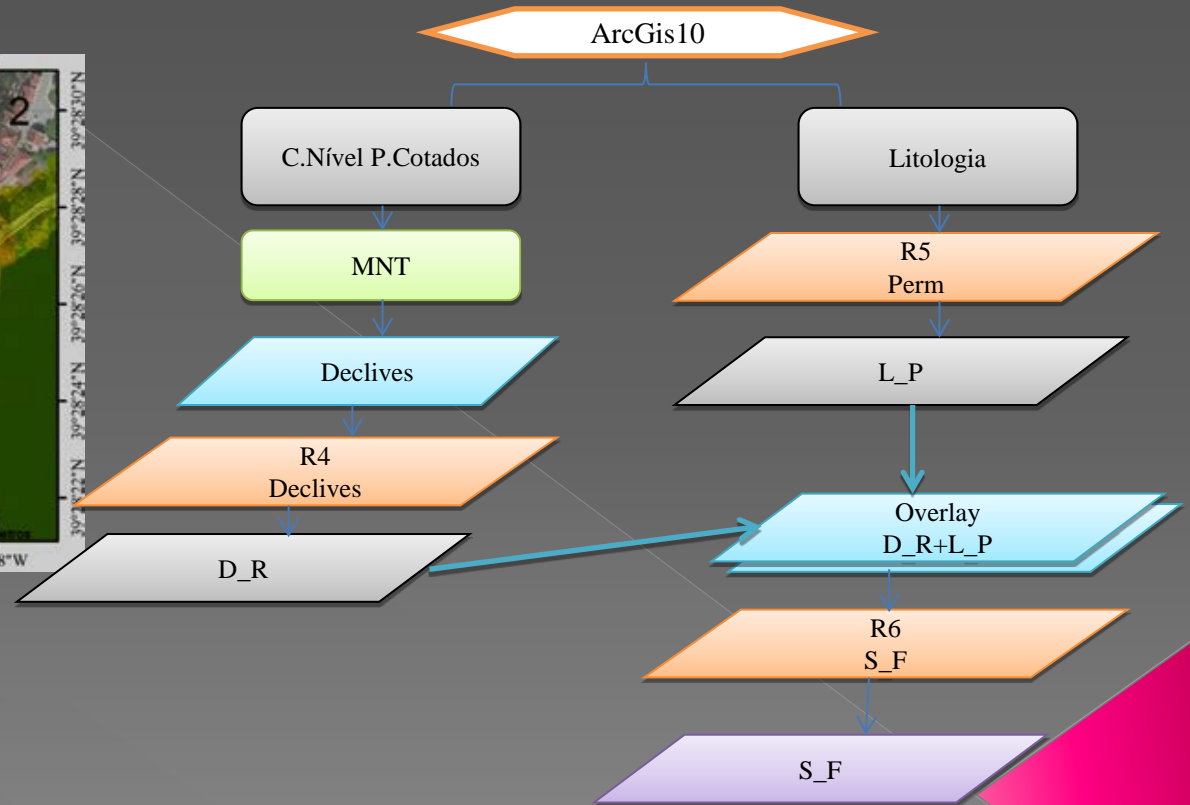
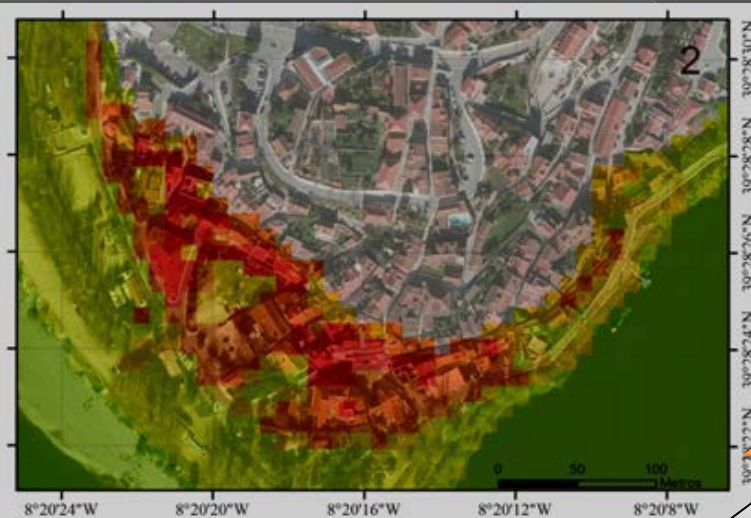
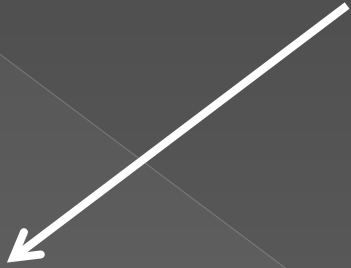


Risks management

Pierluigi Rosina & João Belo



RISK (Geo-hazard)



Natural



Technologic (Human)



