



UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA



Universidad del Tolima



Universidad
de Ibagué

The Third International Conference on Water, Energy and Environment (ICWEE, 2015)

Effects of the change of land use in discharge patterns using distributed hydrological modelling in a tropical watershed

By: Luis Eduardo Peña Rojas (luipero1@doctor.upv.es)
Félix Francés
Miguel Barrios

*Universitat Politècnica de València, Spain
Universidad del Tolima, Colombia
Universidad de Ibagué, Colombia*

Research Group of Hydrological and Environmental Modelling (GIMHA), Spain

<http://luvia.dihma.upv.es>





- ❑ Introduction
- ❑ Watershed characteristics:
- ❑ Simulation Scenarios
- ❑ Results
- ❑ Conclusions

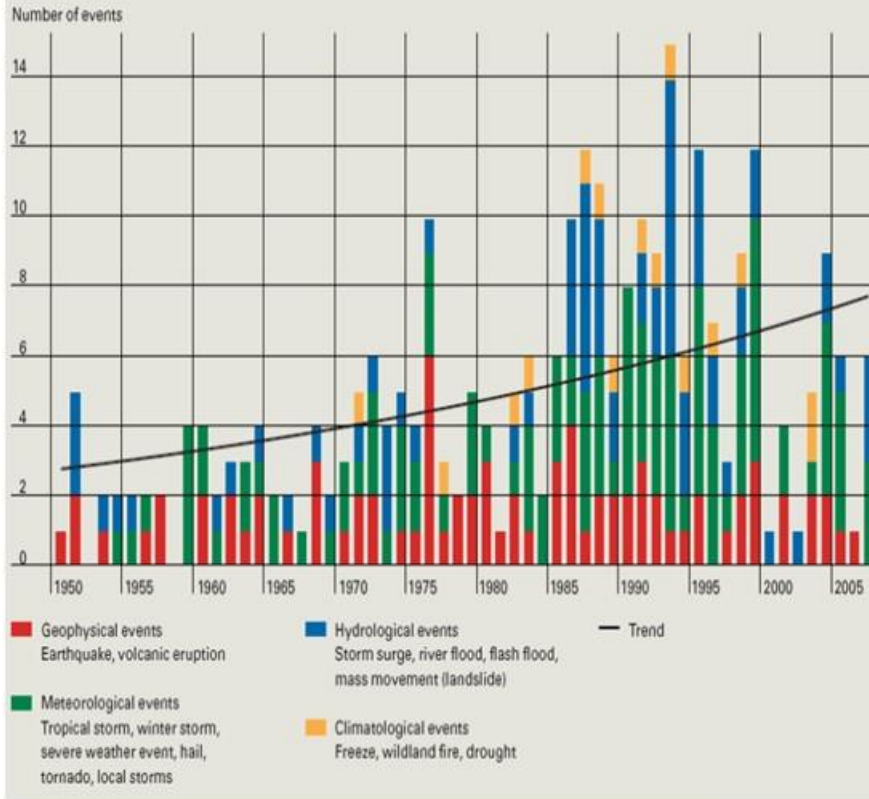


Introduction

Increasing trends in global floods

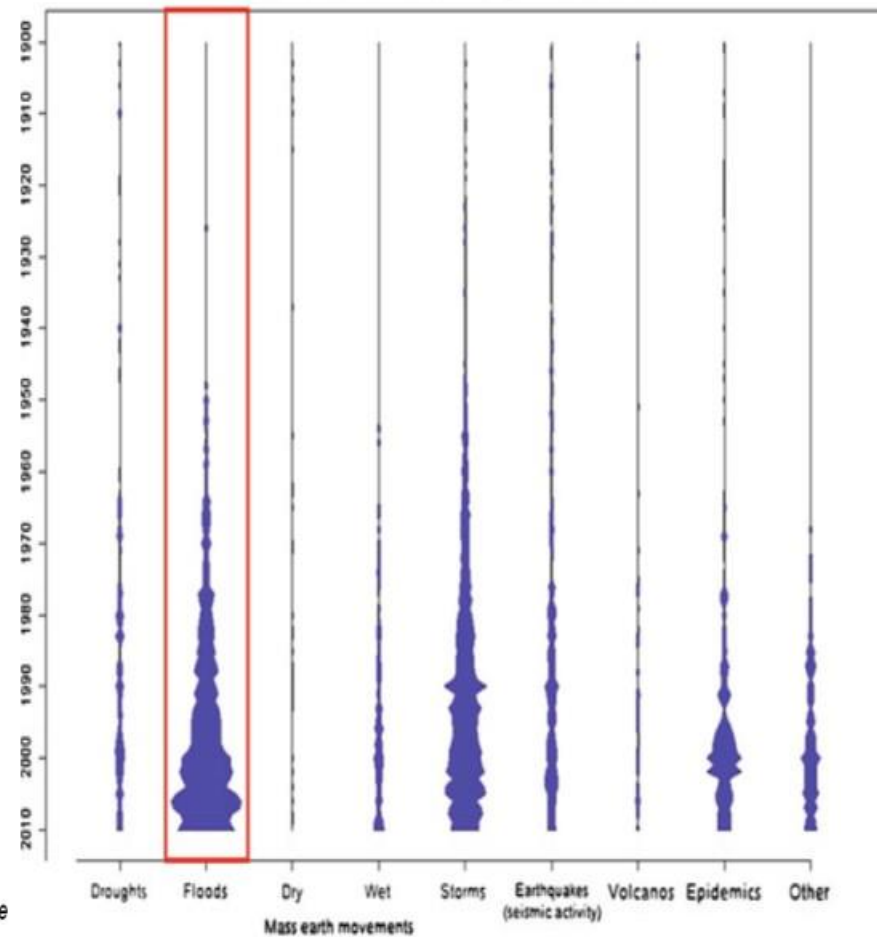
Great natural catastrophes: Number of events

The chart shows for each year the number of great natural catastrophes, divided up by type of event.



