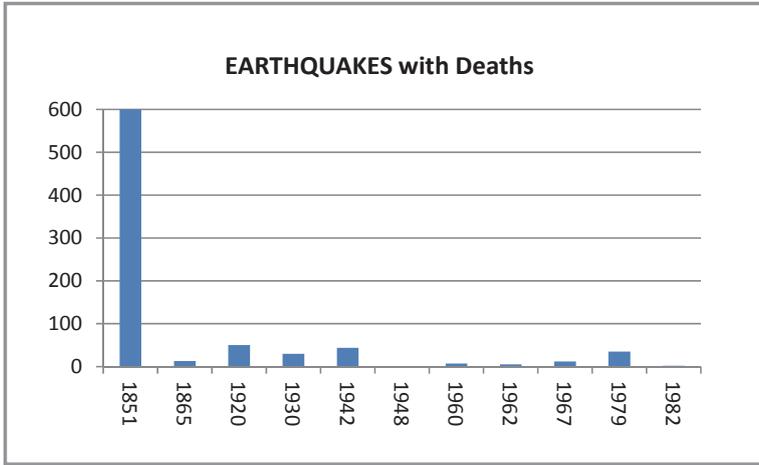


Figure 40. Earthquakes with deaths for the period from 1851-2013.

Summary of statistics

Box 7 summarizes the statistic for earthquakes of the last 20 years. The earthquakes that occurred in the last 20 years affected nearly the 20 % of the total communes. These earthquakes did not caused deaths or damages in agriculture.

In the last 20 years, the houses damaged are 5 times the houses destroyed. On average there are nearly 120 houses destroyed or damaged per year with a peak of 1,200 houses destroyed or damaged in 2009.

The average economic loss for the last 20 years is 215 mln LEK= 1.9 mln \$ reaching the peak for year in 2009 with 154 mln LEK= 1.6 mln \$.

However statistics are different when the entire time-series is considered (from 1851 – 2013, see Box 8). The mortality increases to 5 persons per years, 6.3 persons per event, with a maximum of 600 person on a yearly base and 400 per event. The number of houses destroyed or damaged rise to nearly 500 per year and 600 per event with a maximum of about 17,000 houses destroyed in 1982 and 17,000 houses damaged in 1979.

Box 7: Earthquakes

(for the last 20 years, from 1993)

	Average for year	Maximum for year	Average for event	Maximum for event	% of communes	The most affected communes
Events	4.5	17 (in 2009)	n.a.	n.a.	19.5	Fierze, Polis, Margegaj (3 each)
Mortality	0	0	0	0	0	n.a.
Houses destroyed/damaged	16.25/100	138 (2009)/1,517 (in 2009)	3.6/33.8	70/515	10.7/13.6	Maqellare (70), Gjorice (66), Polis (50)/ Shupenze (515), Zerqan (350), Gjorice (282)
Hectares	0	0	0	0	0	n.a.
Economic losses	215 mln LEK	154 mln LEK (in 2009)	2.4 mln LEK	52 mln LEK	19.5	Zerqan (52 mln LEK), Shupenze (46 mln LEK), Maqellare (18.5 mln LEK)

Box 8: Earthquakes

(for all the years present in DesInventar database, from 1851)

	Average for year	Maximum for year	Average for event	Maximum for event	% of communes	The most affected communes
Events	0.8	17 (in 2009)	n.a.	n.a.	25	Peshkopi (4), Fierze (3), Himare (3)
Mortality	5	600 (in 1851)	6.3	400	4.5	Berat (401), Vlore (200), Peshkopi (44)
Houses destroyed/damaged	132/360	16,802 (in 1982)/17,122 (in 1979)	169/463	16,524/17,122	16.3/20.3	Berat (16,556), Peshkopi (1,425), Fratar (843)/ Shkoder (17,122), Roskovec (16,524), Maqellare (6,522)
Hectares	0	0	0	0	0	n.a.
Economic losses	1.3 mln LEK	154 mln LEK (in 2009)	1.7 mln LEK	51.8 mln LEK	25	Zerqan (51.8 mln LEK), Shupenze (45.8 mln LEK), Maqellare (18.3 mln LEK)

7.5 Meteorological Events

Meteorological events are composed by: snowstorm, rain, storm, windstorm, hailstorm, thunderstorm, fog, cold wave, heat wave and frost.

The average number of events per year is 51 and they impacts on nearly 67% of the communes.

The mortality of meteorological events is nearly 7 persons per years in the last 20 years with a maximum of 38 deaths in 1999.

Houses are destroyed at a rate of 18 houses per year and 82 houses are damaged per year. Damages to houses are mainly related with snowstorms.