Mixed

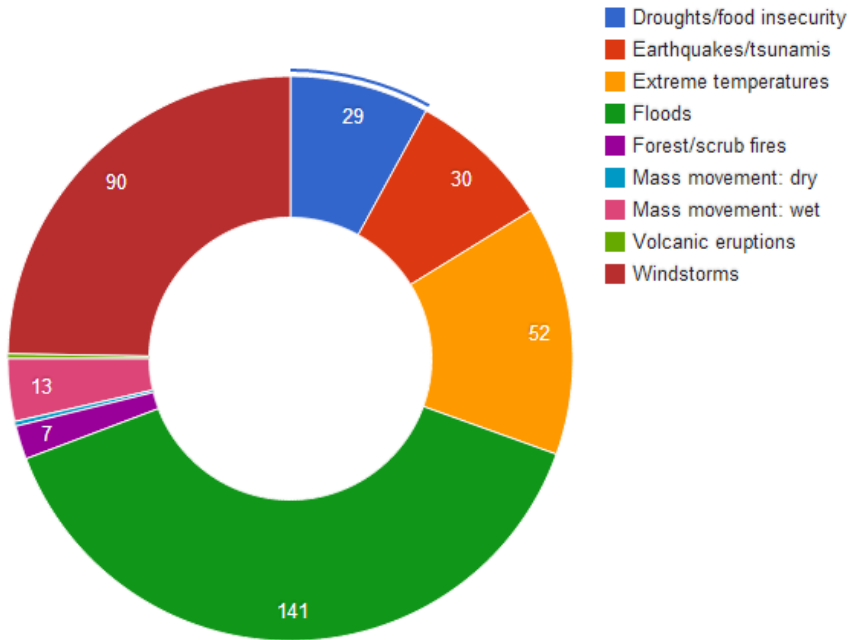




World Disasters Report – 2012 disaster data

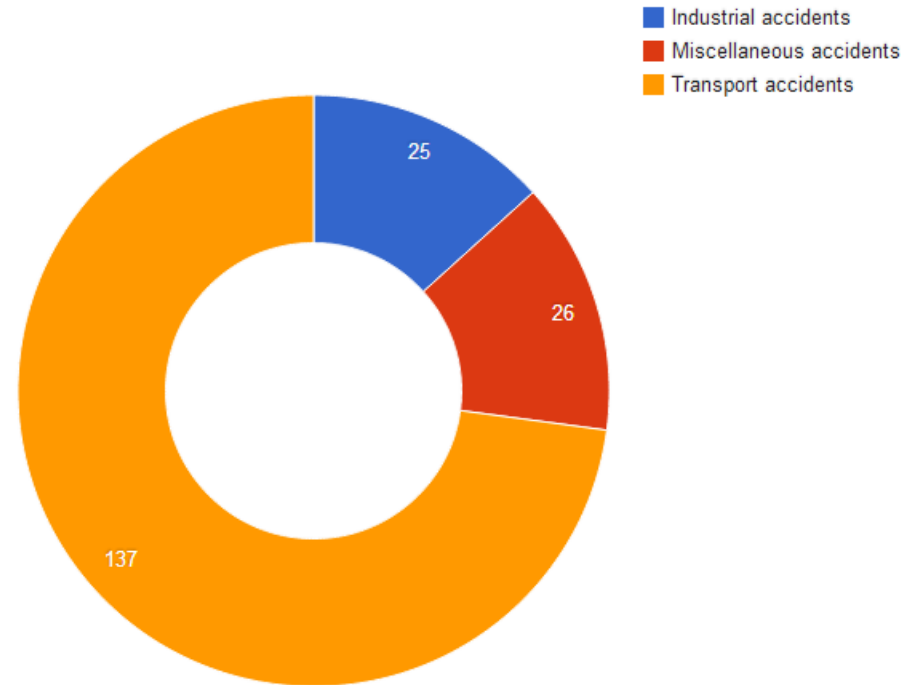
Number of natural disasters - 2012

There were 364 natural disasters reported in 2012

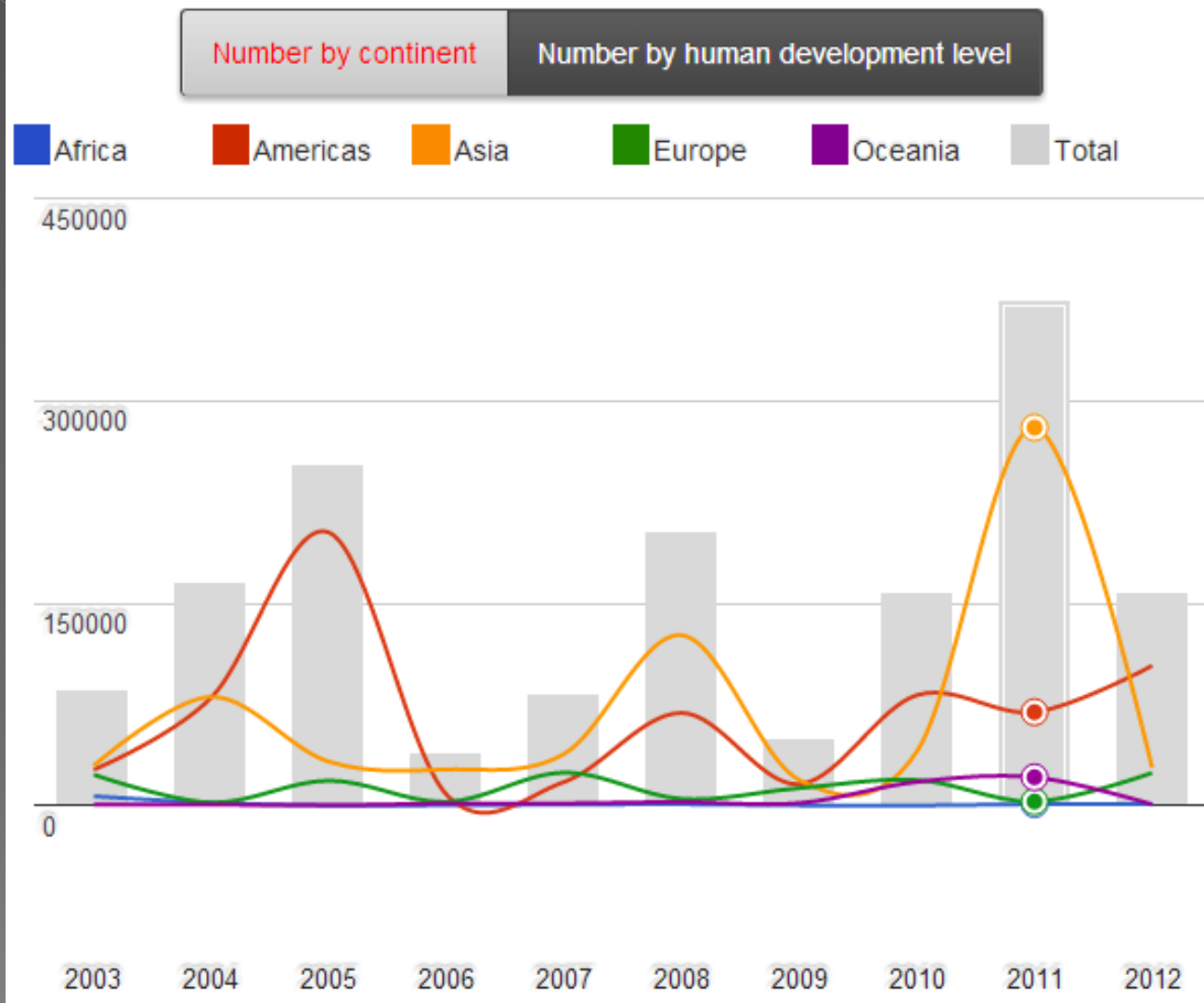


Number of technical disasters - 2012

There were 188 technical disasters reported in 2012



Total amount of disaster estimated damage (2003–2012) in millions of US dollars (2012 prices)