Fuente: Munchen Re

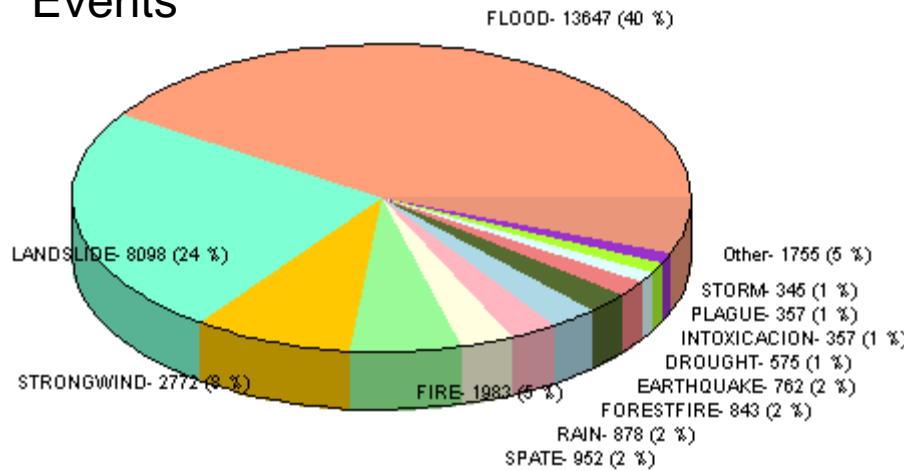
Number of natural disasters reported 1900 - 2010



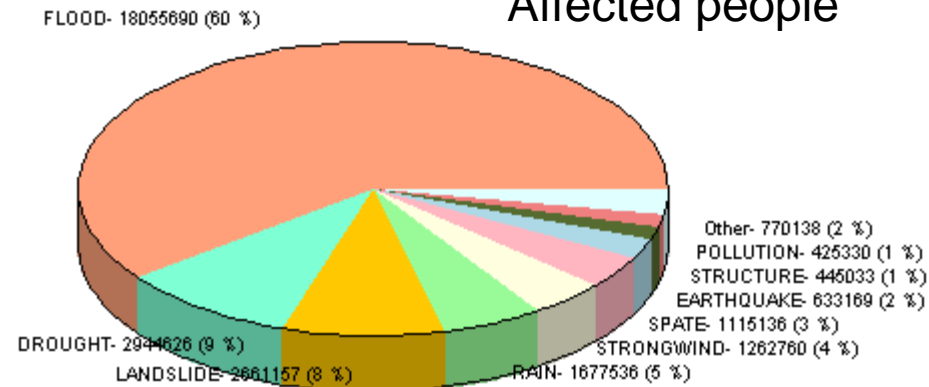
Source: The OFDA CRED International Disaster Database – www.emdat.be – Universae Catholique de Louvain, Brussels - Belgium