Large amount of crops are affected with an average of 1,100 ha per year and a maximum observed of 7,600 ha in 2005).

The average economic loss in the last 20 years is about 51.4 mln LEK (451.9 k\$) per year with a maximum of 667 mln LEK (6.7 mln \$) in 2005.

Box 9: Meteorological events

(for the last 20 years, from 1993)

	Average for year	Maximum for year	Average for event	Maximum for event	% of communes	The most affected communes
Events	51.45	239 (in 2012)	n.a.	n.a.	66.6	Durres (34), Tirane (26), Vlore (18)
Mortality	5.9	38 (in 1999)	0.1	27 (heat waves in 1999)	9	Tirane (28), Polican (10), Gjerbes (4)
Houses destroyed/damaged	18.1/82.4	53 (in 1996)/550 (in 1995)	0.35/1.6	30 (storm in 1996)/280 (windstorm in 1995)	22.5/28	Topoje (33), Vau i Dejes (30), Shtiqen (13)/ Vau i Dejes (286), Shale (270), Kolsh (177)
Hectares	1,087	7,577 (in 2005)	21	2,300 (rain in 2009)	12.6	Balltren i Ri (2,810), Gjocaj (2,194), Vreshtas (2,000)
Economic losses	51.4 mln LEK	667.4 mln LEK (in 2005)	1 mln LEK	160 mln LEK	66.5	Gjocaj (160 mln LEK), Pajove (145 mln LEK), Perparim (120 mln LEK)

8-CONCLUSIONS

Loss data collection systems are one of the key priorities of the Hyogo framework for action.

The purposes of this publication are two: the former is to describe the implementation of DesInventar methodology as a tool for building disaster databases, the second is to illustrate the findings of the historical collection and how the data can be used to update the country risk profile.

DesInventar allows to collect data at local scale and to register small impact disasters that as they are more frequent can produce high damages.

DesInventar methodology differentiates data into mandatory and customized data fields. Customized field are dependent on the country while mandatory data are homogenous for all country databases and can be used for comparison. Customization and local adaptation are fundamental for implementing a sustainable database that meets the requirements of a particular country's needs. It also helps to ensure that the database becomes part of government systems and not a standalone one.

Other international databases, such as EM-DAT, tend to collect data on major disasters that had more international attention. Smaller scale disasters are not recorded because of the data entry criteria.

BOX 9 reports a summary of the main data collected by EM-DAT and a comparison with DesInventar. It is worth to underline that EM-DAT collects data indicators for human and economic loss, while DesInventar provides also data indicators for physical damage related to homes and to infrastructure. There is a big difference in the number of events, people killed and economic data.

BOX 10	DesInventar (data from 1851 - 2013)	DesInventar (data from 1980 - 2010)	EM-DAT (data from 1980 - 2010)
Number of events	4,305	2,746	23
Number of people killed	1,652	484	163
The event with the highest mortality	Earthquake	Snowstorm	Extreme temperature
Economic damage (\$ X 1,000)	95,552	89,758	24,673
The event with the highest economic loss	Flood of 2010	Floods and flash floods of 2010	Flood of 2002
The most frequent events	Forest fires (957 events)	Forest fires (662)	Floods (9 events)

More than 4.000 events have been registered for Albania in the entire period from 1851 to 2013. Only 12 municipalities over 374, 3% of the total, have not experienced disasters.

Meteorological events are the most commons (33% of the total), followed by Climatological (22%), Hydrological events (21%) and Landslides (14%). These four disaster types cover 90% of total number of events during the period under review. About 10% of total number of events are Geophysical, Biological and Technological.

In the last 20 years (from 1993 to 2013) more than 1 person over 100 (relatively to the population of 2011) has been affected by disasters every year. Disasters with at least 1 affected person have been recorded for nearly 70% of the total municipalities.

The total amount of recorded losses in the last 20 years is about 10,5 billions of LEK (92 mln) with an average loss per year of more than 500 mln of LEK (0.026 % of the medium GDP of the last 20 years).

Geophysical disasters have the highest mortality accounting for more than 50% of the total life losses. They are followed by hydrological events with 18% of total deaths.

Moreover, geophysical events are the disasters that mostly affect houses and account for about 68% of the total houses destroyed or damaged. Hydrological events account for 27 % of the total.

Damage to crops is mainly related to hydrological events that account for more than 70% of the total hectares affected by disasters.

The highest direct economic loss is due to hydrological events (mainly floods and flash floods) with 72 % of the total. Landslides also produce high level of economic losses.

Floods and flash floods

The percentage of communes that experienced at least one flood is about 54 % of the total communes.

