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***Economic vulnerability in disasters:
lessons learnt from the field***

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Facing natural hazards in an economic perspective as the working framework

- Following an **economic perspective** the **damage produced on a territory** by a major natural disaster always **means a loss of resources** for a territorial system as a whole.
 - **resources normally used** to maintain the “normal” territorial equilibrium
 - **resources for the future development** of a territorial system



The economic perspective

ECONOMIC PERSPECTIVE in facing natural hazards:

- to look at **territorial values involved** in case of natural event with the related ex ante / ex post **intervention needs**

benefits / revenues / incomes

costs / expenses / losses

- to act in a way to
 - **maximize positive** elements
 - **minimize negative** elements
 - **minimize cost/benefit** ratio



ECONOMIC PERSPECTIVE in facing natural hazards:

minimize potential losses and costs

=

**minimize the reduction of available
resources and of related values
due to a natural disaster**

=

damage mitigation and prevention



The economic perspective/ Working questions

- How to **adequately calculate the – potential – damage** in case of natural disaster?
- How to **adequately recognize all typologies of resources** at stake in case of natural disaster?
- How to **adequately calculate the values** at stake in case of natural disaster?
- How to **adequately calculate real / systemic / long period damage** suffered by a territory after a natural disaster occurs?
- How to **adequately calculate values** from a **mitigation /prevention of economic damage** point of view?



The economic perspective/ Working questions

To be prepared if a **natural disaster** occurs



Foresee potential loss of territorial **resources / values**



Ex ante intervention means **reduction** of **exposure and vulnerability** and **improvement of resilience over time**



Ex ante intervention means **intervention tools to mitigate** the damage:

how to face a huge variety of situations? how much to invest to reduce which amount of potentially lost resources and values? how to select tools?

The economic perspective/ Reading the territorial area concerned

We first do have to put in evidence the “object” of our attention

TERRITORIAL SYSTEMS



Territorial systems are complex

aggregates formed by combining several “**territorial components**” (subjects and objects), each representing a **function and/or a system of interests exposed to hazards**:

- **continuously evolving** within specific and different dynamics referring to different territorial components
- **interacting with each other** over time producing new components



Territorial systems are complex...

.... aggregates of resources

- goods, services, commons and public resources
- with or without monetary values
- tangible/material and intangible/non material
- reproducible and non reproducible
- exposed to different natural hazards in different ways and dimensions (localization)
- with different vulnerability degrees facing different natural hazards
- available over time

Territorial systems are complex...

.... aggregates of resources

Which can be characterized and measured in terms of VALUES

The economic perspective focuses on VALUES and the capability to identify them in terms of TERRITORIAL COMPONENTS to take care of and whose value – reflecting how important that component is according to the specific territorial elements and characteristics of an area – can be assessed using different MEASURE UNITS. Money is a particularly powerful measure unit but it is often difficult to use it (that is to "monetize" the values).



The economic perspective/ Reading the territorial area concerned

... IS A MATTER OF VALUES ...

The "problem" is to evaluate both EXPOSURE and VULNERABILITY in an economic perspective focusing on:

- The identification of the territorial components exposed to the hazards – multisectoral and with a high variability
- The identification of the importance such components have in their specific territorial framework
 - roles
 - use functions
 - values (linked to market dynamics, lifestyles, wellbeing)
 - fragility profiles looking at potential damages

Which INDICATORS are needed and from which data sources?



The economic perspective/ Reading the territorial area concerned

... IS A MATTER OF VALUES ...

Then the assessment/evaluation needs appear:

- qualitative and quantitative assessments
- measure units (money is one of the available ones) to be recognized and shared
- value chains for both residential and economic activities and built environments
- territorial dynamics over time



The economic perspective/ Hazards as potential destroyers of territorial resources

The presence itself of major natural hazards can therefore be regarded as **a potential loss of tangible and intangible resources**, producing “obvious” negative externalities: **loss of values integrated in the "Territorial capital"**

In an economic perspective vulnerability means to what extent and how **a disaster will affect**

- **the capital of local resources** – that is direct and indirect values of the whole amount of resources
- **the capability of the system to continue producing goods and services** – that is values and revenues produced for final consumers or as production means
- **the capability of the system to reproduce the lost resources and in how much time** – that is direct and indirect values related to reproducible and non-reproducible resources



The economic perspective/ Hazards as potential destroyers of territorial resources

If a disaster occurs = loss of resources / values



- ✓ "how big an event is"?
- ✓ "how severe the impact is?"