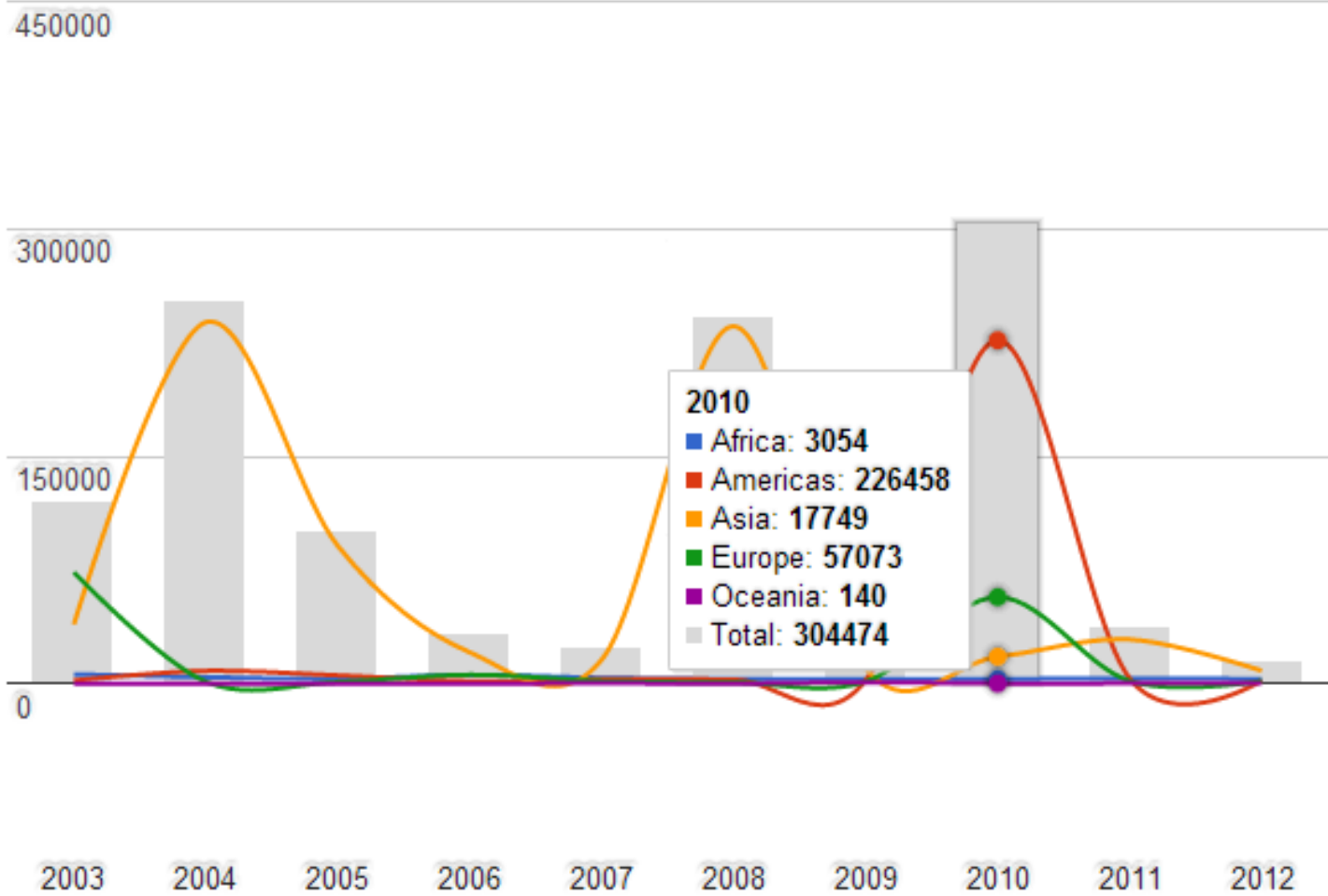


Total number of people reported killed (2003–2012)

