

# FOREST FIRES RESPONSE IN LEBANON

*Challenges, Shortcomings  
& Suggestions*

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# **I. EXECUTIVE SUMMARY**

## EXECUTIVE SUMMARY

- This report leverages the forest fire prediction model of the “Centre National de Recherche Scientifique” (CNRS) as well as the response to the fires as they arise through a pilot forest fire module on IMPACT.
- It focuses particularly on predictions of fires from September 2020 till June 2021.
- Lebanon’s ecosystem is especially susceptible to forest fires that cause devastating damages. Every year, forest fires ravage areas and occasionally burn over 4,000 hectares of land throughout the fire weather season.
- The Inter-Municipal Platform for Assessment Coordination and Tracking ([IMPACT](#)) has been utilizing the daily fire risk levels generated by the “Centre National de Recherche Scientifique” (CNRS) and communicating alarming fire risk levels to local authorities. This data has been cross checked with the information provided by the Lebanese Civil Defense of fires that have taken place in the last year.
- The CNRS fire prediction model has successfully anticipated, at least 48 hours prior to their occurrence, 30% of the fires that have taken place from September 2020 till June 2021 when compared with the Lebanese Civil Defense publicly available information.
- The optimization of the fire prediction model and improved coordination between stakeholders can facilitate the way for a more relevant, coherent and efficient response.
- But in addition to that, the unpredictability of some fires can point to man-made fires and call for a serious investigation of the motives and a prevention plan.



## **II. BACKGROUND & METHODOLOGY**

## BACKGROUND: AN UNFAVOURABLE ECOSYSTEM

*Lebanon's ecosystem renders it prone to a high probability of forest fires which lead to severe damages. In fact, every year, forest fires ravage areas and burn over 4,000 hectares of land throughout the fire weather season.*

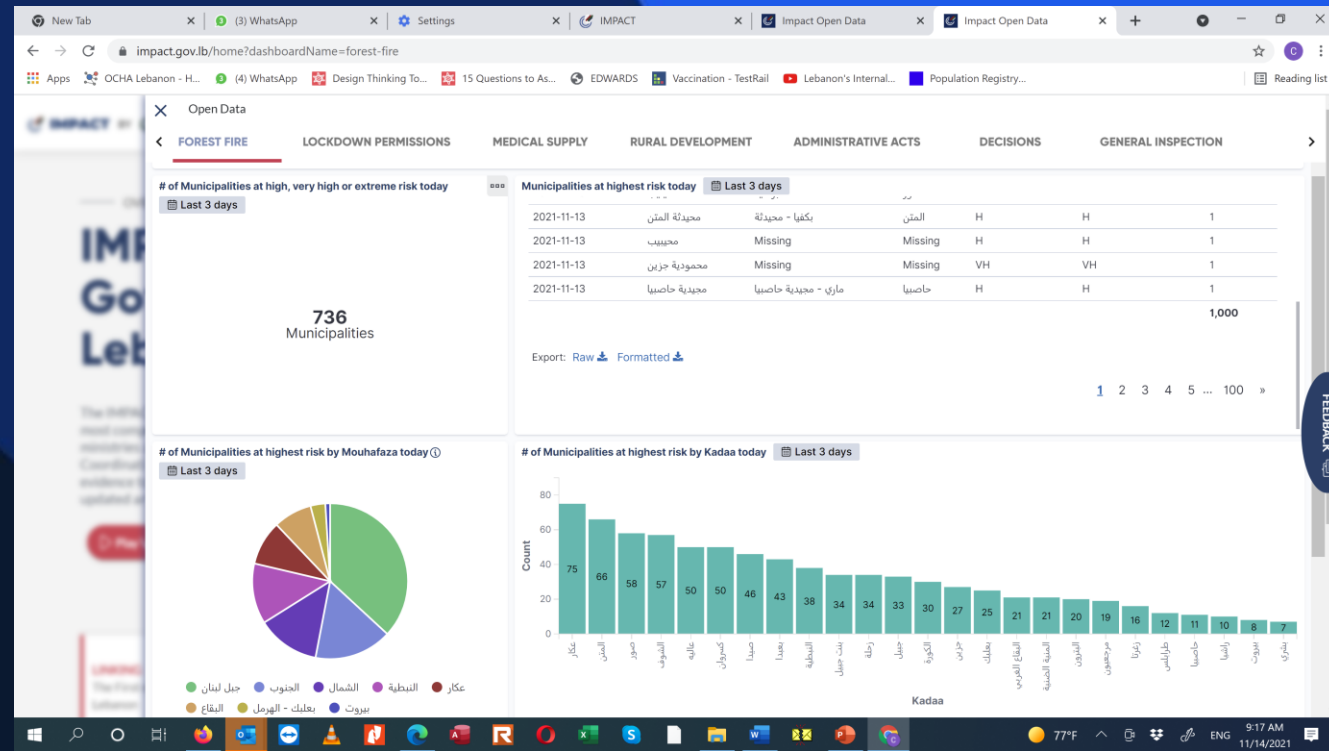
- Lebanon's location in the Mediterranean basin makes it fertile land for forest fires, especially in the warm and dry season. As such, the fire season begins in mid-July and persists for 17 weeks. According to the Issam Fares Institute for Public Policy and International Affairs (2019) the months of September, October, and November witness the highest number of forest fires.
- In 2007, a total of 275 actual fires caused the burning of over 4,000 ha of land, whereas in 2010, 320 actual fires burned over 4,660 ha of land. Similarly, the years 2014, 2016, and 2019 witnessed high numbers of actual fires burning 1,852 ha, 1,871 ha, and 3,155 ha respectively (Mitri, 2019).