There is a general increasing temporal trend in the last 20 years. At least one flood occurred every year in the country (are an exception 1993 and 2007), with an average of nearly 23 events per year.

Though mortality is decreasing in the last 20 years, floods are still continuing to cause deaths at an average rate of more than one person per year with a maximum of 9 persons killed in 1995. The statistics for the last 20 years show an average mortality of 0.05 per event, with a maximum of 5 deaths per event.

Floods and flash floods have high impacts to buildings: nearly 40 houses per year have been destroyed by floods in the last 20 years and 1,200 houses were damaged.

Floods and flash floods also have a big impact in the agricultural sector causing an average of more than 7,000 hectares of land damaged every year with a maximum of more that 40,000 hectares. The average hectares damaged per event are around 300 ha with a maximum of 20,000 ha for a single commune in a single event.

The average economic losses per year are estimated to be around 370 mln of LEK (3.2 mln \$), with a maximum of 4 billion LEK (35.2 mln \$) in 2010. More than 17% of the communes of Albania have registered economic losses in the last 20 years.

Landslides

More than 50 % of communes have experienced at least one landslide in the last 20 years while there are more than 59% communes for all recorder years.

More than 25 events per years occurred in the last 20 years. However, there is evidence of an increasing trend in the number of events.

Mortality of landslide is about 1 per year with a maximum of 5 deaths in 1998. There is an average of 4 persons killed over 100 events with a maximum of 5 deaths for one single event.

On average, more than 3 houses are either destroyed or damaged for each specific event with a maximum of about 110 houses. 50 houses are destroyed per year and around 40 houses are damaged per year. Nearly 40% of communes have experienced at least one house destroyed or damaged by landslides in the last 20 years.

The average of economic losses is about 69 mln LEK per year (607 k\$) with a maximum of 471 mln in 2010 (4.5 mln \$). 2.7 mln LEK (24 k\$) are lost, on average, per each landslide. There is evidence of an increasing trend of economic losses due to landslide and the year with the highest losses caused by landslides was 2010 with 471 mln LEK (4.5 mln \$).

Forest Fires

Forest fires affect a large part of the territory; nearly 70% of the communes have experienced at least one forest fire in the last 20 years with an average of 43 events per year. The year with highest number of events is 2007 with nearly 200 of occurrences.

Compared to other hazards, forest fires have smaller mortality showing approximately 1 death over 10 years and over 500 recorded events.

Forest fires have high impact on agriculture and environment. More than 660 hectares are burned in an average year (roughly 1,700 soccer fields) with a maximum of about 3,100 ha in 2011. About 15 hectares (40 soccer fields) are burned by an average event. More than 95% of the events are small (with less than 100 ha of burned area) and they account for more than 40% of the total burned area, while big events are relatively rare (5% of the total) and cause 60% of the total damage to crops.

Economic losses reach nearly 1 mln LEK per year with a maximum of 7 mln LEK (51 k\$) in the summer of 1999. The average losses per event are about 21,000 LEK (185 \$) and a maximum of 3.4 mln LEK (36,000 \$).

Meteorological

Meteorological events group snowstorm, rain, storm, windstorm, hailstorm, thunderstorm, fog, cold wave, heat wave and frost.

The average number of events per year is 51 and they impacts on nearly 67% of the communes.

The mortality of meteorological events is nearly 7 persons per years in the last 20 years with a maximum of 38 deaths in 1999.

Houses are damaged at a rate of 18 houses per year and 82 houses are damaged per year. Damages to houses are mainly related with snowstorms.

Large amount of crops are affected with an average of 1,100 ha per year and a maximum observed of 7,600 ha in 2005).

The average economic loss in the last 20 years is about 51.4mln LEK (451.9×10^3 \$) per year with a maximum of 667 mln LEK (6.7 mln \$) in 2005

Earthquakes

Earthquakes affect nearly 20% of the communes, confirming the high seismicity of the area.

In the last 20 years, the houses damaged are 5 times the houses destroyed. On average there are nearly 120 houses destroyed or damaged per year with a peak of 1,200 houses destroyed or damaged in 2009.

The average economic loss for the last 20 years is 215 mln LEK= 1.9 mln \$ reaching the peak for year in 2009 with 154 mln LEK= 1.6 mln \$.

In the last 150 years the mortality increases to 5 persons per years, 6.3 persons per event, with maximum of 600 person on a yearly base and 400 per event. The number of houses destroyed or damaged rise to nearly 500 per year and 600 per event with maximum of about 17,000 houses destroyed in 1982 an 17,000 houses damaged in 1979.

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