Number by continent

Number by human development level

Africa Americas Asia Europe Oceania Total



Philippine

Cyclone



Guadalupe



Croatia

Landslide

Belgium





Landslide
Altamira (Pa) - Brasil



Lithuania

Extreme weather
conditions

Germany



Brasil

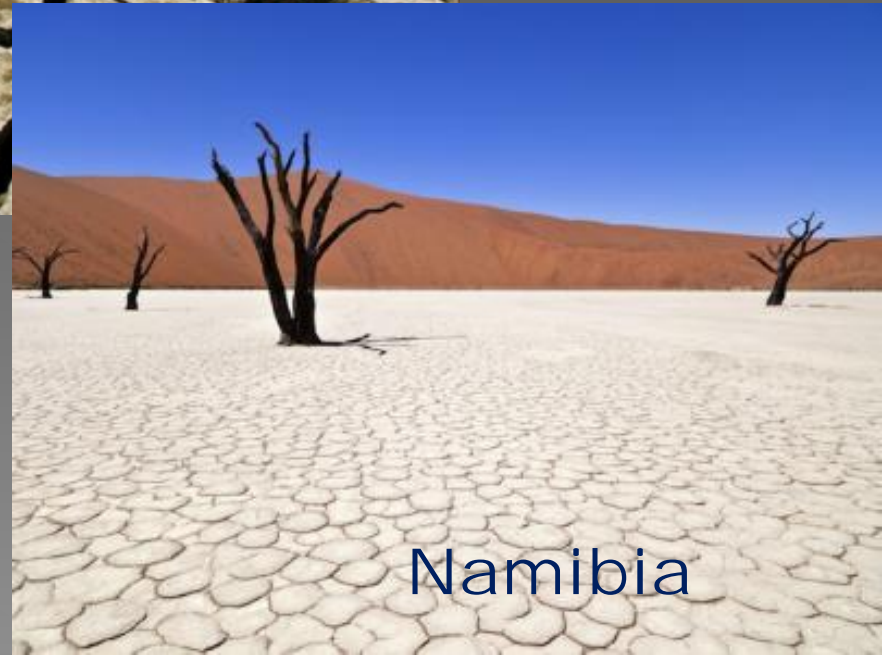


DROUGHT

Ethiopia



Namibia



Floods



England



Macedonia



Earthquake
L'Aquila - Italy



Germany

Nuclear waste

France





Turkey
(Spanish boat)

Mixed Risks

Spain - Galicia



Mação (Portugal)



Forest Fires



Sicilia (Italy)



$$\text{Risk} = H * E * V$$

H = Hazard

E = Exposition

V = Vulnerability





Vesuvius – Napoli (Italy)

RISK MANAGEMENT

Localization

Physiographical and socio-economical characterization
Cartographical elaboration

Identification

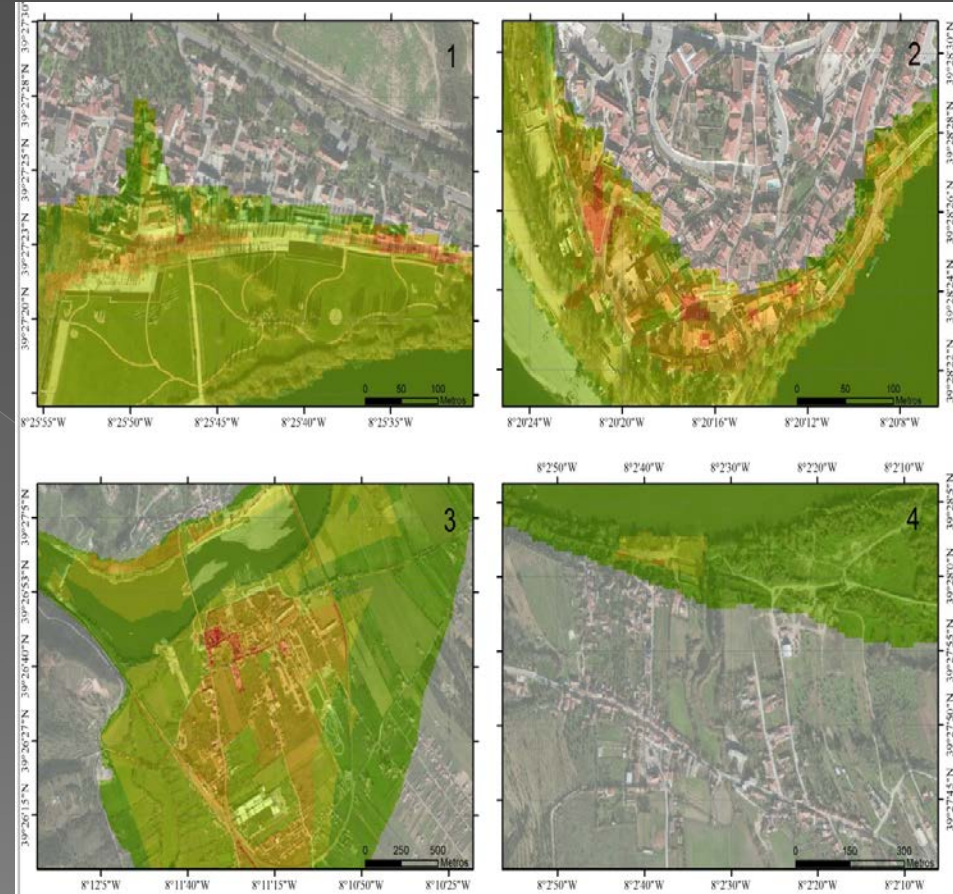
Recurrence
Historical data

Analysis

Scenarios
Estimative
Risk determination

Management Strategy

Mitigation
Prevention



(Adapted by ANPC, 2009)