The economic approach looks at the values of the territorial components hit by the event and to the damage suffered as the reduction of such values. The damage can be:

- ✓ temporary or permanent
- ✓ involving the whole element or a part of it
- ✓ Involving renewable or not renewable elements or resources
- ✓ Involving economic subjects/workers, residents, public bodies...



The economic perspective/ Hazards as potential destroyers of territorial resources

If a disaster occurs = loss of resources / values



The “logical” answer of the economic perspective is:

- ✓ To understand what are the values at stake
- ✓ To assess exposure and vulnerability for such values
- ✓ To understand the key values for the territory
- ✓ To understand links and interdependences



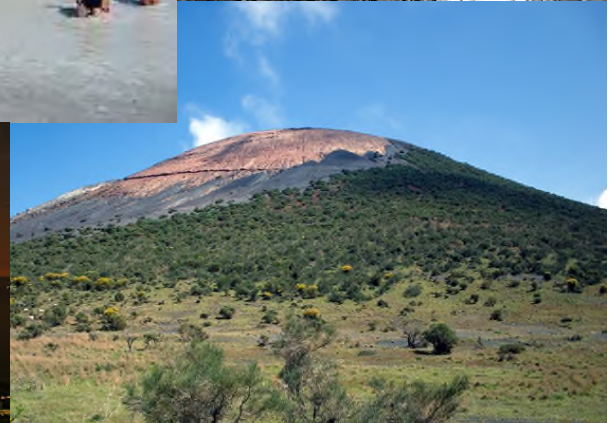
Act to minimize potential losses
Mitigation measures and DRR approaches



The economic perspective/ Hazards as potential destroyers of territorial resources

Case study: Vulcano, Italy

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a. Before the eruption



b. After the eruption



Figure 2.7: Fogo Island Roads Destroyed by the Volcanic Eruption

The economic perspective/ Hazards as potential destroyers of territorial resources

We therefore need to **identify, fully understand and “calculate”**

□ which are the resources/values affected and to what extent:

- “economic vulnerability” assessment
- “economic exposition” to hazards

□ with which effects before a disaster occurs:

- economic impact of the presence itself of one or more hazards
- economic impact and values of hazard management, disaster prevention, emergency preparation, ex ante disaster mitigation

□ with which effects after a disaster:

- direct and indirect economic impact of a disaster
- emergency costs
- economic capacity to cope with disasters (resources)
- tools and strategies to minimize economic effects
- “economic resilience”



The economic perspective/ Hazards as potential destroyers of territorial resources

The **economic vulnerability and resilience assessment** results **will depend on:**

- the **type** of hazard / disaster and its “local characteristics”
- the **characteristics and values of the exposed** system of resources (which resources, for which uses, their availability / renewability / reproducibility)
- the territorial system as **a system of monetary and non-monetary values**
 - social model
 - economic model
 - settlements, buildings and infrastructure quality and localization
- the **over-local role of the territorial system** and the **interdependence** with other territories



The economic perspective/ Hazards as potential destroyers of territorial resources

- ❑ some territorial resources **cannot be substituted with others** (often financial), like historical cultural heritage or particular natural ecosystems
- ❑ the **reimbursements** (by the state or the insurance system) **and reconstruction financial needs** (by public or private territorial actors) **absorb economic means**, in some cases slowing down territorial development at the local level
- ❑ the **past experiences** show that the damage can affect the **territorial systems in the medium and long period**, with an amplification of the damage impacts over the years
- ❑ The **past experiences** show the difficulties to produce clear and **effective damage accounts** as many of the lost or damaged resources-values can hardly be assessed “using money” as the **measure unit**



The economic vulnerability/ Learning from accountability

Economic damage assessment:

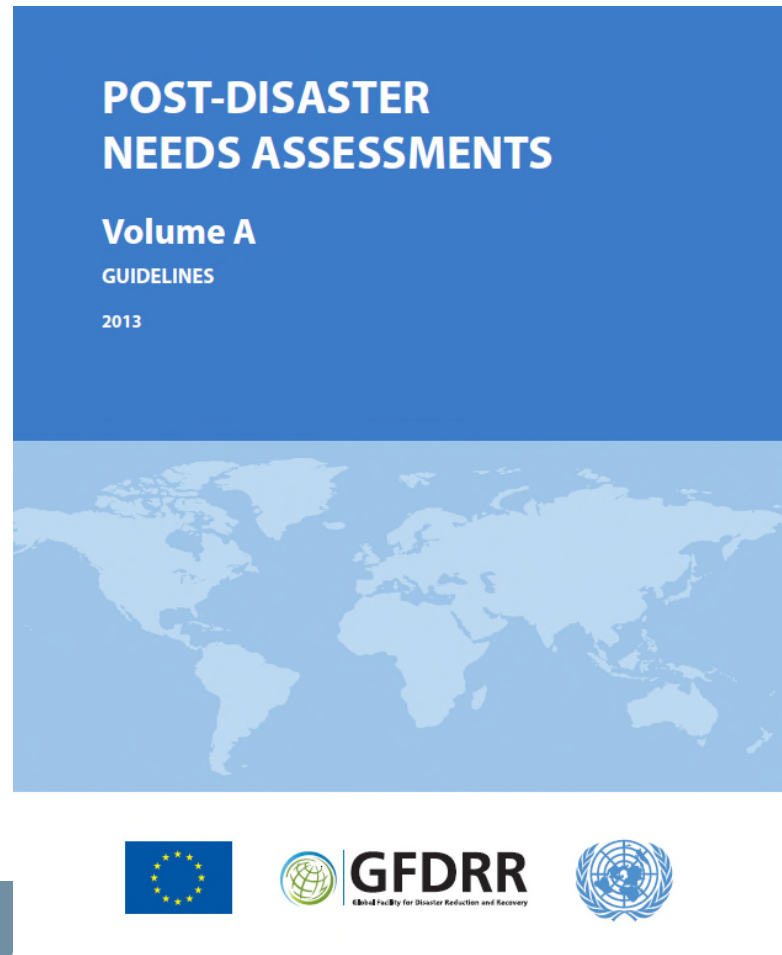
- An increasing number of official/scientific based reports are available concerning ex post damage assessment
- Knowledge building on damage from an economic perspective is increasing at the international level but still variability of “lists” and methodologies is very high
- An increasing number of studies concern methodologies for the economic damage assessment, in particular in the last decade

**.... Learning from
damage accountability**



The economic vulnerability/ Learning from accountability

The Post Disaster Needs Assessment (PDNA): a disaster management tool based on damage accounting.



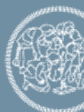
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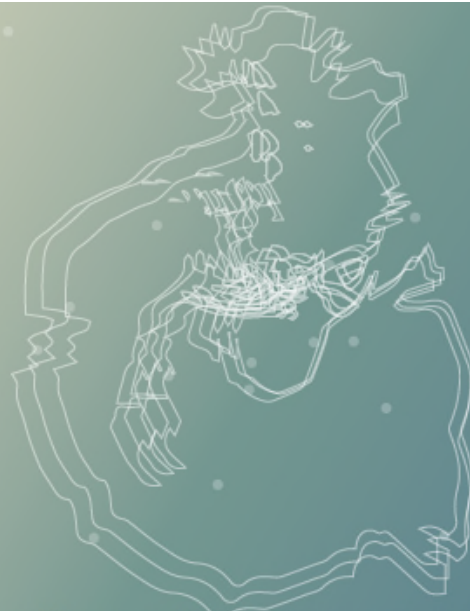
Sectors assessed
in the PDNA
(Reproduced from
GFDRR 2013)



The economic
accountability

The Post Disaster
management t

): a disaster



Post-Disaster Needs Assessment (PDNA)

FOGO VOLCANIC ERUPTION

2014-2015



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The economic vulnerability/ Fogo volcanic eruption PDNA 2014-2015

