

Climate change REsilience

framework for health

SYStems and hospiTALs

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Executive summary

This deliverable was produced as part of action A1.2 of the LIFE RESYSTAL project, which aims to assess the capacities and training needs of each pilot hospital. An adaptative capacity assessment matrix (or checklist) was designed. It covers the different dimensions of hospital's climate resilience: governance & leadership, crisis management, buildings and infrastructure. Interviews were then conducted with targeted members of the communities of practice of each hospital, and climate resilience capacity profiles were produced.

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Table of abbreviations		
Abbreviations	Meaning	
ARS	Agence Régionale de Santé	
CCA	Climate Change Adaptation	
CH MILLAU	Hospital Center of Millau	
СоР	Community of Practice	
HCWHE	Health Care Without Harm Europe	
NCSRD	National Center for Scientific Research Demokritos	
NHOSP	General State Hospital of Nikaia "Agios Panteleimon"	
NGO	Non-Governmental Organization	
PCAET	Local Climate, Air and Energy Action Plan	
POLIBARI	University hospital complex of the polyclinic of Bari and the Giovanni XXIII	
	hospital	
RINA-C	RINA Consulting	
SERGAS	Galician Health Service	
UCAM	University of Cambridge	

Climate Resilience Capacity Profile

Hospitals of Millau and Saint-Affrique Rapid Climate Resilience Capacity Profile



Background information

The Centre Hospitalier de Millau and the Centre Hospitalier Emile Borel de Saint-Affrique are two public hospitals located in the South of France, within the "Grands Causses" Regional Nature Park, a living area hosting about 70,000 inhabitants distributed between small towns¹ and countryside. Since 2019, the two hospitals have² a unique management team and some administrative functions are now shared. This is a first step before a merger scheduled with the creation of a new hospital by 2030 which will bring together staff from both hospitals. Millau and Saint Affrique Hospitals are members of the Groupement Hospitalier de Territoire de Coordination et de Mutualisation de l'Est-Hérault et du Sud-Aveyron (abbreviated as GHT), a consortium of nine hospitals managed by the university hospital complex of Montpellier (CHU Montpellier), the third largest French city near the Mediterranean coast. Created in 2016, the GHT aims to mutualize resources and promote joint work between health professionals in order to better serve a community of nearly 1 million people. Below are some key figures:

Key figures in 2019	Millau	Saint Affrique	
Foundation date	1910	1933	
Beds	200 ³	250 (including 130 for the	
		retirement home - EHPAD) ⁴	
Health professionals	600 including 60 doctors	320 including 20 doctors	
Patients hospitalized (per year)	10,000	4,300	
Patients examined at outpatients' clinics (per year)	42,000	9,700	
Budget (million €)	53	28	
Built area (m²)	37,000	10,000	
Buildings and campuses	21 spread over 6		
Duliuliys and campuses	campuses	5 in one campus	



Hospital of Millau (Source: CH-Millau Website, 2011)

Hospital of Saint-Affrique (Source: Journal de Millau.fr 2018)

¹ 30,000 inhabitants for the Millau Grands Causses community of municipalities, the largest one in the Park, and 15,000 for the Saint Affrique community of municipalities

² Together with the *Hôpital de Proximité Maurice Fenaille*. Located in Sevérac-le-Chateau, 30 km north of Millau, this hospital has a capacity of 80 beds. It is also a member of the GHT.

