LIFE11 ENV GR 975
FLIRE: Floods and flre Risk assessment and management

Technical Report

Action B1

31/12/2012

Project location	Greece – Attiki region
Project starting date:	01/10/2012
Project ending date:	30/09/2015
Coordinating Beneficiary	National Technical University of Athens

Associated Beneficiary responsible for Action B1	National Technical University of Athens
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Other Associated Beneficiaries involved in Action B1	ICL, IRPI-CNR, FORTH
Contact Persons	ICL: Cedo Maksimovic, Maria Aivazolglou, Callum Clench IRPI: Tomasso Moramarco, Silvia Barbetta, Luca Brocca FORTH: Nektarios Chrysoulakis, Dimitris Poursanidis

Name of the Action: Catchment Hydrological Modelling

Starting date of the Action: 01/10/2012

Ending date of the Action: 29/03/2013

Short description of the Action

Aim

The aim of the Implementation Action B.1 is the simulation of the spatially distributed hydrological processes that take place in the rural part of the study area.

Objectives

- Quantification of the hydrological response of the rural catchment with the application of a rainfall-runoff model in the area
- Consideration of the dynamic nature of the catchment during the hydrological modelling (in view of events, such as fires and floods but also urbanization), using "live" timeseries together with up-to-date underlying maps
- Assessment of the hydrological behaviour of peri-urban areas considering hydromorphological issues (initial soil moisture conditions, initial abstraction from the ground etc.), alterations in the spatial characteristics of the catchment etc.
- Outputs of the hydrological modelling (which will correspond to responses of the rural catchment to different rainfall events, under different hydrological conditions) tailored to inputs required from the urban flood model (Action B.2)

Expected outcomes

As foreseen in the submitter proposal, the expected outcomes of Action B.1 are:

- A good understanding of the hydrology of the area and the main parameters that govern its flooding.
- A complete and continuously updated dataset of hydro-morphological parameters.
- A calibrated hydrological model able to link to urban flood modelling tools

As also mentioned in the submitted proposal, the reliable operation of the extended network of sensors that monitor the study area (raingauges, streamflow gauges etc.) is taken for granted. To this direction, the maintenance of HOA (the Hydrological Observatory of Athens, operated by NTUA) has already been intensified.

No deviations and/or amendment to the submitted proposal have been identified so far for Action B.8.

Tasks

1. Collection of hydrometeorological datasets (from HOA (http://hoa.ntua.gr) and NOA) and topographic datasets for the modelling phase (**NTUA**) [**high priority**]
2. Collection of satellite data for land cover after the occurrence of flood or fire events (and in any case at an annual basis) (**FORTH**) [**high priority**]
3. Collection of soil moisture datasets from satellites (**IPRI-CNR**) and HOA sensors (**NTUA**) [**medium priority**]
4. Research on a more accurate estimation of the initial abstraction in the rural catchment of the study area (**NTUA**) [**medium priority**]
5. Selection of a number of representative scenarios for different rainfall return periods and different hydrometeorological and geomorphological conditions and running through the catchment model (**NTUA**, **ICL**, **IRPI-CNR**) [**high priority**]
6. Setting up and running of the open source GIS extension HEC-GeoHMS (**NTUA**) [**medium priority**]
7. Setting up, running and calibration of the open source rainfall-runoff model HEC-HMS (**NTUA**) [**high priority**]
8. Examination of the application of the continuous and freely available MISDc rainfall-runoff model, developed by IRPI-CNR (**IPRI-CNR**, **NTUA**) [**medium priority**]
9. Setting up, running and calibration of the MISDc rainfall-runoff model (if Task 8 is applicable) (**IPRI-CNR**, **NTUA**) [**medium priority**]
10. Comparison between the HEC-HMS and MISDc model runs and selection of the most appropriate model for further application (if Tasks 8 and 9 are applicable) (**NTUA**, **IPRI-CNR**) [**medium priority**]
11. Estimation of runoff volume and peak discharge rate (**NTUA**) [**high priority**]
12. Sensitivity analysis of the impact that alterations in the spatial characteristics of the catchment may have on its hydrological behavior (**NTUA**, **ICL**, **IRPI-CNR**) [**high priority**]
13. Investigation on the possibility of applying CA (cellular automata) approaches coupled with appropriate rainfall-runoff models for simulating highly complex physical systems (**NTUA**, **ICL**) [**low priority**]

14. Development of a knowledge database which will include the potential responses of the catchment to rainfall events with different characteristics (**NTUA**, **IRPI-CNR**) [**high priority**]
15. Preparation of a short technical report with graphs, tables and explanatory text presenting in brief the outputs of the hydrological study of the area (**NTUA**, **IRPI-CNR**, **ICL**) [**high priority**]

Working Team

NTUA

- **Maria Mimikou** – Project Coordinator, who will work on the coordination of the NTUA team.

- **Christos Makropoulos** – Internal Project Coordinator, who will work on:
  - The selection of a number of representative scenarios for different rainfall return periods and different hydrometeorological and geomorphological conditions and running through the catchment model
  - A sensitivity of the impact that alterations in the spatial characteristics of the catchment may have on its hydrological behavior
  - The investigation on the possibility of applying CA (cellular automata) approaches coupled with appropriate rainfall-runoff models for simulating highly complex physical systems
  - The development of a knowledge database which will include the potential responses of the catchment to rainfall events with different characteristics

- **Chrysoula Papathanasiou** – Civil Engineer, Hydrologist, flood modeler, who will work on:
  - The research on a more accurate estimation of the initial abstraction in the rural catchment of the study area
  - The selection of a number of representative scenarios for different rainfall return periods and different hydrometeorological and geomorphological conditions and running through the catchment model
  - The setting up and running of the open source GIS extension HEC-GeoHMS
  - The setting up, running and calibration of the open source rainfall-runoff model HEC-HMS
  - The examination of the application of the continuous and freely available MISDc rainfall-runoff model, developed by IRPI-CNR
  - The setting up, running and calibration of the MISDc rainfall-runoff model (if Task 8 is applicable)

- The comparison between the HEC-HMS and MISDc model runs and selection of the most appropriate model for further application (if Tasks 8 and 9 are applicable)
- The estimation of runoff volume and peak discharge rate
- A sensitivity of the impact that alterations in the spatial characteristics of the catchment may have on its hydrological behavior
- The investigation on the possibility of applying CA (cellular automata) approaches coupled with appropriate rainfall-runoff models for simulating highly complex physical systems
- The development of a knowledge database which will include the potential responses of the catchment to rainfall events with different characteristics
- The preparation of a short technical report with graphs, tables and limited explanatory text for the hydrological study of the area

- **Evangelos Baltas** – Senior Engineer, Hydrologist and flood modeler, who will work on:
  - The research on a more accurate estimation of the initial abstraction in the rural catchment of the study area
  - The comparison between the HEC-HMS and MISDc model runs and selection of the most appropriate model for further application (if Tasks 8 and 9 are applicable)
  - A sensitivity of the impact that alterations in the spatial characteristics of the catchment may have on its hydrological behavior
  - The preparation of a short technical report with graphs, tables and limited explanatory text for the hydrological study of the area

- **Nikolaos Mamassis** – Senior Engineer, Hydrologist, expert in Geoinformatics, who will work on:
  - The research on a more accurate estimation of the initial abstraction in the rural catchment of the study area
  - The comparison between the HEC-HMS and MISDc model runs and selection of the most appropriate model for further application (if Tasks 8 and 9 are applicable)
  - A sensitivity of the impact that alterations in the spatial characteristics of the catchment may have on its hydrological behavior

- **George Papoutsoglou** – Tech. Agronomist, responsible for the hydrometeorological stations of NTUA in the study area, who will work on:

- The collection of hydrometeorological datasets (from HOA (http://hoa.ntua.gr) and NOA) and topographic datasets for the modelling phase
- The collection of soil moisture datasets from HOA sensors
- The preparation of a short technical report with graphs, tables and limited explanatory text for the hydrological study of the area

- **George Karavokiros** – Computer Scientist, expert in network modelling, who will work on:
  - The development of a knowledge database which will include the potential responses of the catchment to rainfall events with different characteristics
  - The preparation of a short technical report with graphs, tables and limited explanatory text for the hydrological study of the area

ICL

- **Čedo Maksimović** - head of the Urban Water Research Group (UWRG) within the Department of Civil and Environmental Engineering at Imperial College London, project coordinator, senior engineer, advise on flooding/flood protection

- **Maria Aivazoglou** - research and development on urban flood and intecations on forest fires,

- **Callum Clench** - project manager

These members of the ICL team will all cooperate and work on:

- The selection of a number of representative scenarios for different rainfall return periods and different hydrometeorological and geomorphological conditions and running through the catchment model
- A sensitivity of the impact that alterations in the spatial characteristics of the catchment may have on its hydrological behavior
- The investigation on the possibility of applying CA (cellular automata) approaches coupled with appropriate rainfall-runoff models for simulating highly complex physical systems
- The preparation of a short technical report with graphs, tables and limited explanatory text for the hydrological study of the area

IRPI-CNR

- **Tommaso Moramarco** – Internal Project Coordinator, who will work on:
  - The selection of a number of representative scenarios for different rainfall return periods and different hydrometeorological

and geomorphological conditions and running through the catchment model
    - A sensitivity of the impact that alterations in the spatial characteristics of the catchment may have on its hydrological behavior
    - The development of a knowledge database which will include the potential responses of the catchment to rainfall events with different characteristics

- **Luca Brocca** – Environmental Engineer, Hydrologist, flood modeler, who will work on:
    - The collection of soil moisture datasets from satellites
    - The selection of a number of representative scenarios for different rainfall return periods and different hydrometeorological and geomorphological conditions and running through the catchment model
    - The examination of the application of the continuous and freely available MISDc rainfall-runoff model, developed by IRPI-CNR
    - The setting up, running and calibration of the MISDc rainfall-runoff model (if Task 8 is applicable)
    - The comparison between the HEC-HMS and MISDc model runs and selection of the most appropriate model for further application (if Tasks 8 and 9 are applicable)
    - A sensitivity of the impact that alterations in the spatial characteristics of the catchment may have on its hydrological behavior
    - The development of a knowledge database which will include the potential responses of the catchment to rainfall events with different characteristics
    - The preparation of a short technical report with graphs, tables and limited explanatory text for the hydrological study of the area

- **Silvia Barbetta** – Environmental Engineer, Hydrologist, flood modeler, who will work on:
    - The selection of a number of representative scenarios for different rainfall return periods and different hydrometeorological and geomorphological conditions and running through the catchment model
    - The comparison between the HEC-HMS and MISDc model runs and selection of the most appropriate model for further application (if Tasks 8 and 9 are applicable)
    - The development of a knowledge database which will include the potential responses of the catchment to rainfall events with different characteristics

- The preparation of a short technical report with graphs, tables and limited explanatory text for the hydrological study of the area

- **Temporary Fellow Researcher** – Hydrologist, flood modeler, who will work on:
  - The collection of soil moisture datasets from satellites
  - The examination of the application of the continuous and freely available MISDc rainfall-runoff model, developed by IRPI-CNR
  - The setting up, running and calibration of the MISDc rainfall-runoff model (if Task 8 is applicable)
  - The comparison between the HEC-HMS and MISDc model runs and selection of the most appropriate model for further application (if Tasks 8 and 9 are applicable)
  - A sensitivity of the impact that alterations in the spatial characteristics of the catchment may have on its hydrological behavior
  - The development of a knowledge database which will include the potential responses of the catchment to rainfall events with different characteristics
  - The preparation of a short technical report with graphs, tables and limited explanatory text for the hydrological study of the area

FORTH

- **Nektarios Chrysoulakis** - Physics / Remote Sensing who will:
  - coordinate the Earth Observations (EO) related activities,
  - work on satellite observations pre-processing
  - work on the development of an accurate Digital Elevation Model
  - work on the classification of the satellite images with up to date classification techniques to produce the land cover of the area
  - interface the numerical modeling and EO teams
  - analyze modeling requirements for EO inputs
  - validate classification results

- **Dimitris Poursanidis** - Environmental Science / Cartographer who will:
  - work on the classification of the satellite images with up to date classification techniques to produce the land cover of the area
  - work on collection of satellite data for land cover after the occurrence of flood or fire events (and in any case at an annual basis)
  - work on the development of an accurate Digital Elevation Model

- **Nikos Benas** - Physics / Remote Sensing who will:

- Support the pre-processing and the classification of satellite observations

- **Nikos Manioudakis** - Physics / GIS who will:
  - Support the pre-processing and the classification of satellite observations

Deliverables

The Implementation Action B.1 has one deliverable, the **"*Hydrological study of the area*"** that has to be delivered by **29/03/2013**.

The hydrological study will have the format of a short technical report which will include relevant graphs, tables and text, presenting in brief some general conclusions from the hydrological analysis of the rural zone of the study area.