# METHODOLOGY: A JOINT EFFORT

The Inter-Municipal Platform for Assessment Coordination and Tracking (IMPACT) utilizes the daily fire risk levels generated by the “Centre Nationale de Recherche Scientifique” (CNRS) and is thus able to communicate alarming fire risk levels to local authorities. The data provided is cross-checked with the data provided by the Lebanese Civil Defense targeting fires that have taken place in the last year.

- Alert System:** In 2020, an alert system was established through the Inter Municipal Platform for Assessment Coordination and Tracking (IMPACT). Its main purpose is to connect local authorities with the daily forest fire risk levels generated by the “Centre Nationale de Recherche Scientifique” (CNRS).
- Fire risk levels:** Fire risk levels are provided for the current day, the following 24 hours, and the following 48 hours. The fire risk assessment is divided into 6 different levels ordered in an ascending way: VL (Very Low), L (Low), M (Medium), H (High), VH (Very High) and E (Extreme). Subsequently, municipalities with VH or E risk are alerted via an SMS highlighting the risk levels for the upcoming 3 days, along with recommendations on preventative and preparatory measures to be taken.
- Cross-checking:** A list of missions conducted by the Civil Defense dealing with forest fires has been utilized and cross-referenced with the CNRS data on IMPACT. Each mission represents an actual fire. Missions are logged with a specific ID number, location, type of terrain, and type of affected flora, with no mention of fire intensity or size of the burnt area.





**III. DATA ANALYSIS:  
FIRES LARGELY  
UNPREDICTED**

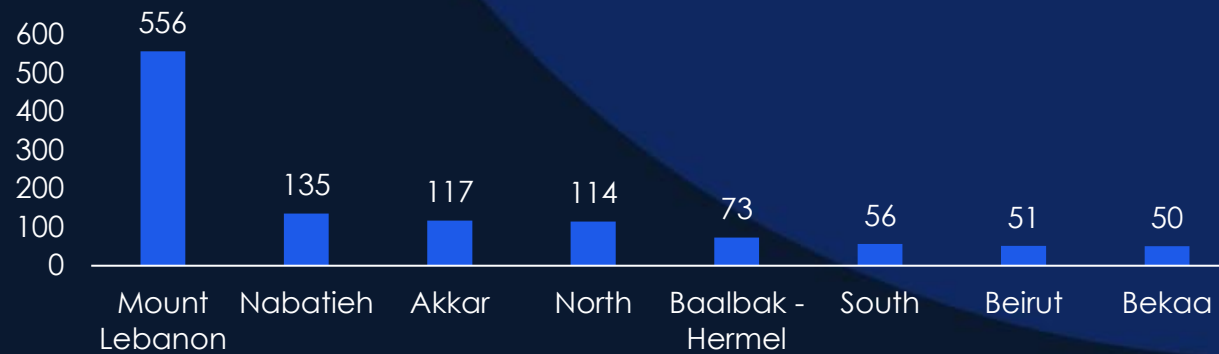


## DATA ANALYSIS: 2020 TO 2021

*The data covers the period from September 7 2020, up until the 13th of June 2021. The CNRS fire prediction model has successfully anticipated, at least 48 hours prior to their occurrence, 30% of the fires that have taken place from September 2020 till June 2021 compared with the Lebanese Civil Defense publicly available information.*

**Between September 2020 and June 2021, Lebanon witnessed 1152 forest fires, 48% occurred in Mount-Lebanon alone. Large numbers of fires in specific regions could indicate higher susceptibilities to fire triggers and hence, require particular attention**

Fig.1 Breakdown of fires by Governorate according to Civil Defense



# FIRES LARGELY UNPREDICTED

Despite 30% of actual fires being predicted by the CNRS algorithm and municipalities being warned of imminent threat, a large percentage of actual fires failed to be predicted and thus prevented.