Floods in Colombia

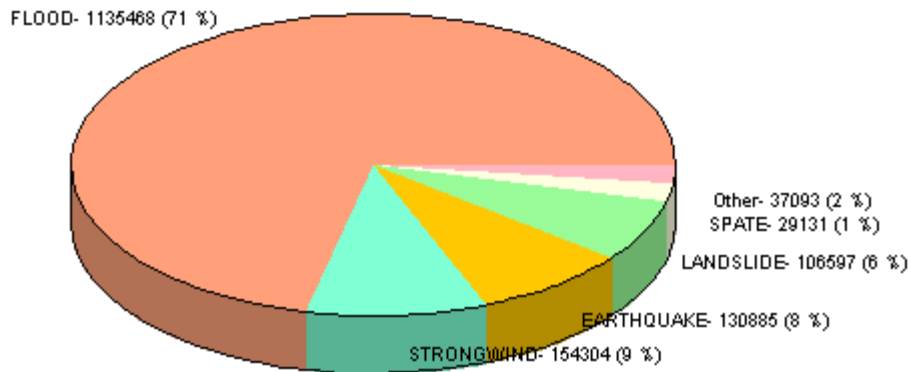
Events



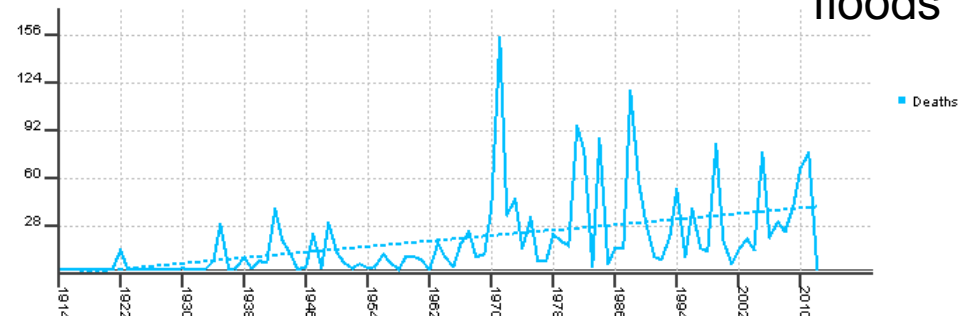
Affected people



Destroyed + damaged houses



Deaths for floods



UNISDR: http://www.desinventar.net/index_www.html

Colombia 2010-2012



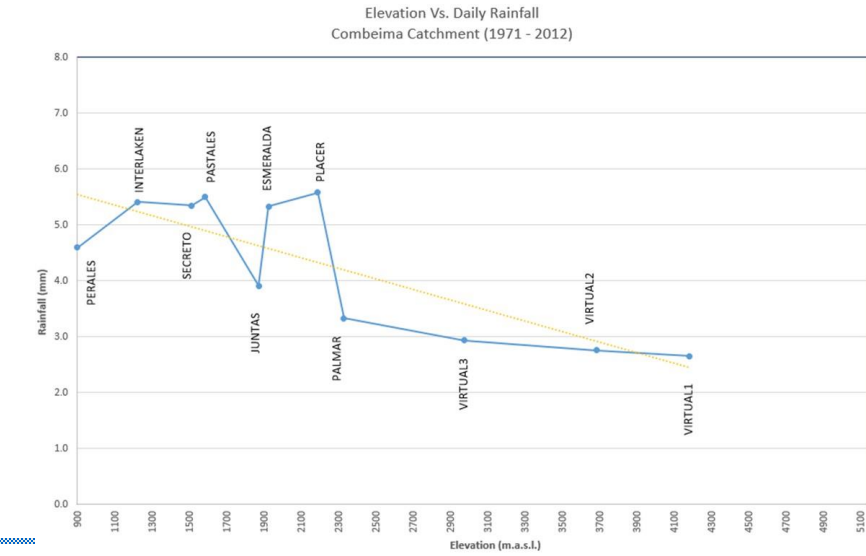
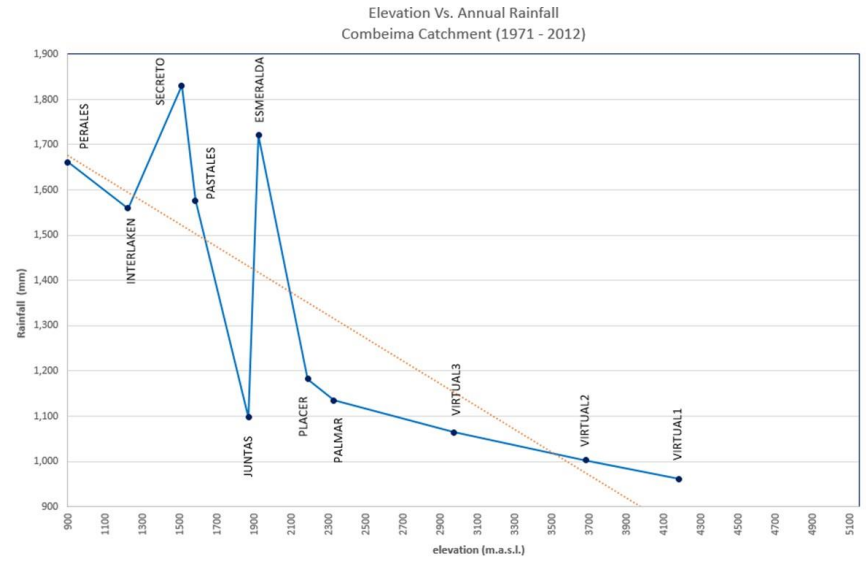
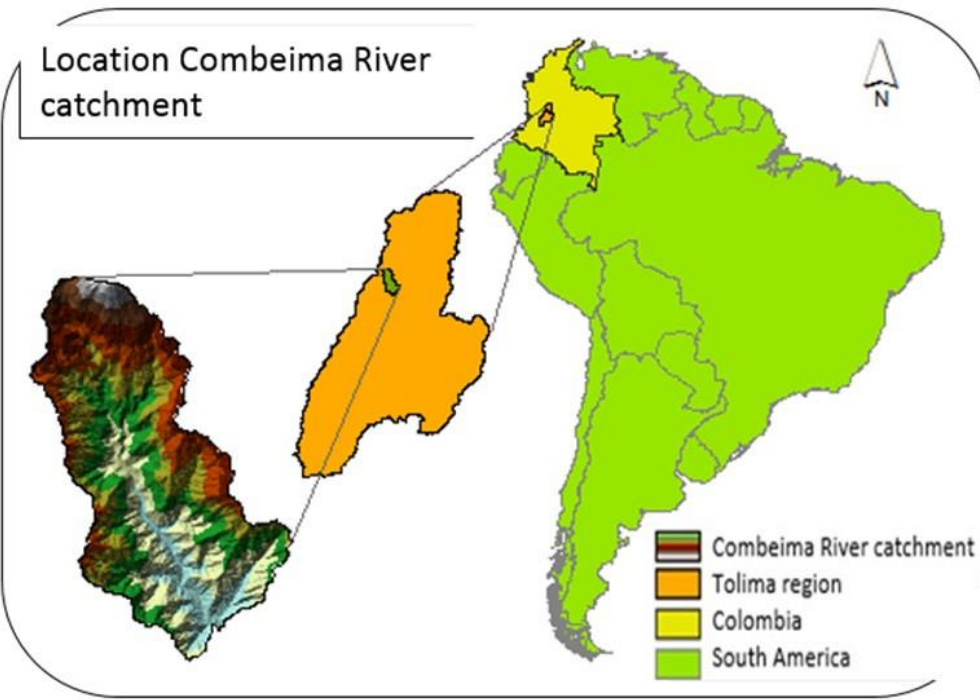
Colombia 2010-2012