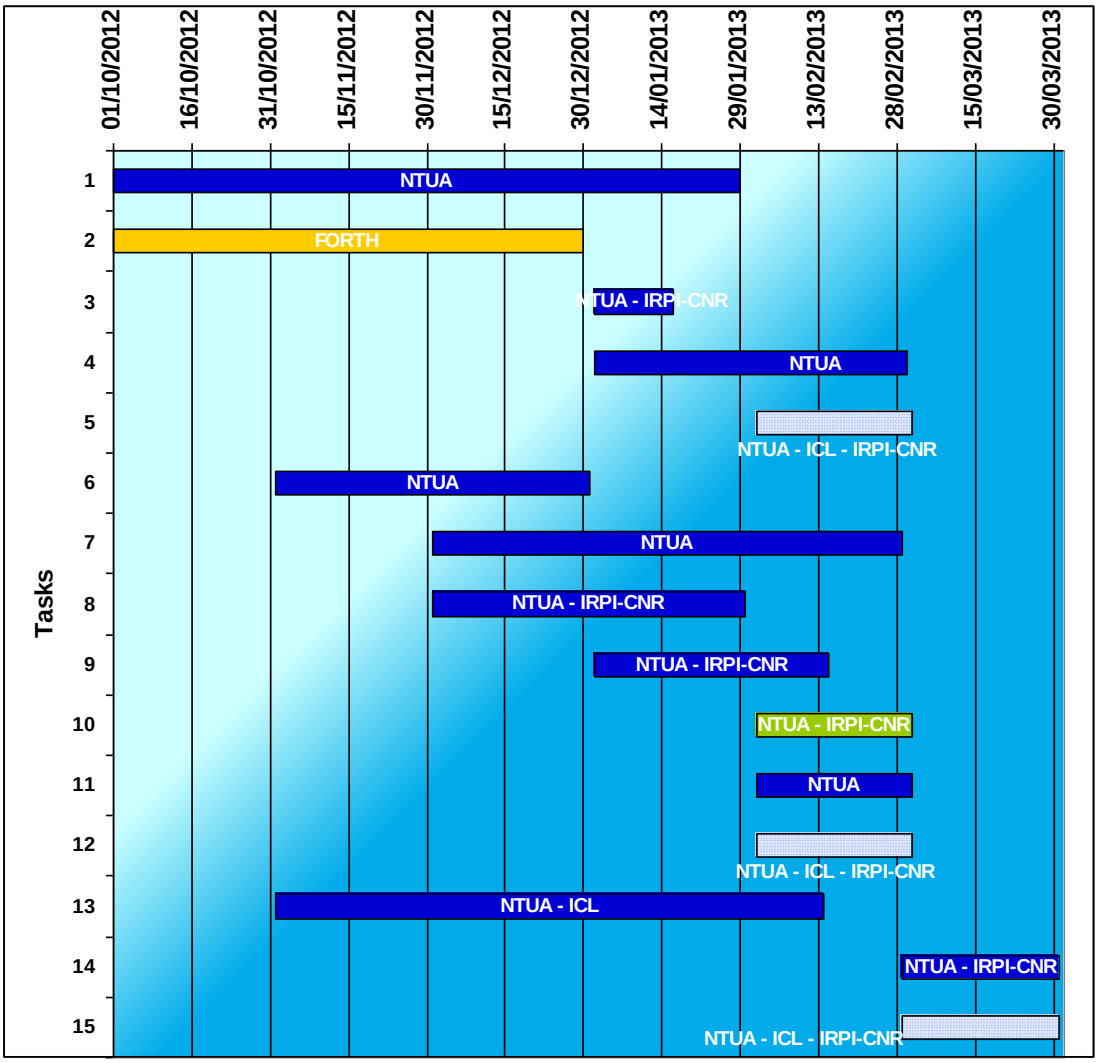
Milestones

The Implementation Action B.1 has two milestones:

1. ***Satellite data analysis completed*** that has to be ready by **31/01/2013**
2. ***Completion of the hydrological analysis*** that has to be ready by **29/03/2013**

The analysis of satellite data for the production of land cover datasets has to be completed by FORTH and the hydrological analysis will be completed by NTUA. Details on the satellite data analysis and the hydrological analysis are presented in the previous fields "Short description of the Action" and "Tasks".

Gantt-chart



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