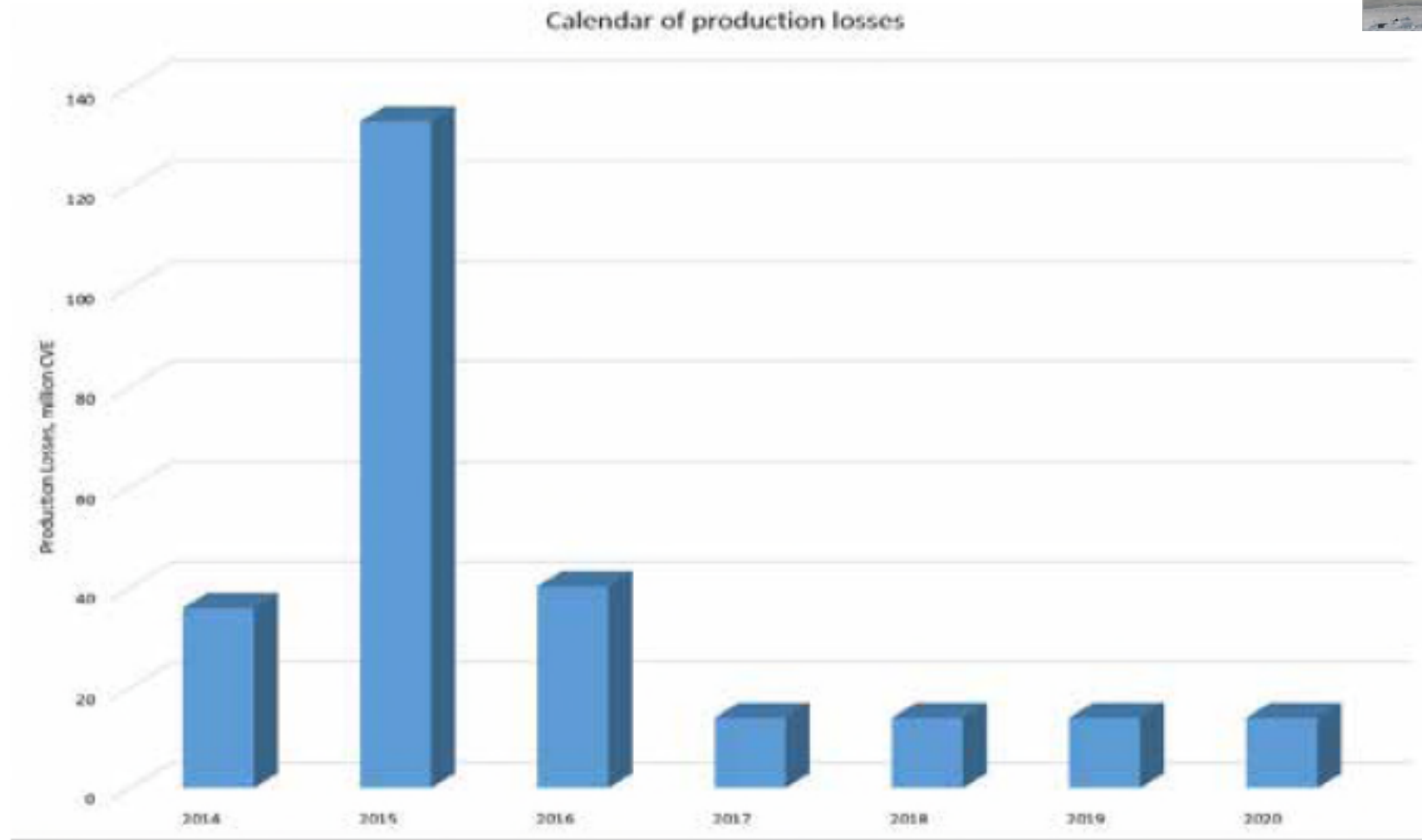
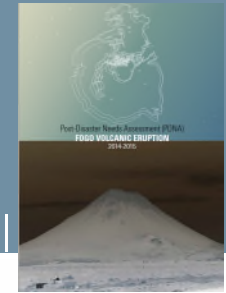
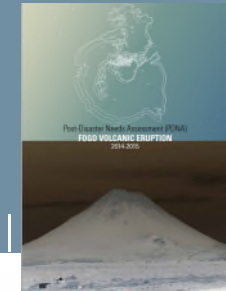


Figure ES.2: Time Variation of Production Losses Caused by the Volcanic Eruption.

Source: PDNA.