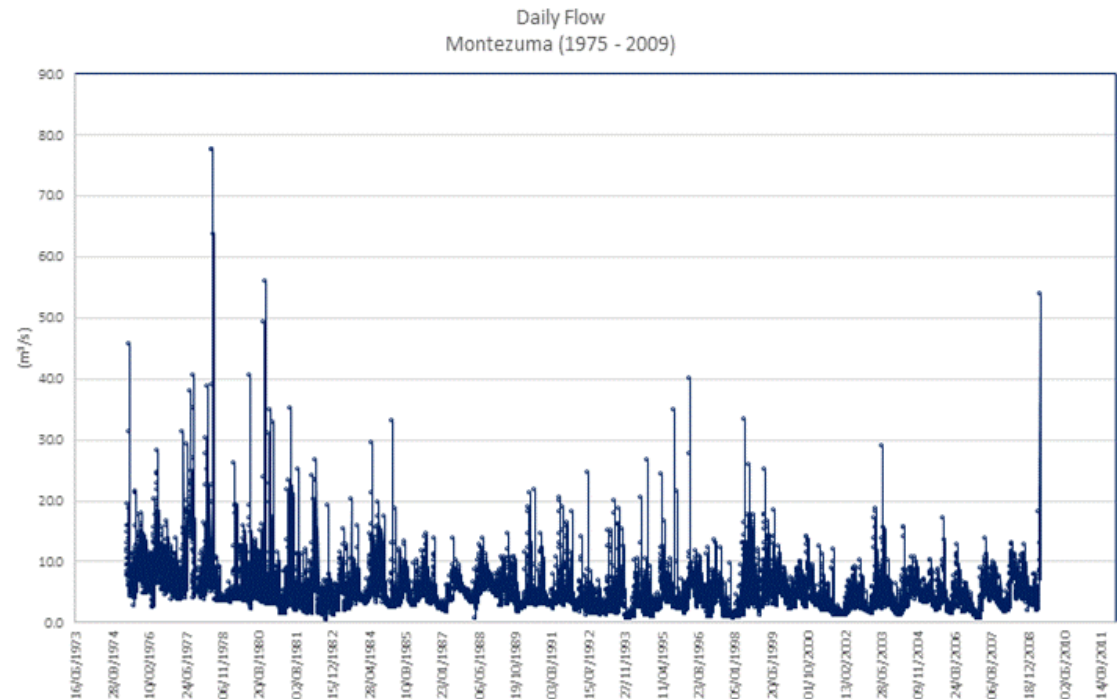
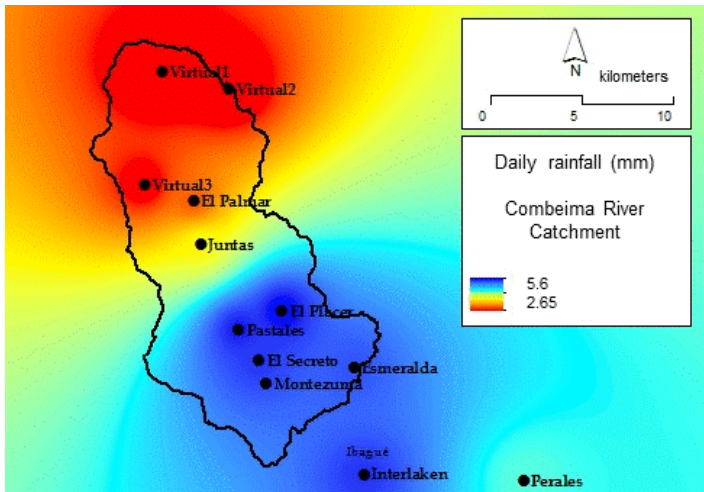
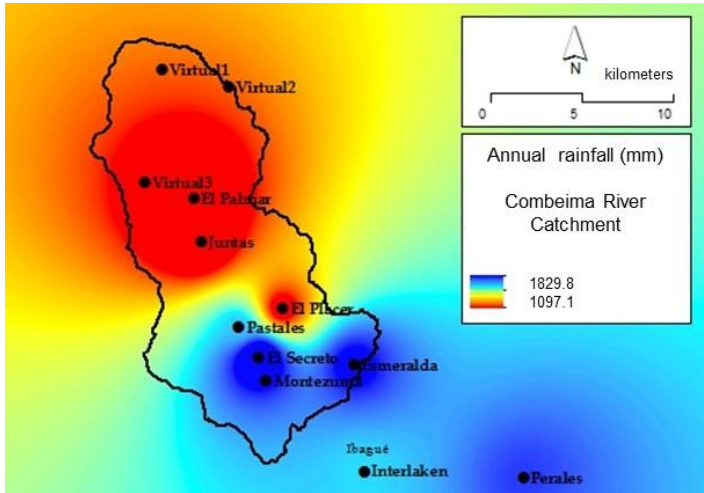
http://www.google.com.pe/imgres?q=inundaciones+chia+colombia&um=1&hl=es&biw=1024&bih=509&tbm=isch&tbnid=myd6QezHwx7PvM:&imgrefurl=http://inundacionenlasabana.blogspot.com/2011/04/chia-tambien-fue-victima-de-las_25.html&docid=lcxpHRUeUyK77M&imgurl=http://4.bp.blogspot.com/-fRgZwoqR3AQ/TbXrk9X1Pxl/AAAAAAAAAJ4/Ilkx04wr1Yj4/s1600/ch%252525C3%252525ADa%252525B5.jpg&w=800&h=500&ei=FKmhUjPBof1ygHL8YHABQ&zoom=1&iact=hc&vpx=110&vpy=163&dur=576&hovh=177&hovw=284&tx=223&ty=95&sig=100942321582918708354&page=1&tbnh=144&tbnw=223&start=0&ndsp=8&ved=1t:429,r:0,s:0,i:63