**Despite warnings being sent out to municipalities, local authorities were not able to prevent the fires from occurring. In addition, 70% of actual fires failed to be predicted by the model, which rendered the concerned municipalities unprepared and unable to preemptively take adequate measures.**

Fig.2 Number of predicted and unpredicted fires by CNRS model

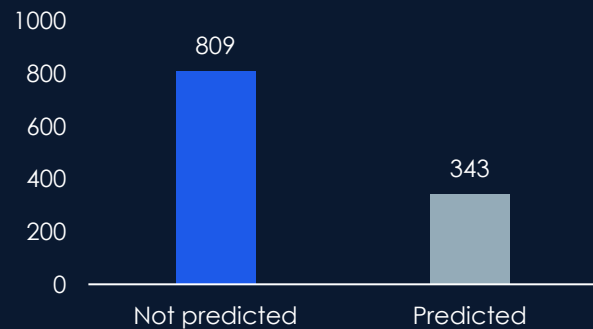
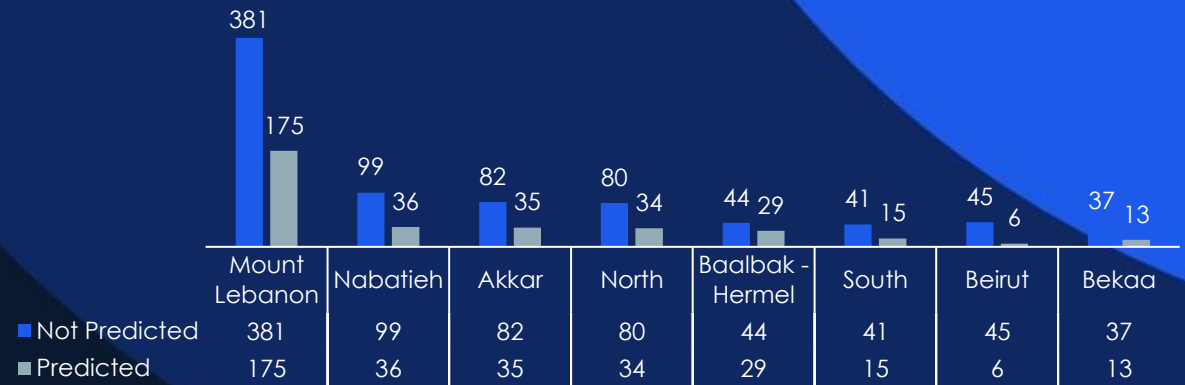


Fig.3 Breakdown predicted and unpredicted fires by Governorate



**Beirut exhibits a low prediction success rate of only 12%, while Baalbek has a prediction success rate of 40%. All other governorates have a prediction success rate varying between 25% and 31%. A high level of deviation from the national average could indicate a need to tailor the CNRS algorithm for specific regions.**

**This low predictability may point towards a hypothesis of man-made fires and arson.**



**IV.  
RECOMMENDATIONS  
& WAY FORWARD**

## ACTIONABLE RECOMMENDATIONS

*By combining efforts, relevant stakeholders have been able predict a certain number of fires, however, in order to predict a larger number and thus allow local authorities to properly prevent fires from occurring, recommendations have been formulated.*

- Improve the current process by gathering feedback and needs from the municipalities to understand the reason behind the inability to prevent predicted fires.
- Support the CNRS in enhancing and tailoring their fire prediction model, and bring in support by Balamand and other universities working in this field.
- Consider the integration, in the forest fire predictive AI, of all data collected on IMPACT in relation to preventive measures, municipal cross sectoral mapping, and other relevant indicators.
- Include the Civil Defense in the current process. IMPACT can both alert the Civil Defense of a high fire risk, and function as a standardized log book following their missions.
- Provide communication channels between the Civil Defense, municipalities and administrative authorities to facilitate coordination for prevention and fighting of forest fires.
- Integrate Civil Society Organizations in the early warning produced by IMPACT, and in the preventive measure implementation and reporting on IMPACT.
- Explore the hypothesis of man-made fires, drill into its root causes and put a preventive plan that addresses this risk. IMPACT can be leveraged in the implementation of this plan.
- Support the Ministry of Environment's leadership, through monitoring and enforcement by relevant State actors including MoIM, DGLAC, and Central Inspection. This can be leveraged on the IMPACT fire prevention workflow.
- Involve IMPACT in the National Forest Fire Management Strategy, which was developed by the Ministry of the Environment (MoE) and the Association for Forests, Development and Conservation (AFDC), and is currently being updated.
- Reinforce State-Society collaboration and encourage CSOs to support the new strategy to boost state capacity and MoE initiatives in tough times.

# THANK YOU

**SIREN**  
ANALYTICS

For more information on IMPACT,  
please visit: <https://impact.gov.lb>