³ <u>https://etablissements.fhf.fr/annuaire/hopital-fiche.php?id_struct=248%20</u>

⁴ <u>https://etablissements.fhf.fr/annuaire/hopital-fiche.php?id_struct=4726</u>



Climate hazards:

The two hospitals are facing pressing yet distinct climate hazards:

- In Saint-Affrique, the main climate hazard is **flooding** from the Sorgue river. A flood risk reduction investment
 program (*Programme d'Actions de Prévention des Inondations* PAPI) is under implementation and a new
 one is under design. The current one includes the setup of cofferdams and the drafting of emergency
 instructions for hospital staff. In 2014, as a result of heavy rainfall (*épisode cévenol*) the hospital basement
 was fully flooded due to the overflow of the Sorgue river, resulting in its closure for 6 months, and all patients
 had to be evacuated in 48 hours.
- In Millau, the main hazards are heatwaves as temperatures inside the buildings can reach 30°C in the rooms which are incompatible with good patient care and worsen the staff's working conditions. Saint-Affrique hospital is also impacted by heatwaves yet to a lesser extent as its buildings are less subject to the heat island effect (UHI).
- Another hazard in Millau is **shrink-swell subsidence** of the clay soil which could damage some of the buildings (not the main ones).

The hospitals are also impacted by **snow and ice episodes** during the winter, which require an immediate reactivity of snow removal operations, especially in the Millau Hospital's "Puits de Calès" campus located on the top of a hill.



Map showing the nine hospitals of the GHT and its location in France (Source: Agence régionale de Santé de la région Occitanie)

External risk factors:

The two hospitals being located in a mostly rural and sometimes mountain area (up to 1,000 m above sea level), they have to deal with external factors that impact the resilience of the hospital, mainly:

- An important ageing and rather low-income population with tremendous healthcare needs
- A lack of accessibility of the hospitals as the community served can be pretty secluded.



Lessons learned: existing capacities and prospects

The Millau and Saint-Affrique hospitals have only marginally adapted their organization, their infrastructure and their crisis management doctrine to climate change challenges.

Yet, the hospitals appear well aware of the need to build their climate resilience as they are subject to the effects of climate change: the flood of the Sorgue river as a result of which the Saint Affrique hospital was kept closed for over 6 months in 2014 raised awareness about the need to adapt the hospital to floods and more generally to climate hazards. as regards the Millau hospital, the difficulty to cool the rooms (especially ICUs) already jeopardizes the continuity of service during the summer period; the technical department is working very hard to improve the situation and raise funds on that end.



Assessment of the 6 dimensions of adaptive capacity for the Millau and Saint Affrique Hospitals

The way forward:

Within this context, one main challenge for the hospital to

adapt to climate change will be, first to stabilize its governance which impeded over the last years any major improvement and, second, to secure the funds that are lacking for both the new joint hospital project⁵ as well as the rehabilitation of the existing hospitals.

The hospital's resilience capacity is analyzed for each dimension identified i.e. (i) Governance, leadership and data, (ii) Buildings, (iii) Green infrastructure, (iv) Utilities, (v) Transport and telecommunication, and (vi) Emergency preparedness and management.

1- Governance, Leadership and Data

Score: 2.5 (between marginal and functional)

This score indicates that the Millau and Saint-Affrique hospitals have only to some extent adapted their organization to climate change challenges. Yet, they are pretty aware of the need to and are able to steer funds in this aim.

1-1 Organizational capacity

The organizational capacity of the hospital to deal with climate change is functional as the hospital has appointed one person responsible for sustainability issues (Sustainable Development Officer). However, this task come in addition to her responsibilities as Head of Technical Services, which are already very demanding. This person deals with both the hospitals' buildings and infrastructure climate mitigation and adaptation issues .

No formalized climate resilience plan exists for the two hospitals. However, climate resilience objectives will be included in the hospital's forthcoming strategic plan (*Projet d'Etablissement*). In addition, even without formalization or dedicated budget, the two hospitals are already taking it into consideration for strategic decisions, such as: the location for the future hospital outside a flood-prone zone, commissioning an energy audit of the buildings (developed by consulting firm *Primum Non Nocere*) and steering funds for an energy retrofitting project, 50% of which is co-funded by public utility companies⁶.