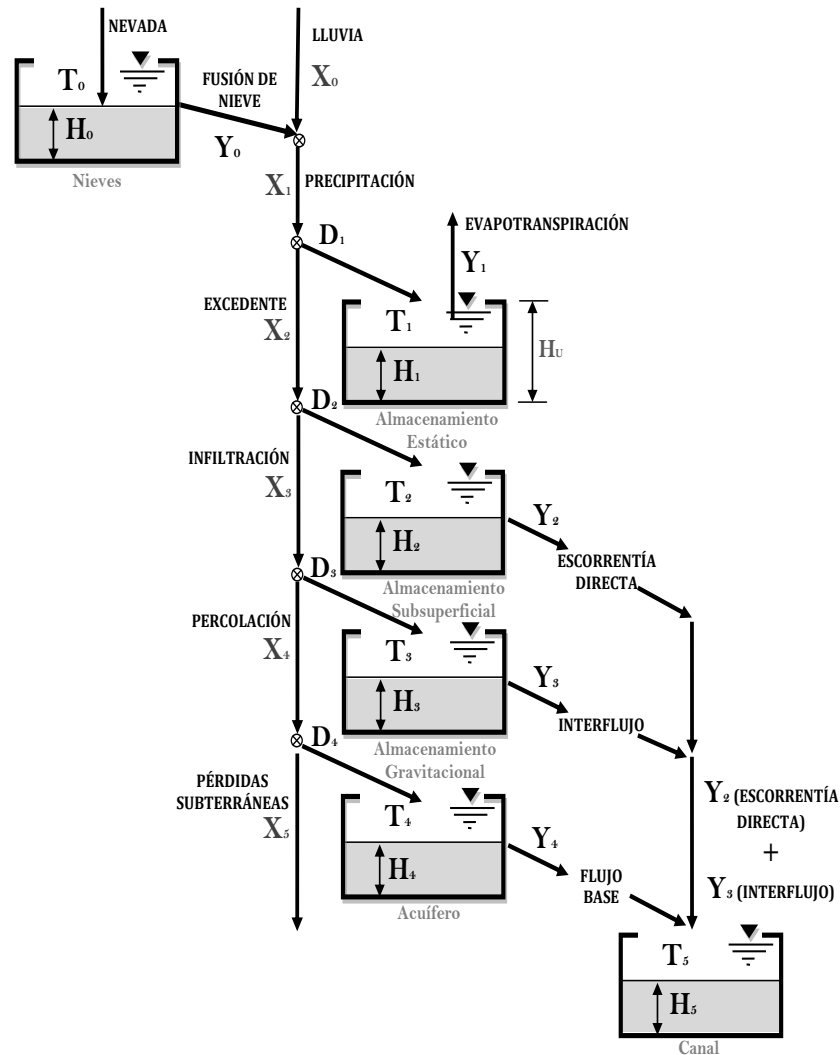


Combeima Watershed characteristics

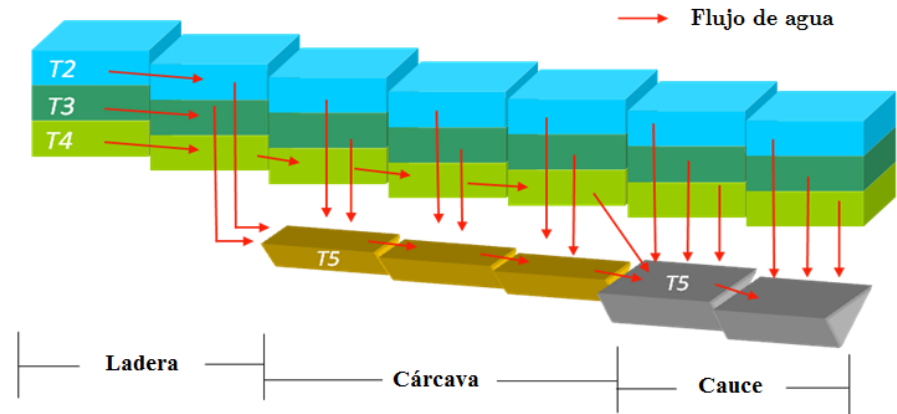
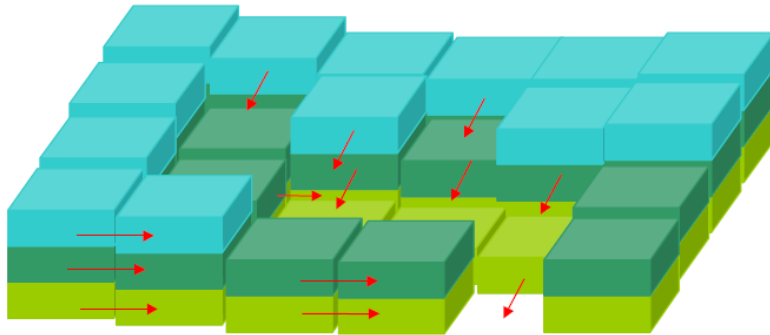