The economic vulnerability/ Fogo volcanic eruption PDNA 2014-2015



"The analysis of the disaster effects distribution across sectors reveals that the productive sectors experienced most of them, with a total of CVEsc 1,397 million, accounting for approximately 50 percent of the total effects. Social sectors followed with CVEsc 830 million, corresponding to the 29 percent of the total"

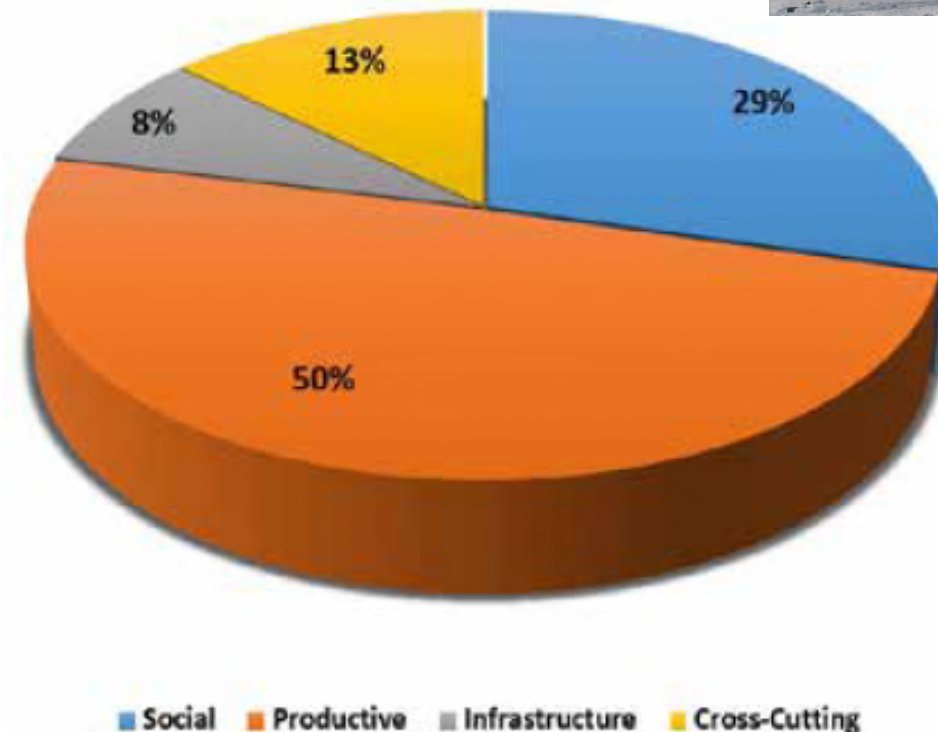
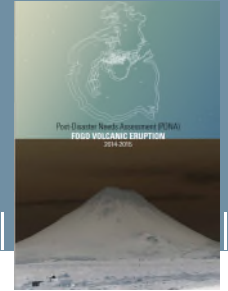


Figure ES.3: Main Sectors Affected by the 2014 Fogo Disaster
Source: PDNA.



The economic vulnerability/ Fogo volcanic eruption PDNA 2014-2015

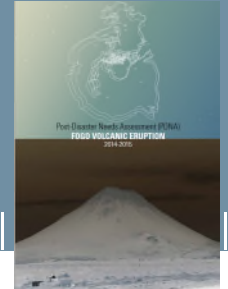


The most affected sectors were

- agriculture (CVEsc 851 million, in terms of damage and production losses);
- housing (CVEsc 757 million, mostly as damages);
- agroprocessing (CVEsc 335 million);
- water and sanitation (CVEsc 540 million);
- agro-industry (CVEsc 330 million);
- environment (CVEsc 320 million);
- tourism (CVEsc 205 million);
- transport (CVEsc 204 million)



The economic vulnerability/ Fogo volcanic eruption PDNA 2014-2015




The impact of the volcano eruption has been substantial on the local economic activity of Fogo Island but small in terms of Cabo Verde's economy as a whole.

The damage caused by the eruption translates into a loss of capital stock at the end of 2014 equivalent to 0.42 percent of the total capital stock, with the highest losses occurring in the primary sector. In terms of GDP, there is a small loss in 2014 attributable to the 1.5 months of foregone economic output since the volcano eruption started. The highest loss to GDP occurs in 2015 and is equivalent to 0.44 percent of the expected GDP of that year.

Related to EXPOSURE and VULNERABILITY at the local and over-local levels

Additional vulnerabilities arising during and after the event, like food insecurity because of the impacts on agriculture





Thank you for your attention!

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