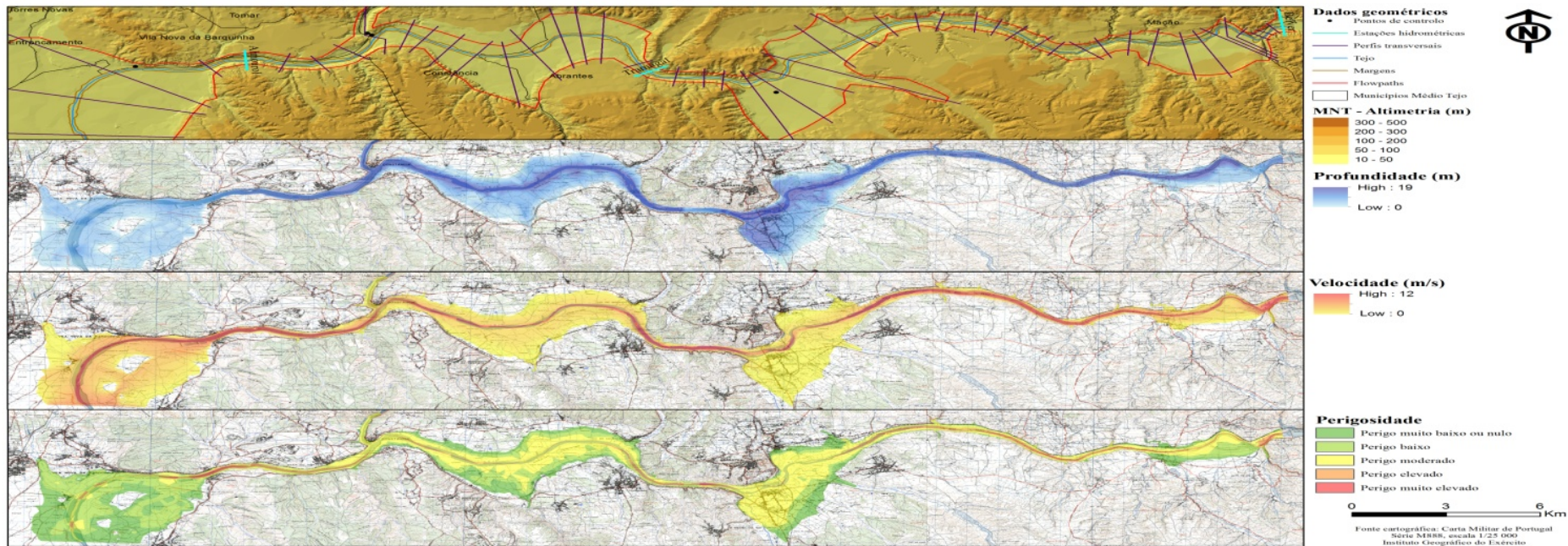
Flood

Vila Nova da Barquinha - Portugal

Modern technologies in landscape management

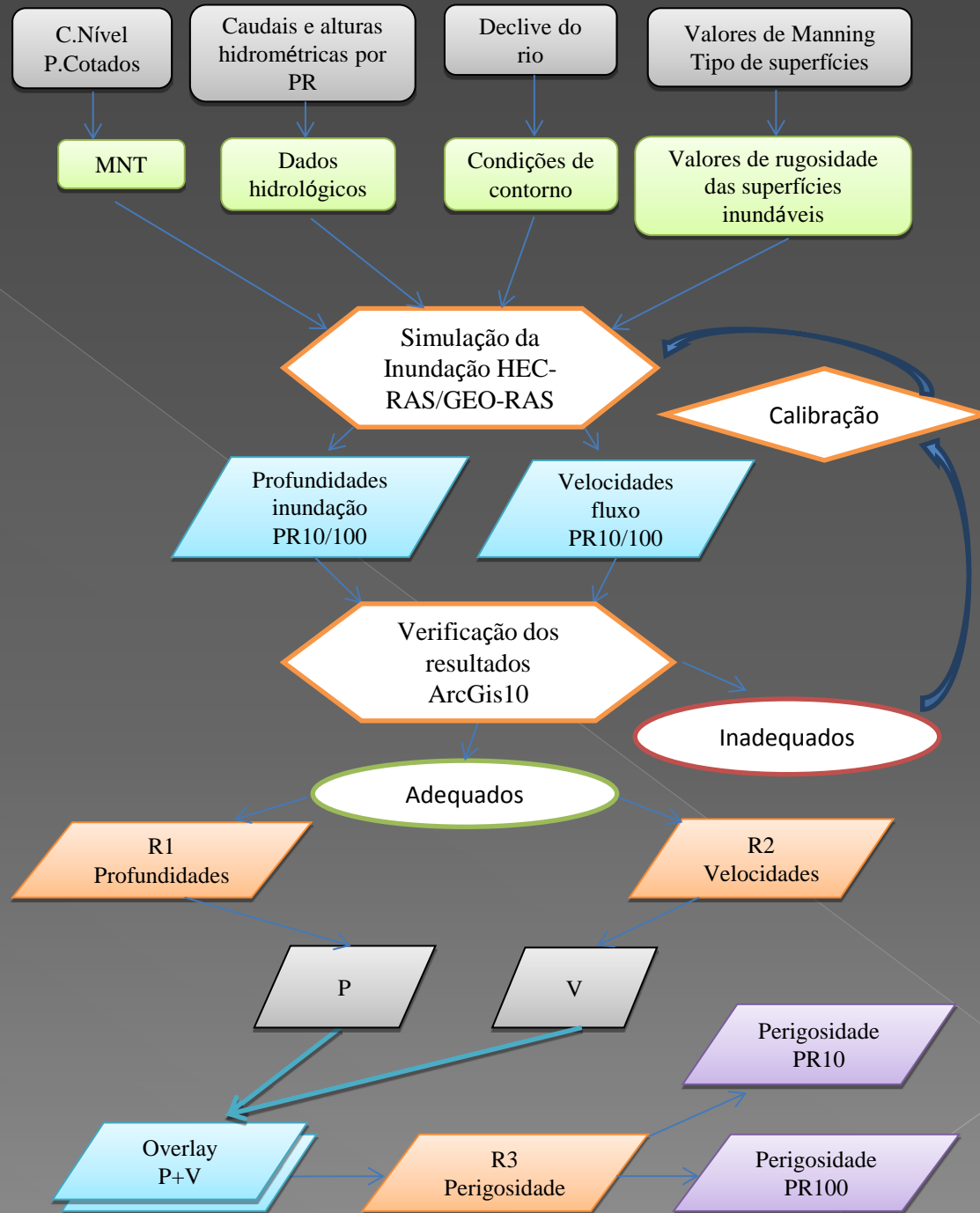
GIS Remote Survey (Drones)

DADOS GEOMÉTRICOS, PROFUNDIDADES, VELOCIDADES E PERIGOSIDADE DA INUNDAÇÃO
(período de recorrência 100 anos, probabilidade de ocorrência 1%, método de Gumbel)