Spatial variation in rainfall



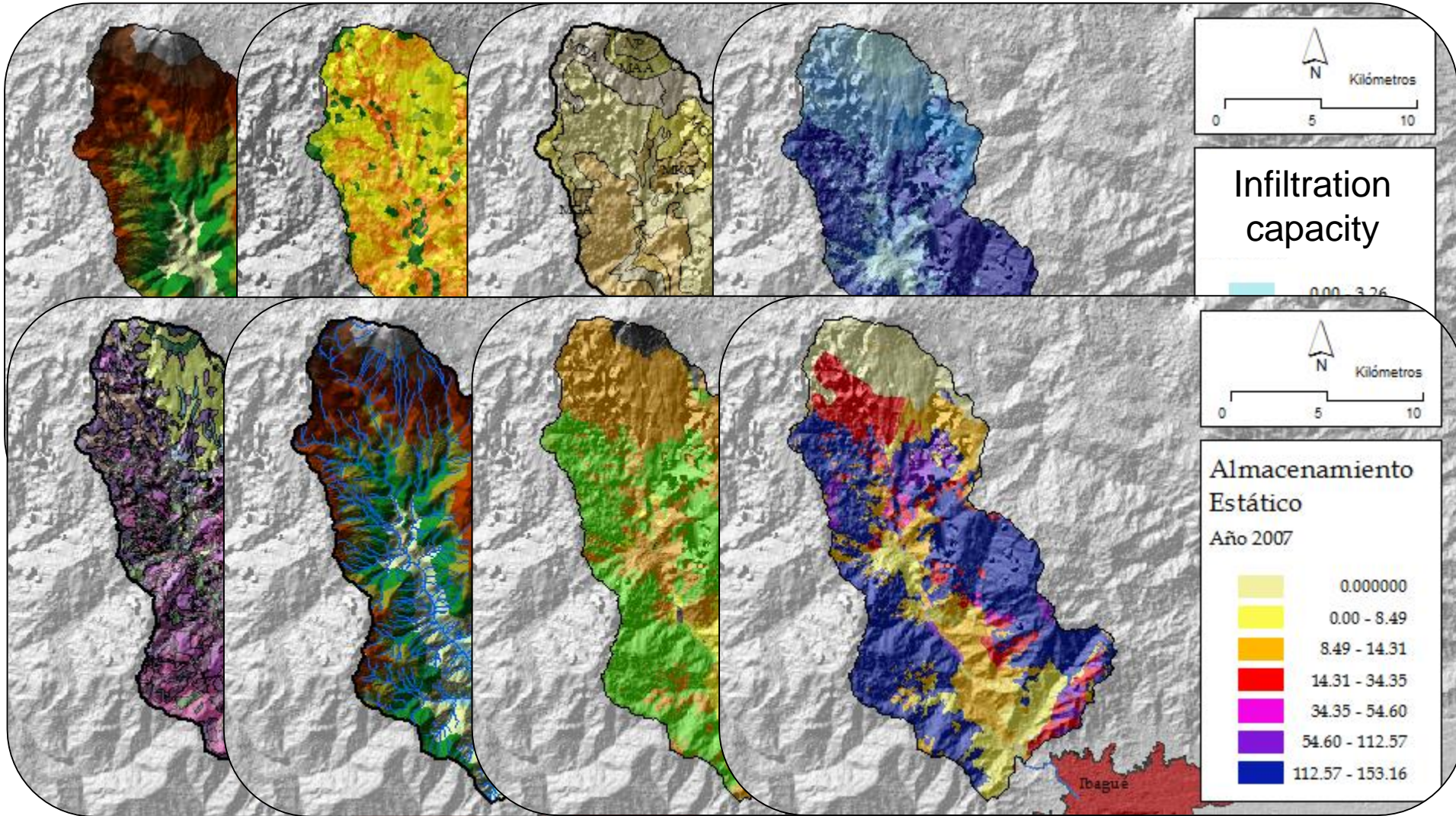


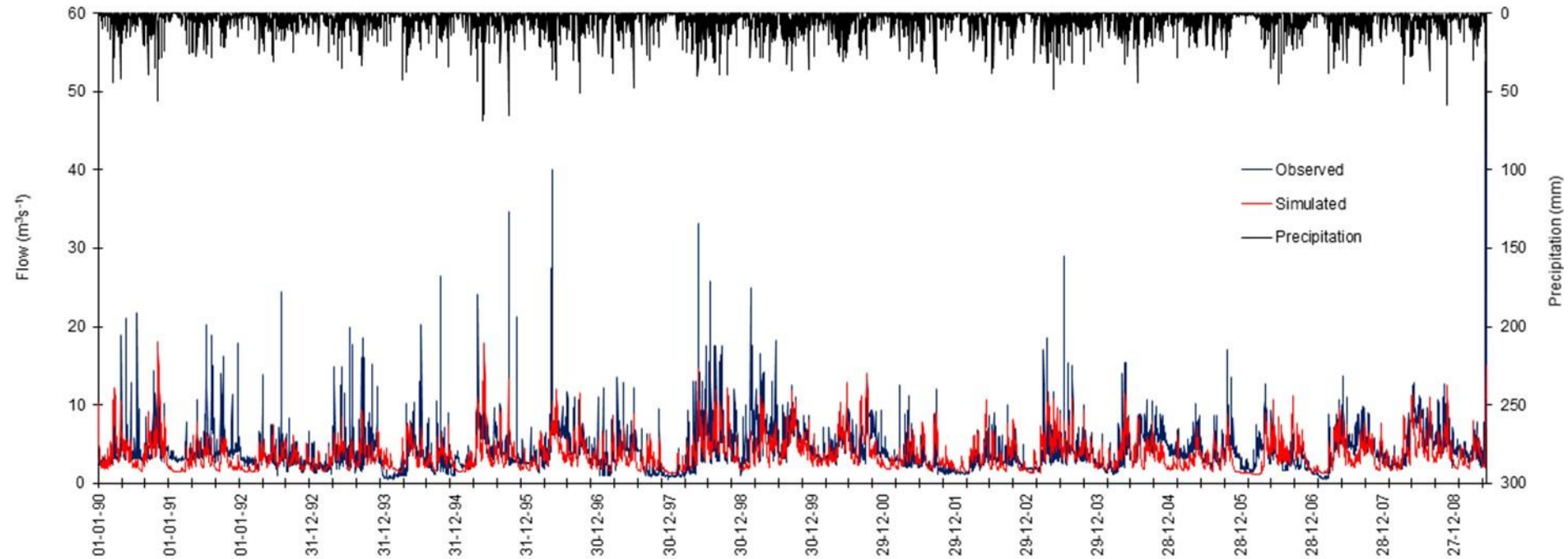
Bussi (2010)



Vélez (2001)

- ❑ Digital Elevation Model
- ❑ Static storage (Hu) Soil water content in the root zone
- ❑ Saturated hydraulic conductivity vertical (Ks)
- ❑ Saturated hydraulic conductivity horizontal (Kss)
- ❑ Saturated hydraulic conductivity through the rock layer (Kp)
- ❑ Land use/cover code
- ❑ Groundwater flow (Kpa)
- ❑ Series of precipitation, temperature, evapotranspiration and flow

