Action C1: Impact

Monitoring FLIRE's impact on local society

30/09/2015

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Coordinating Beneficiary	National Technical University of Athens

Associated Beneficiary responsible for Action c1	ALGOSYSTEMS S.A
Contact person	Giorgos Eftichidis
Postal address	206, Leoforos Syggrou av., Kallithea, Greece
Telephone	0030 210 9548000
Fax :	0030 210 9548099
E-mail	
Other Associated Beneficiaries involved in Action C1	NTUA, ICL, IRPI-CNR, NOA,, FORTH
Authors of the report	Ioannis Mitsopoulos, Giorgos Eftichidis, Vasiliki Varela, Chrysoula Papathanasiou

LIFE11 ENV GR 975
FLIRE: Floods and flre Risk assessment and management
Monitoring FLIRE's impact on local society

2

Table of Contents

LIFE11 ENV GR 975
FLIRE: Floods and fIre Risk assessment and management
Monitoring FLIRE's impact on local society

3

1. Summary

The main objective of this action was the creation of a user group (FLIRE's user group), which includes representatives from local stakeholders, such as staff/members of public administration, forest and fire management authorities, environmental organizations, and active citizens groups.
More specifically this report includes:

- *Report on stakeholders' meetings*, where the interesting aspects of FLIRE for the local communities were presented and discussions on various relevant issues took place. Discussions included the ways the local community can be involved in or support FLIRE, as well as issues related to floods, forest fires and their interaction.

- *Report on training seminars* to promote the potential use of the FLIRE DSS tool and the early warning systems by local authorities and stakeholders and to highlight the associated benefits with their use.

- *Feedback on FLIRE's impact on local society*, obtained from questionnaires, which were sent to the FLIRE's user group and selected recipients from various target groups. The questionnaires aimed at exploring the attitude of local society towards the existence and evolution of natural risks in the area, and possible solutions, which emerge from the combination of scientific, technological and political tools and methods.

It is important to keep in mind that the social impact monitoring reported here refers to the monitoring accomplished up to September 2015. The social impact of FLIRE is expected to increase in the future building on the After LIFE communication plan.

2. Introduction

In general, social impact monitoring consists of analysing, assessing and managing the social consequences of development. The need for social impact monitoring during the project implementation stems from the fact that:

Social Impact monitoring enhances positive and sustainable outcomes associated with the project implementation;

- It supports the integration of social and environmental aspects associated with the numerous subprojects into the decision making process;

- It enhances positive social and environmental outcomes;

- It minimizes social and environmental impacts as a result of either individual subprojects or their cumulative effects;

- It protects human health and minimizes impacts on cultural property.

Social problems arise largely due to the conflict between economic development and natural resources management. Economic losses and social costs from environmental degradation often occur long after the economic benefits of development have been realized. Although the development projects provide economic benefits and a better living environment, they frequently affect local societies adversely. Hence, social impact monitoring helps in understanding such interactions.

The main objective of the social impact monitoring in the FLIRE project is to ensure that the potential impacts from fires and floods are identified, their significance is assessed, and appropriate mitigation measures are proposed to minimize or eliminate such impacts during a fair and visible timeframe, also considering of the investment which is required.

3. Mapping the area of impact

The study area of the FLIRE Project is the catchment of Rafina, which is a peri-urban area in the greater southeastern Mesogeia region in Eastern Attica, Greece. It covers approximately 123 km^2 and geographically extends to the east of Hymettus Mountain up to the coastline of Evoikos Gulf. The exact location of the area is shown in Figure 1.

LIFE11 ENV GR 975
FLIRE: Floods and fIre Risk assessment and management
Monitoring FLIRE's impact on local society

5

Figure 1. Project area

The outcomes of the FLIRE Project are of high relevance to the national and local authorities, the civil protection agency and services, the non-governmental organizations focusing on environmental protection, and the local residents and tourists.

Apart from the above stakeholders, there are two more categories of communities, which will benefit from FLIRE:

- Researchers and research communities: Considering the main objective of the project, researchers and research communities are key beneficiaries of the project. FLIRE will enable them to achieve a better understanding and a more effective integration of research activities related to fire and flood management.

LIFE11 ENV GR 975
FLIRE: Floods and fIre Risk assessment and management
Monitoring FLIRE's impact on local society

6

- Students (mainly postgraduates): They constitute an important category of project stakeholders, as they will benefit from the common programme of education and training created by the project in the relevant areas for DSS implementation.

The dissemination activities of the FLIRE project focused on the awareness raising, regarding the interaction between floods and fires and their impacts on the environment, the economy and the society. Public consultation with key stakeholders, local authorities and citizens' committees from Eastern Attica and Athens city was crucial in order to gain sufficient information for the area and secure the use and integration of the early warning systems and the DSS tool by local authorities.

4. Periodic meetings

During the FLIRE project numerous networking activities with other relevant projects took place to complement the results of the meetings held with local authorities and local stakeholders. These included *inter alia* meetings and contacts with research organizations, researchers and public services dealing with flood and forest fire issues. In the context of these networking activities, FLIRE was either the main topic of discussion or part of the discussion among other relevant topics.

During the FLIRE project, a great effort was invested by the relevant consortium partners towards the completion of the flood and fire DSS components. Hence, the FLIRE partners undertook networking activities with researchers and research organizations involved in other projects related to floods, fires and Early Warning Systems (EWS). The purpose of these meetings was to disseminate the FLIRE concept, outputs and conclusions and exchange knowledge, lessons learnt and experience. The ultimate target was to explore the possibility of using the components of the FLIRE system in other similar areas and relevant projects.

LIFE11 ENV GR 975
FLIRE: Floods and fIre Risk assessment and management
Monitoring FLIRE's impact on local society

7

At that stage of time, the fire component of the DSS was almost completed and, therefore, ALGOSYSTEMS organized a number of meetings with the central public authorities, which are in charge of the forest fire management and the civil protection in Greece. The purpose of these meetings was to investigate the possibility of using FLIRE, and in particular the web-based fire propagation tool, on an operational basis. Table 1 summarizes the relations between the stakeholders, the main activities enabled for them by the project, and expected impacts for each category.

Table 1. Relations between stakeholders, main activities enabled for them by FLIRE project, and expected impacts for each category.

Stakeholder type	Main activities possible using FLIRE's outputs	Expected Impact
National and local authorities	Become data providers; get involved in the civil protection operational chain	Use better services
Civil protection agencies and actors	Better Search and Rescue deployment	Reduced costs for civil protection
Non-governmental organization	Access to FLIRE DSS	Active participation in civil protection
Active citizens	Access to FLIRE DSS	Improving self-protecting during fire and flood events
Researchers and research communities	Use the FLIRE DSS to access data and conduct experiments	Improvement of research quality and results
Students	Access to FLIRE DSS	Well-trained students in the relevant areas for flood and fire management

5. Training seminars

A specific session of the 2nd training workshop of FLIRE was dedicated to the interaction with local stakeholders represented by regional organizations, citizens' groups, local committees and individuals located in Eastern Attica, Greece. A properly prepared questionnaire aiming at investigating the culture and experience of the local society on the issues of fire and flood risk was distributed and filled in, following relevant discussion between the consortium partners and the participants of the workshop. The survey consisted of a broad set of questions covering all aspects of fire and flood management. All of the responders expressed their personal experience and their opinion as receivers of the impacts of wildfires and floods on the natural environment and their quality of life.

In case of such events, most of the responders contacted the local fire service for stating the event and for receiving relevant advice. According to the answers provided by the local stakeholders, the daily fire and flood risk warning is rated as more important compared to the weekly. Also, the daily fire and flood risk assessment should cover not only their area, but the broader region. Furthermore, guidelines on evacuation plans and self-protection measures should be the first priority of the local authorities.

Based on the answers of the participants, it was concluded that the stakeholders recognize the value of the visual and graphical representations of the expected fire propagation and flood risk assessment in preventing disastrous situations. Responders stated that the visual representation of fires and floods may improve the coordination of all involved parties during fire suppression and flood events. Responders stated that they prefer to become aware of the fire and/or flood events in the vicinity of their area through a dedicated on-line website or by receiving text messages to their mobile phones. The requested information for both fire and flood events should be mainly focused on safe evacuation plans and self-protection measures during the events, as well as on the expected day of a flood event and the expected time of arrival of the flame front.

The findings of the survey can be critically important in determining how the fire and flood management considerations are perceived by the local society. Additionally, in case the FLIRE DSS and results are integrated into the risk management plans for the Eastern Attica region, they may contribute to enhanced environmental protection.Moreover, stakeholders were asked to express their opinion and rank the various possible expected benefits, selecting the appropriate items from a pre- defined list. Table 2 shows the most relevant benefits from the FLIRE project. These are the expansion of the range of research activities and services made available to operational communities and the delivery of well-trained and educated stakeholders on the field. Other expected benefits include succeeding in improving the quality of the software services and systems in flood and fire management, reaching more users by better targeting their needs, improving scalability, and higher efficiency in performing operational activities.

Table 2. Expected benefits from FLIRE according to stakeholder's perspectives.

Ranking	Expected benefits
1st	Expand the range of research activities and services made available to operational communities
2nd	Well-trained and educated stakeholders
3rd	Improve the quality of the software services and systems in flood and fire management
4th	Ability to better target users/beneficiaries' needs
5th	Improve scalability
6th	Increment the optimization of resources/improve efficiency
7th	Improve the access to large amounts of data. Improve the possibility to exploit large amounts of data (more efficient data analysis)
8th	Cost reductions

The expected benefits are described in more detail as follows:

1. **Expand the range of research activities and services made available to operational communities:** Information on post-fire flood risk resulting from research activities must be made available to the emergency services. The fire services, in particular, need to be made aware of the post-fire risk potential in their area, so that they can take the appropriate precautions in case of an emergency.

2. **Well-trained and educated stakeholders:** Well-trained and educated stakeholders can play a significant role in post-fire flood management. The local communities generally practice activities and knowledge, which is primarily associated with risk prevention. This includes planning and supervision of activities, post-fire monitoring and response, and provision of support to individuals to enhance their post-fire management tasks.

3. **Improve the quality of the software services and systems in flood and fire management:** Management authorities and end-users have become increasingly dependent upon software-intensive systems to support new ways of conducting operational activities. These critical software-intensive systems are becoming more complex, and difficult to manage, yet the performance and quality expectations from management and the end-users continue to increase. The improvement and the quality of such systems in post-fire flood management is vital for performing successful operations.

4. **Ability to better target users/beneficiaries' needs**: This is also called "perceived efficiency" and has been assessed by asking the stakeholders and end-users to describe the benefits they experience by using the service/product offered by the FLIRE consortium.

5. **Improve scalability:** Many web applications, such as the FLIRE system can benefit from increased scalability. End-users were asked if they experienced problems when more people used the application at the same time.

6. **Increment the optimization of resources/improve efficiency:** The challenge for fire service organizations is to save time, focus on the real issues, and effectively communicate their vision to all members. It takes everyone in the organization to generate efficiency. Doing this means improving the operational planning process within the fire service. One of the goals of the FLIRE system is to solicit cross-domain expertise to improve the operational planning of the fire service.

7. **Improve the access to large amounts of data. Improve the possibility to exploit large amounts of data (more efficient data analysis):** Post-fire flood management is a complex phenomenon that encompasses numerous interacting social, ecological, and physical factors. Integrating credible scientific information, data, and existing models in post-fire flood management is important for community preparedness and resilience.

8. **Cost reduction:** Reducing post-fire flood costs has been an objective of fire protection agencies for years. The FLIRE web system aims at providing strategies that collectively enable the agencies to manage the costs of fires and floods more effectively by integrating both risks in a unique system.

LIFE11 ENV GR 975
FLIRE: Floods and fIre Risk assessment and management
Monitoring FLIRE's impact on local society

12

6. End-user participation

Public consultation with social stakeholders, citizens' committees and NGOs from Eastern Attica and Athens was crucial in order to receive valuable feedback for the area status, to cover knowledge gaps and ensure the successful integration and use of the DSS platform by the relevant authorities. The FLIRE consortium developed a special users' group platform where representatives and members from all relevant stakeholders were invited to participate: local and regional administration authorities, public services with responsibility of floods and fire management, NGOs and citizens' committees from Eastern Attica.

Special users' group platform: http://www.flire.eu/en/participate_en/public_en

The basic goal of the platform is to become a space for the exchange of experiences, knowledge and know-how among different types of interested parties. The platform provided cross-pollination between project members, external experts and the general public making the outcome of this project more consolidated, more oriented to real world challenges and better equipped to deal with a bigger set of scenarios.

The platform was important for the dissemination of the project's outcomes and multiple developments, including scientific, technological and operational information. The platform helps members to stay informed by reading articles written by project's members on multiple areas of the project. Since the FLIRE project was constituted by multiple work actions, the stakeholders are able to find, among others, articles on scientific issues, such as methods to increase the operational capabilities during flood and fire events. The authorized users can also participate in online discussions on issues related to flood and fire management, they may subscribe to digital services such as the electronic version of the project newsletters, and participate in polls and surveys, etc.

It should be highlighted that there were a number of stakeholders, which registered into the users' group platform without being directly associated with the study area. These include the Municipality of Argyroupoli-Ellinikon, the Balkan Environment Center (BEC), the Public Power Corporation (PPC), the Aristotelian University of Thessaloniki (AUTH), the WWF, and the Regional Fire Service of Crete. After registering, those stakeholders were kept updated about the project's evolution (e.g. receipt of communication/dissemination results, newsletters). As a result, their involvement has benefited the project in terms of expanding the dissemination of the project's results beyond the geographical boundaries of the study area. Another key benefit of their involvement is the increased diversity of the stakeholders' interests. Each of the stakeholders has focused on different aspects of the project's results, i.e. those which are more relevant to his duties and assignments: scientific insights (Aristotelian University); environmental impacts of floods and fires (Balkan Centre, WWF); flood protection (PPC); fire protection (Regional Fire Service of Crete); best practices in civil protection (Municipality of Argyroupoli-Ellinikon).

Table 3. Type of stakeholders and users registered into the FLIRE special user group platform.

Type of stakeholder/ user	# of registered entities		Entities
National and local authorities	10	1	Municipality of Rafina-Pikermi[1]
		2	Municipality of Nea Makri-Marathon[2]
		3	Municipality of Spata-Artemida[3]
		4	Municipality of Argyroupoli-Ellinikon[4]
		5	Balkan Environment Center (BEC)
		6	Region of Attica
		7	Center for Security Studies, Ministry of Interior and Administrative Reconstruction
		8	Special Secretariat for Water
		9	Public Power Corporation S.A. (PPC)
		10	General Secretariat of Civil Protection (GSCP)
Researchers & research communities	4	1	National Technical University of Athens (NTUA)
		2	National Agricultural ResearchFoundation (NAGREF)
		3	Aristotelian University of Thessaloniki (AUTH)
		4	Foundation for Research and Technology (FORTH)

Non-governmental organization	4	1	WWF
		2	OCEANIS Association
		3	Neos Voutzas Citizens group
		4	Kallitechnoupoli Citizens group
Fire service	7	1	Fire Service HQ
		2	Rafina Fire Service Office
		3	Nea Makri Fire Service Office
		4	Spata-Artemida Fire Service Office
		5	Marathon Fire Service Office
		6	Lavrio Fire Service Office
		7	Regional Fire Service of Crete
Voluntary teams	2	1	Volunteers of Rafina-Pikermi (ETHORP)
		2	Volunteers of Papagou-Cholargos
Total	27		

[1] Rafina and Pikermi were two different municipalities merged administratively by "Kallikratis" law during the project life into one

[2] N.Makri and Marathon were two different municipalities merged administratively by "Kallikratis" law during the project life into one

[3] Spata and Artemida were two different municipalities that merged administratively by "Kallikratis" law during the project life into one

[4] Argyroupoli and Ellinikos were two different municipalities merged administratively by "Kallikratis" law during the project life into one

7. Impact assessment

In order to develop a methodology to undertake the Social Impact Assessment of the FLIRE project we provide documentation and guidelines to enable capturing the social impacts, as an expansion of the current monitoring strategy of the project. Through a better insight into the social impacts, the FLIRE project will be able to identify success stories, which can be beneficial to the wider AAL community; to evaluate the success of the project, depending on the social benefits for end-users; and to follow up on the implementation of the results. The aim of this assessment is to collect information on how to capture social impacts from project's activities.

The social impact assessment methodology is specifically focused on the active duration of the FLIRE project. The assignment will make use of existing information, as much as possible, and it will complement the already existing monitoring strategy of the FLIRE project (deliverables, reports, actions etc.).

Examples of the indicators used can be clustered in the following categories:

Progress/outcome in technology innovation (scientific/technical)

- Technical achievements (e.g. demonstrators developed)
- End-user services developed
- Patents and other Intellectual Property Rights (IPR)
- Publications

Progress/outcome in addressing end-user demands

- Type of end-users involved
- Total number of end-users involved

Progress/outcome in value-creation models

- Number of jobs created

The indicators which were selected and the estimated achieved impact of the FLIRE Project during the 36 months (3 years) of its implementation are shown in Table 4.

LIFE11 ENV GR 975
FLIRE: Floods and fIre Risk assessment and management
Monitoring FLIRE's impact on local society

17

Table 4. Selected indicators and achieved impact of the FLIRE Project during its implementation period.

Indicators	Quantitative assessment (# or Y / N)	Qualitative assessment (achieved impact)
Increased knowledge and innovation capacity		
Publications in scientific journals and conference proceedings	25	*Very high* A very large number of publications in scientific journals and conference proceedings was achieved (over 8 publications/year on average). A satisfactory number of citations (80) was achieved for these publications, which is expected to grow in the future as some publications are very recent. Many contacts with researchers and academics was achieved during scientific conferences.
Publications in business press, sector-specific magazines and popular press	8	*High* A large number of publications in business press, sector-specific magazines and popular press was achieved (almost 3 mentions/year on average). Publications included very popular national newspapers and the local press.
Collaboration between universities/research institutes and operational agencies	Y	*High* Academic and research bodies (i.e. NTUA, NOA, FORTH, IRPI, ICL) designed and tested an integrated DSS tool in close cooperation with operational agencies of Greece, such as the Hellenic Fire Service (responsible for fighting wildfires and dealing with flooded buildings) and the Civil Protection Agency (responsible for early alerting and crisis management).
Collaboration between universities/research institutes and enterprises	Y	*High* Academic and research bodies (i.e. NTUA, NOA, FORTH, IRPI, ICL) collaborated with an SME (i.e. ALGOSYSTEMS) for the development of the integrated FLIRE DSS tool and the implementation of the project's communication-dissemination activities. The team communicated with the Public Power Corporation and 6 high-profile environmental consulting companies in Greece to inform them about the project's achievements.

Multi-disciplinary and inter-disciplinary research and innovation	Y	*Very high* FLIRE tools and services are innovative, since the combination of fires and floods, in an operationally meaningful and scientifically robust way, has never happened before. It is a result of a multi-disciplinary and inter-disciplinary research effort involving hydrology, meteorology, environmental sciences, forestry, ICT, remote sensing, social science and governance.
International collaboration	Y	*High* Researchers from three different countries, i.e. Greece, Italy and the UK, collaborated successfully for the design of FLIRE tools and the implementation of the project's communication-dissemination activities.
Access to end-user organisations	Y	*Moderate* Access to end-user organizations (e.g. municipalities, environmental and civil protection agencies, environmental consulting companies) was implemented using round table meetings, training sessions and other networking activities.
Change in business, innovation processes and sustained competitiveness		
End-user collaboration in the test, pilot and demonstrator phase of the Project	Y	*Very high* Key end-users (from Municipalities, Civil Protection Agencies, Fire Service etc.) were consulted during the test and pilot phase of FLIRE and supported actively its demonstration to their organizations.
End-user involvement in the research phase of the project	Y	*Very high* The research team consulted with the end-users (key stakeholders) frequently during round table meetings, training sessions and other networking activities, to get feedback from them and adapt the design of the FLIRE tools to their remarks.
New products/ services/ processes developed and launched	7 (Forecasts, observations, smart alerts, fire management tool, fire danger index, floodplain data, planning tool)	*Very high* A large number of innovative products/ services/ processes were developed, launched and properly disseminated to support the integrated management of floods and fires.

Platform developed with the potential for multiple products and services	Y	*Very high* The web platform was developed, with the aim to become a hub of information related to the project's identity and the project's activities, containing descriptive texts, documents/ presentations/ videos produced during the project, dissemination and communication material, as well as an active link to the FLIRE DSS, which provides services focused on the integrated management of floods and fires. The platform has the potential to host additional products, if necessary.
Patent applications and grants	N	-
Jobs created during the project implementation	Approx. 20 (as a direct contribution of the project)	High A large number of job positions have been created, covering a wide range of expertise: research on water, fire and environment; website development; video production; graphic design; meetings organization etc.
Contribution to/impact on policy making		
Meetings with policy makers	15	*High* A large number of meetings with policy makers for a 3 year project (5 meetings/year on average). A lot more informal contacts.
Policy workshops attended	4	*High* Increased participation in policy workshops (over 1 workshop/year on average).
Collaboration with policy makers and public agencies regarding fire and flood management	Y	*Moderate* Fire and flood management issues were extensively discussed during relevant workshops, where policy makers and public agencies participated.
Contribution to solving societal challenges		
End-users benefiting from the FLIRE Project	52	*Very high* The sound operation of FLIRE tools has benefitted 52 end-users from 14 key organizations (i.e. the FLIRE User Group excl. the FLIRE team).
Estimate change in quality of life for citizens	Y	*High* The application of FLIRE DSS by end-users enhances the quality of life of citizens by protecting human lives and properties in events of fire and flood risk, by reducing the magnitude and the occurrence of such risks and by lowering the anxiety of citizens against natural threats.

Estimated increase in productivity/ employability of citizens	Y	*Moderate* The application of FLIRE DSS by end-users increases the productivity/ employability of citizens by reducing the risks and impacts of floods and fires: less human lives threatened, less distortions to transports and economic activities; less anxiety for natural threats. Higher security and less economic damages support economic growth and, consequently, job creation.
Direct contributions to improvements made in flood and fire management, e.g. in terms of quality of services and productivity	Y	*Very high* The FLIRE DSS has improved the potential of integrated flood and fire management in Attica (and elsewhere) substantially, by initiating or upgrading the methodological, technological and socio-environmental tools, which are required. Flood and fire risks were previously managed separately without the use of advanced tools for near-real time weather monitoring and forecasting (using an extensive network of automated gauges), smart alerts, fire propagation and hydrological models, databases, web platforms and planning tools. The work conducted on environmental, social and ICT issues has led to high quality systems, which provide a variety of needed services and reduce the time of response for the authorities.

8. Conclusions

This document reports on the impact of FLIRE on the local society, as well as the key findings from surveys of stakeholders, stakeholder's meetings and training seminars.

It important to note that during the FLIRE workshops throughout the project, stakeholders were asked to express their opinion and rank the possible benefits from their participation in the FLIRE project. According to their perception, the most relevant benefits of the FLIRE project are the expansion of the range of research activities and services made available to operational communities and the delivery of trained/educated stakeholders on the field.

LIFE11 ENV GR 975
FLIRE: Floods and fIre Risk assessment and management
Monitoring FLIRE's impact on local society

21

The FLIRE impacts are strongly dependent on the stakeholder type. Specifically, national authorities were provided with better services, the civil protection agencies were given a tested method, tools and technologies that allows them to reduce their operational costs by improving search and rescue operational efficiencies, while active citizens are now better able to improve self-protecting during fire and flood events. Moreover, the research community (researchers, students etc.) were provided with improved, high quality data and methods.

The total of 27 entities registered into the FLIRE special user group platform including entities coming from different stakeholder types and geographic regions. A good example of this dispersion beyond the boundaries of the project's region include: the dissemination of scientific insights (Aristotle University of Thessaloniki), of knowledge on environmental impacts of floods and fires (Balkan Centre, WWF), of research into flood protection (PPC), and operational practices related to fire protection (Regional Fire Service of Crete) and of the combined fire-flood system and its effects of civil protection enhancement in other municipalities (Argyroupoli).

Finally, a social impact assessment was performed by using the monitoring strategy of the FLIRE project (deliverables, reports, actions etc.). The table including the main results (Table 4), identified the main success stories, which are beneficial to the local community, as well as to the follow-up actions of the FLIRE Project results.