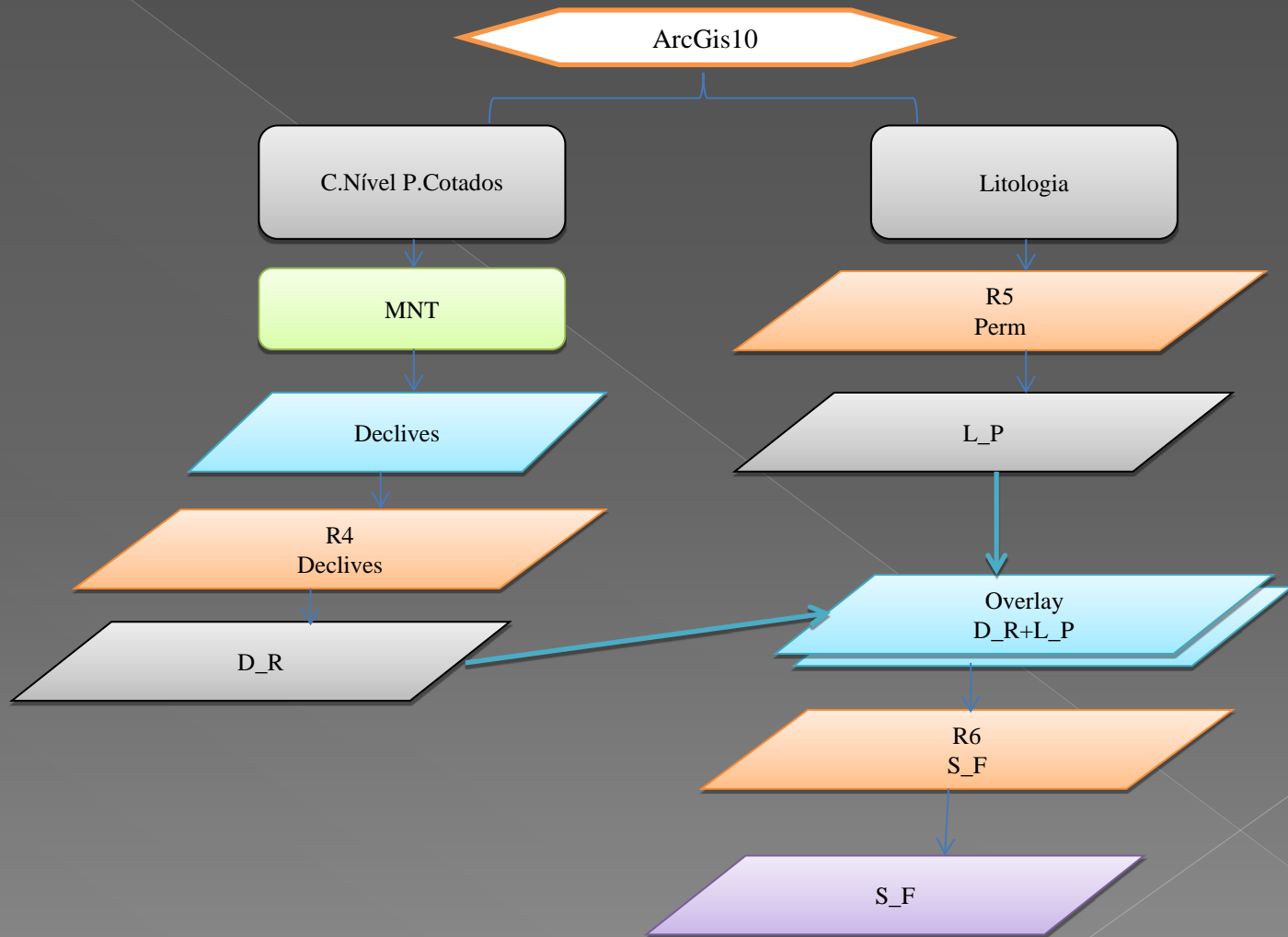
GIS

Hazard



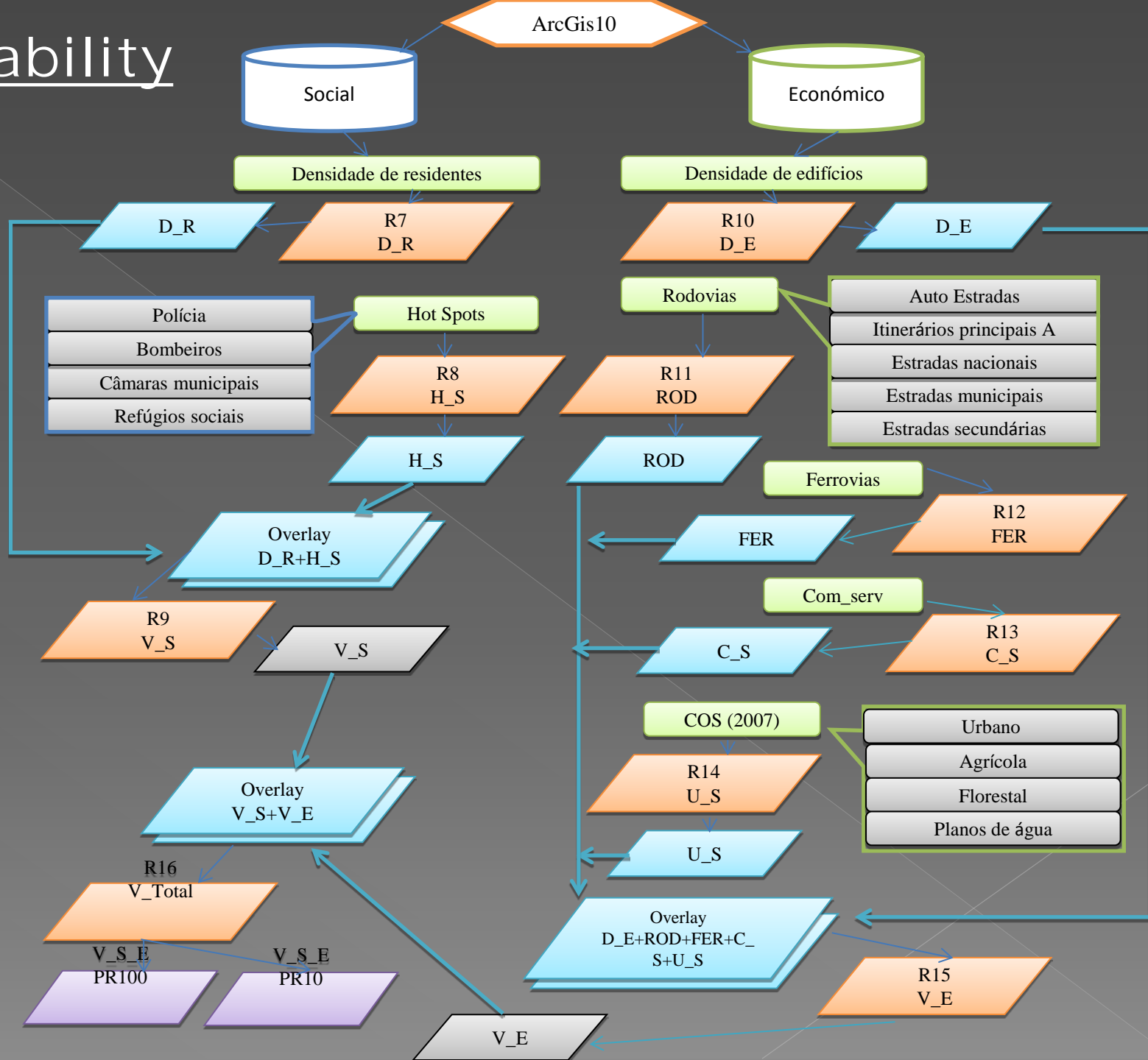
SUSCETPTIBILITY