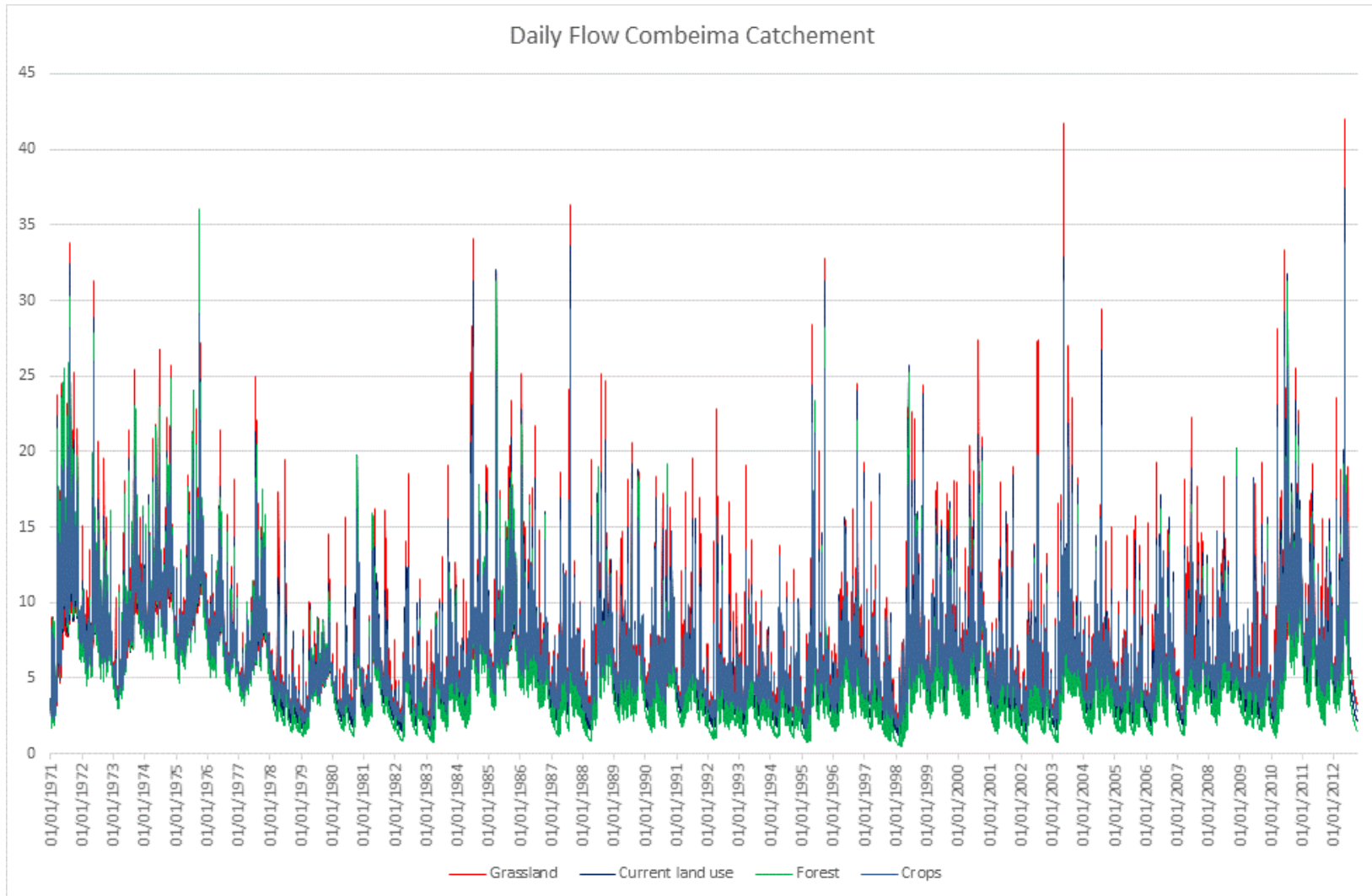


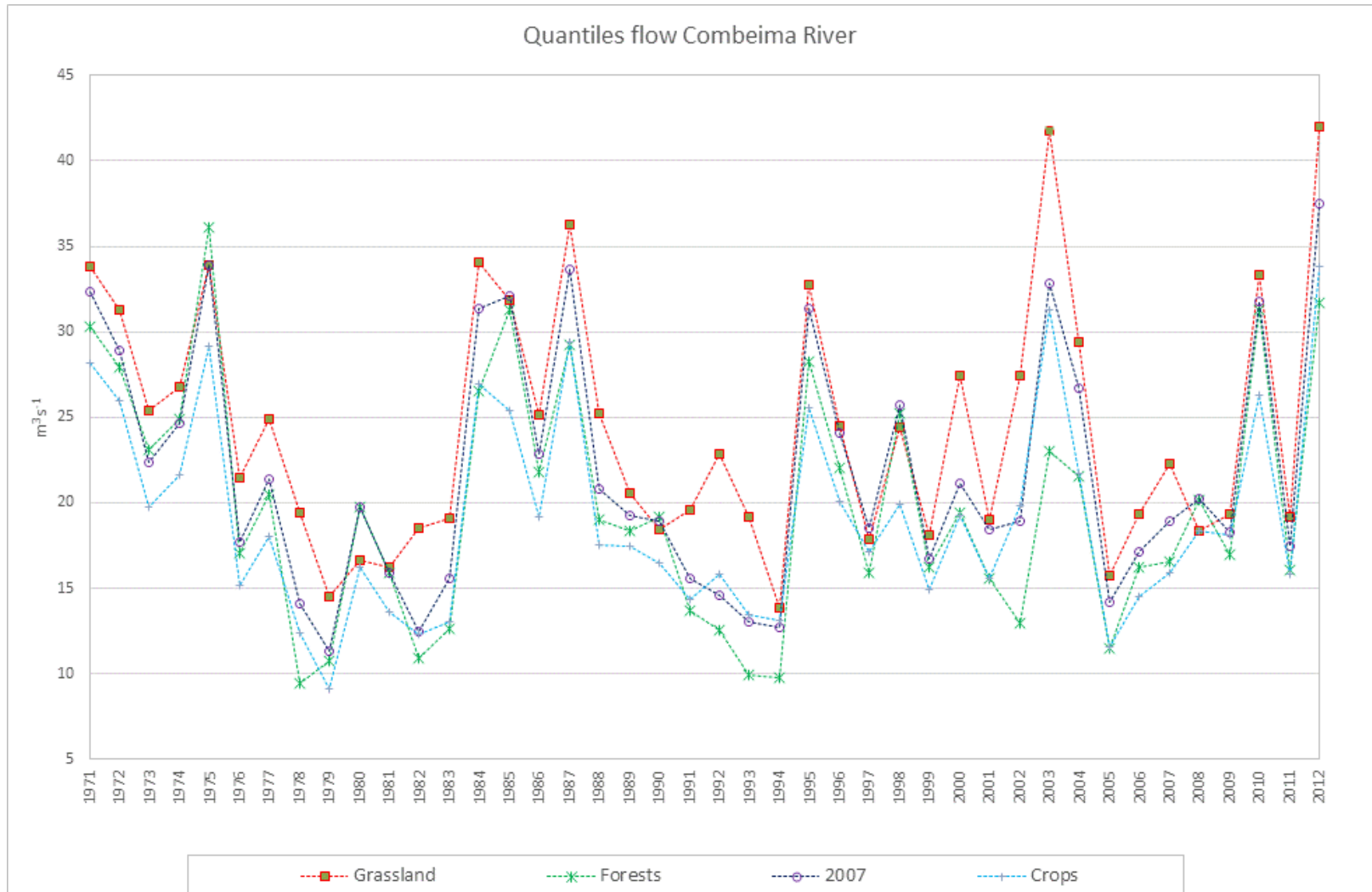


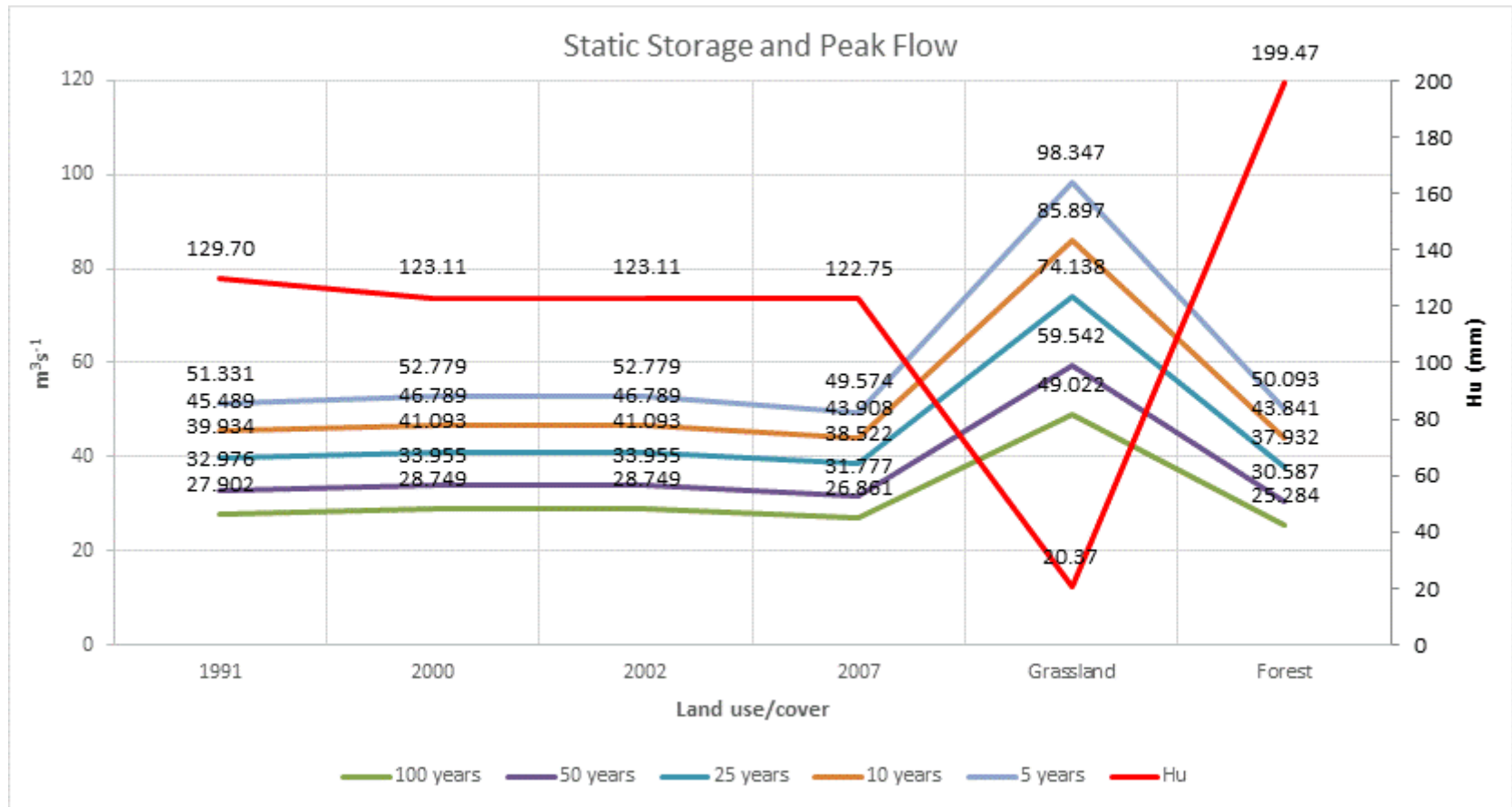
Efficiency index	Calibration	Validation
Error volume (%)	3.45	3.87
NSE	0.52	0.46

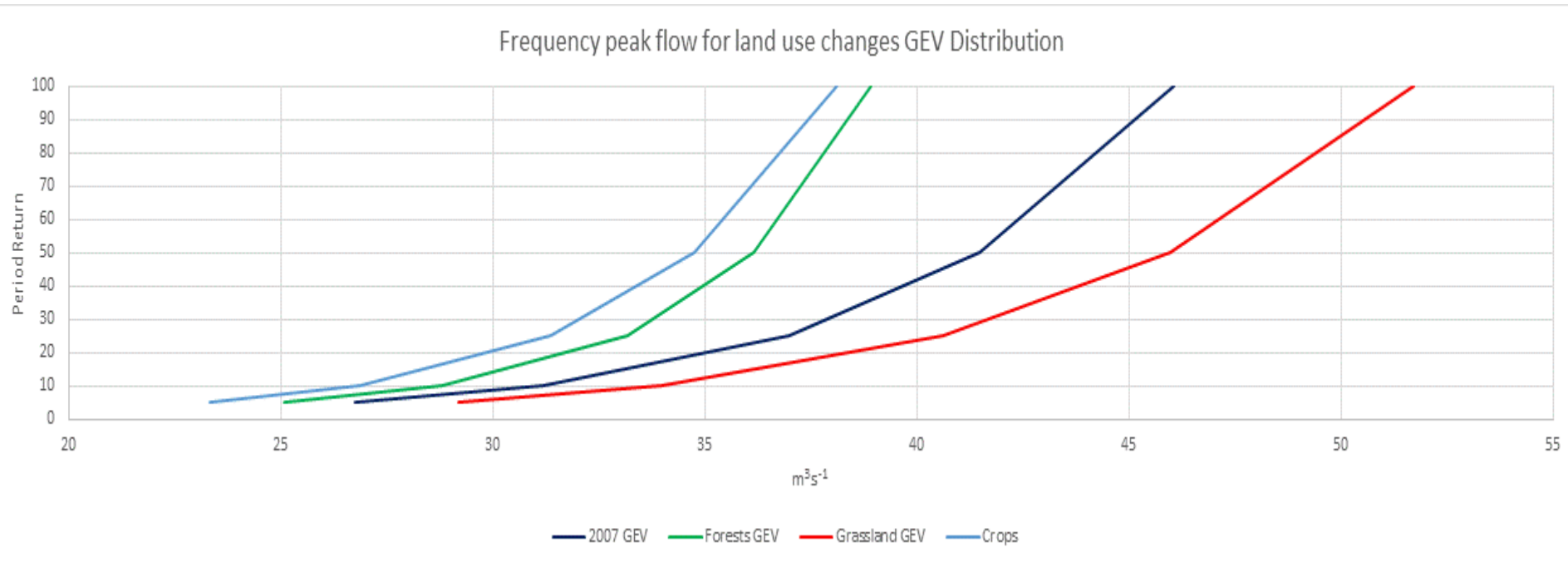


- ❑ Full Grassland / Land use
- ❑ Full Forest / Land use
- ❑ Current land use/cover









- ❑ The hydrological distributed modeling is a powerful tool to simulate changes in land uses / cover
- ❑ Changes in land use affect the flood regime
- ❑ Land uses with lower infiltration capacity increase peak flows
- ❑ Land uses with high infiltration capacity increase peak flows



Acknowledgements

This research was funded partially by:



UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA