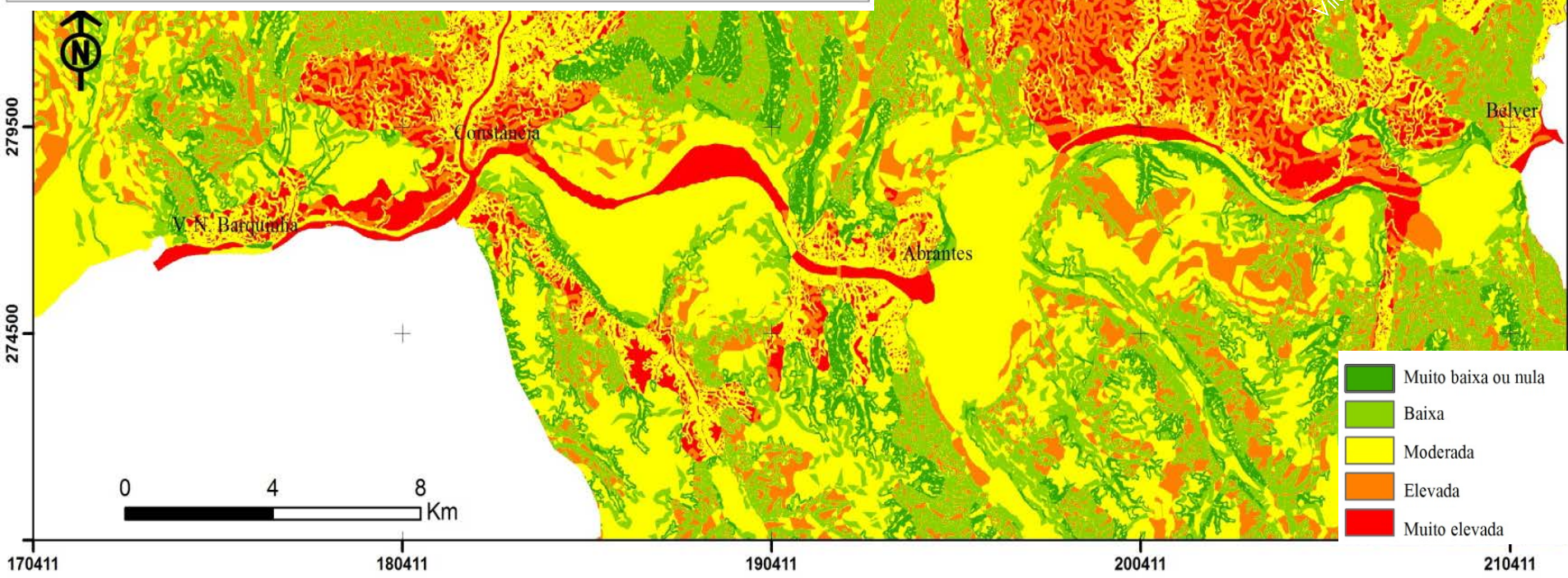
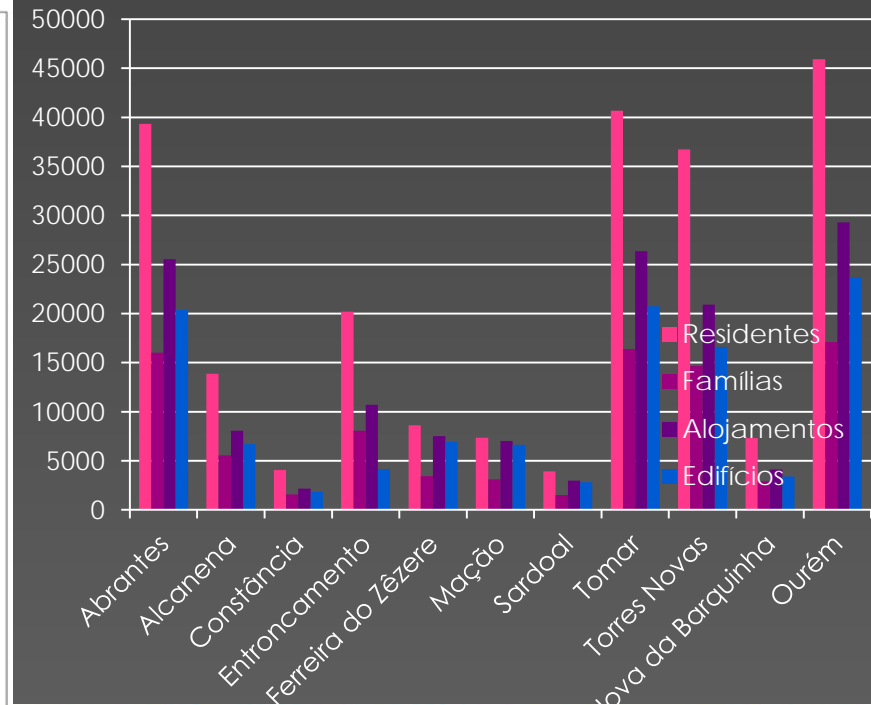
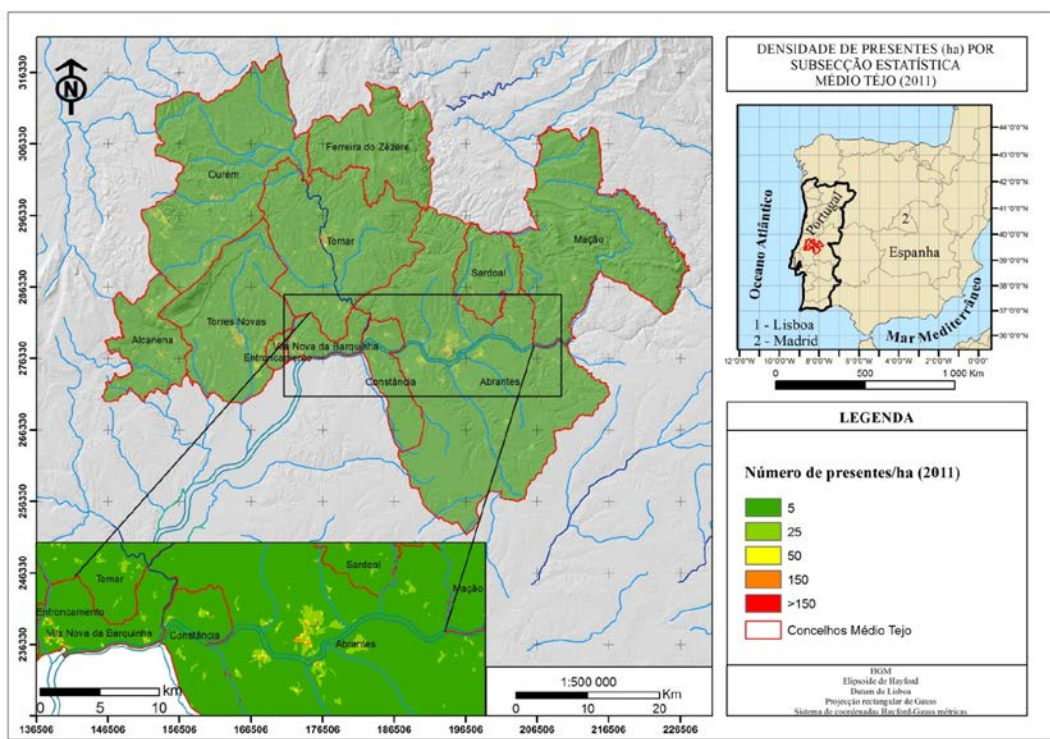
GIS



Vulnerability

GIS





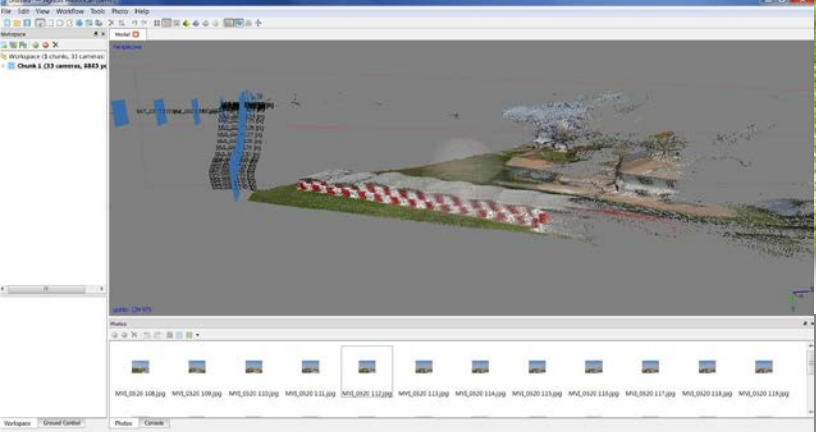
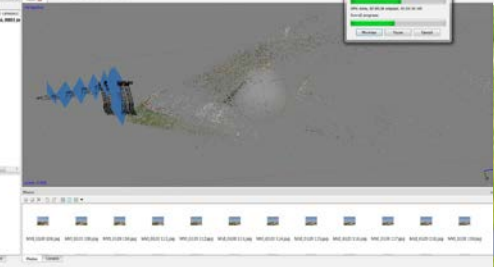
Drone "Esattero"



Photo



Drone four helix

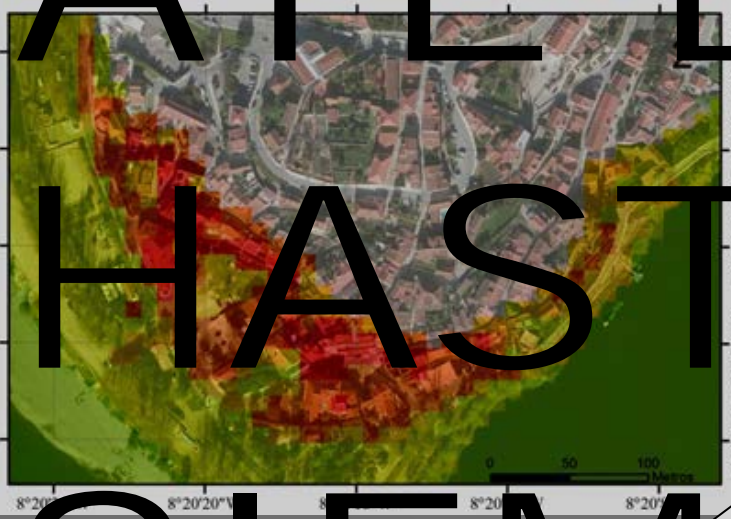


Photogrammetric elaboration

Risks management

Pierluigi Rosina & João Belo

ArGis10



C.Nível P.Cotados

Litologia

MNT

R5
Perm

Declives

L_P

R4
Declives

Overlay
D_R+L_P

D_R

R6
S_F

S_F

SIEMPRE