⁵ A €90 million funding was recently secured for this project, with a mix of EU, national and regional public fundings. URL: <u>https://www.midilibre.fr/2022/03/14/sud-aveyron-90-millions-deuros-consacres-a-lhopital-median-10169493.php</u>

⁶ Within the framework of the program « AMI CHARMES 'Coordonner et Hiérarchiser les Actions de Rénovation du Médico-Social: économisons l'énergie' » managed by the FNCCR (*Fédération Nationale des Collectivités Concédantes et Régies*, National federation of local public utility companies)



1-2 Enabling environment

The hospitals do not receive any specific support from their supervisory bodies (Regional Health Agency⁷ and Health Ministry) to adapt to climate change – except weather alerts that the hospitals receive by email from the Regional Health Agency. At the local scale, the "Grands Causses" Regional Park developed a climate adaptation and mitigation plan and therefore acquired a sound understanding of the territory's vulnerability to address climate hazards, on which the hospitals could build.

1-3 Mechanisms to Collect and Monitor Data

The hospitals do not collect and or monitor data related to climate change8. However, they say that they take into account climate hazards for the upgrading or construction of new buildings, as it is the case for the new hospital project for which the flood hazard is fully integrated.

2- Buildings

Score: 2 (Marginal)

This score indicates that the hospitals' buildings are rather old and in a decayed state. They cannot withstand extreme weather events, especially heatwaves and floods. Besides DYI solutions, no measure has been taken to reduce the vulnerability of the buildings.

The buildings of the two hospitals are rather old and in a decayed state. In terms of maintenance, the personnel is neither trained to inspect buildings and detect signs of deterioration, nor to manage an emergency situation caused by an extreme weather event. Finally, the hospitals are only insured against flood risks.

In the case of the Millau hospital, 21 buildings were built between 1910 and 2021 for the most recent one. The ones built between 1937 and 1947 (in the Puits-de-Calès campus) are in a very dilapidated state and do not protect at all from the heat. The situation is particularly acute for ICUs and laboratories as they affect the nominal operation of some equipment. None of the buildings have high efficiency glazing systems for heat and cold insulation. In order to cope with heatwaves, "do-ityourself" solutions have been adopted by adding fans and portable air conditioners in the rooms. In addition, some buildings are located on clay heights so there is a risk of **shrink-swell subsidence**, but not for the main buildings.

"Overall, the buildings are watertight in the sense that when it rains, it doesn't get into the building, yet: heat and cold gets in" Head of Technical Services (talking about the Millau Hospital)

Regarding the Saint-Affrique hospital, it is made of 3 buildings – built between 1933 and 1984 – on one



Flood risk map showing that the Saint-Affrique hospital hospital (black circle) is located in an area with medium (in blue) to heavy flood risk (in red) (Source: inondations.canalblog.com)



Basement of the Saint Affrique hospital, which was fully flooded in 2014 (Source: Midilibre.fr)

⁷ Agence régionale de santé (ARS): Regional Health Agency for the Occitania region

⁸ Such as an ex-post evaluation conducted following past climate events, the presence of a GHG emission monitoring system, indicators defined by the hospital regarding its climate action (mitigation and/or adaptation), etc.



single campus. As it is located near a bridge right in the meander of the Sorgue river, the hospital buildings are heavily exposed to floods. In 2014, the hospital was affected by a major flood, and all the technical equipment was flooded: generator, boiler, etc.⁹. Unfortunately, it seems that no efficient risk mitigation measure could be implemented to reduce the vulnerability of the buildings besides relocating the hospital. Until the new hospital is built, the technical equipment remains located in the current campus, and is highly at risk of flood.

3- Green infrastructure

Score: 2 (Marginal)

This score indicates that the hospitals have only marginally committed to enhance their resilience through green infrastructure. In addition, no adaptation measure has been implemented lately.

The Saint-Affrique campus is surrounded by green spaces. The plant species are local or resistant to climate conditions (drought). On the contrary, in the Millau campuses, there are no green spaces. However, the hospital still owns a piece of agricultural land that used to supply the hospital with food 20-30 years ago. Today this is not the case anymore as public procurement procedures are now managed by the *Groupement Hospitalier de Territoire Est-Hérault Sud-Aveyron* and one single supplier has been selected for all nine hospitals of the consortium.

4-Utilities

Score: 2 (Marginal)

This score indicates that the hospitals can marginally operate in case utilities are disrupted due to extreme weather events. Nonetheless, the hospitals embarked on an ambitious plan to diversify their heating sources thereby increasing the resilience of their energy system.

4-1 Energy

Power and thermal system

In case a power cut occurs, oil-based emergency generators can supply the hospitals with electricity for a period of about 72 hours without refueling (48 hours is the minimum requirement in France; it is extended to 72 hours in mountainous areas).

In Millau and Saint-Affrique, **heating is provided by boilers using town gas**. The heating system can operate for 3 weeks in case the network is disrupted. As mentioned above, cooling relies on fans and portable air conditioners in the rooms that are connected to the power system.

Energy efficiency measures

Several energy efficiency measures (which contribute to resiliency by reducing the reliance on energy) have been taken by the hospital such as: i) setting targets for reducing energy consumption; ii) setting a monitoring system; iii) raise awareness of staff about energy saving measures; iv) put in place low-energy lighting, such as T-5 or LED; v) install lighting control systems to minimize energy consumption.

In addition, as part of an ambitious energy transition strategy led by the "Grands Causses" Regional Natural Park¹⁰, the hospitals, which are the highest energy consumers of the territory have taken several actions. They have responded jointly with the Park to a call for projects focusing on the energy renovation of buildings and health facilities. The program will last for 2 years (09/2021 to 09/2022)¹¹. Within this framework, the hospitals aim to reduce their carbon footprint. One projects include connecting to the urban heating network set up in Saint Affrique, of which 86% of energy is produced by wood-fired boilers. (see figure below).

⁹ More information is provided in this podcast: « Développement durable à l'hôpital, réalités et perspectives ? Conversation#23 avec Camille Devroedt », Groupe 6. URL: <u>https://groupe-6.com/hopitaldufutur/developpement-durable-a-lhopital-realites-et-perspectives/</u> ¹⁰ This strategy aims to make of Grands Causses a "Positive energy territory" (i.e. a territory that produces more renewable energy than it consumes) by 2023.

¹¹ Geneviève De Lacour, 10/03/2022, Three health establishments in South Aveyron join forces with the Parc des Grandes Causses to control their energy consumption, URL : <u>https://www.techopital.com/trois-etablissements-de-sante-du-sud-aveyron-s-</u> associent-au-parc-des-grandes-causses-pour-maitriser-leurs-consommations-energetiques-NS 6195.html

The Millau hospital, which covers a surface area of 12,000 m², is the building that consumes the most energy in Millau, along with the swimming pool and the water treatment plant" Project manager at the Grands Causses Regional Natural Park



Local wood-fired boiler room supplying the Saint-Affrique urban heating network (Source : Causses Energia 2021)

4-2 Water and Sewage

Both hospitals do not have alternative water resources in case of a water emergency. Based on a crisis management protocol, there is a stock of about 1,000 1.5 L water bottles in each hospital. The hospitals track their water consumption on a weekly basis.

4-3 Waste management

The hospitals monitor the amount of waste they produce, the dominant medical waste being chemotherapy residues. They sort medical waste; yet they would like to improve waste sorting to increase of amount of recycled waste (such as cardboard/paper/food glass).

5- Communication, information, and access to the hospital

Score: 1,5 (Marginal)

This score indicates that the hospitals communication systems are not very resilient to climate change. In addition, the hospitals may not remain accessible when extreme weather events occurs.

There is a landline, mobile phone and radio communication system and a dedicated server for electronic medical records (capable of running on backup power) with very frequent backups. In Saint-Affrique, paper medical records are not safe from flooding. Therefore, the floods in 2014 resulted in the loss of medical records and is likely to happen again.

The escape route is the main entry route for both hospitals and it is vulnerable to falling trees (as most roads in the territory). To access the hospitals, there is no public transportation system besides bus lines which do not run very often. In case of a snow event, transport is stopped. However, the hospitals remain accessible by foot (around 30 min walk from the city center). On the Puy de Calès campus – one of the Millau hospital's campuses – the supply conditions are also very complex, as the location of the campus on the top of a hill do not make it very accessible.

Saint Affrique hospital has a helipad but it is located in a flood-prone area. Millau's helipad is not suitable for landing – except by the army – as there is a high-voltage line nearby. Another landing site is being used a few kilometers away from the hospital.



6- Emergency Preparedness & Management

Score: 2.5 (Between marginal and functional)

This score indicates that the hospital is materially self-sufficient in case of an extreme weather events but its functioning will be deteriorated and may be jeopardized due to its lack of preparation as well as its organizational weaknesses.

Both Millau and Saint-Affrique hospitals have defined their crisis management doctrine by setting up the regulatory framework as per the Health Ministry's requirements:

- *Plan blanc* (literally "white plan"): it is the hospital's crisis management plan. It describes the processes for the hospitals to respond to a critical situation, including vis-à-vis mobilization of staff, material, logistics and the adaptation of medical activity of the facility.¹² The emergency instructions are part of the crisis management plan and indicate for each crisis situation (including flood, heatwaves, etc.) who is responsible for what.
- *Plan bleu* (literally "blue plan"): it is the crisis management plan for retirement home managed by the hospital. It was created after the 2003 heatwave in France, and aims for a rapid and consistent mobilization of means to deal with a crisis in order to protect the elderly which are more at risk.
- Plan de continuité d'activité (PCA Business continuity plans): it defines the measures to be implemented in healthcare facilities. Its purpose is to: (i) maintain essential activities in case of a crisis; ii) evaluate the level of preparation of the hospital to face a crisis situation.
- Plan de sûreté des établissements (PSE Health Facility Safety Plan) which is closely linked to crisis management as it defines the overall policy to secure the facility from unexpected events, especially terrorist attack.

Regarding climate-related emergencies, both hospitals receive early warning notifications from the Regional Health Agency when a meteorological event (heavy rainfall, hail, snow, storm, heatwave) is forecasted.

6-1 Crisis management capacities and preparation

To face a high patients' influx, both hospitals rely on patient transfers which are conducted informally depending on the contacts established by with nearby hospitals (mainly Rodez, whose infectologist cooperates a lot with them). In the future, more links will need to be established with the hospital of Montpellier which leads the GHT Est Hérault-Sud Aveyron. In addition, private doctors – which also work part-time at the hospital – are sometimes mobilized when there is a lack of health staff.

Millau hospital has an emergency department of about 3 beds. It relies on a pool of 7 nurses which can be mobilized at any time depending on needs (number of beds available). The hospital uses an excel sheet document to oversee the mobilization of the pool of nurses as well as for personnel recall. There is no dedicated software for crisis management.

Few crisis management simulations and trainings have been organized over the past years. The hospital has nevertheless recently signed a partnership agreement with the fire brigade to organize joint simulations.

Millau hospital's crisis management unit is functional.

As underlined in the diagram below, the hospital is self-sufficient in terms of material. It has its own storage unit, pharmacy, food production unit, and stock of water bottles.

¹² The *Plans Blancs* are coordinated at the regional level by the *Plan ORSAN* (Organization of the response of the health system in exceptional health situations) that are developed by the Regional Health Agency.



Entrance of the ED of Millau hospial (Source: Millavois.com, 2021)

Saint-Affrique hospital has a rather small emergency department: there are about 47 available beds in the ED. Additional beds from the maternity building may also be used.

Although the action plan of the crisis management plan (*Plan Blanc*) recommends at least two emergency management exercises per year, none have been carried out in the hospital due to multiple changes in management which have blocked these activities.

The hospital also cooperates with the city hall on flood hazards: two years ago, when a heavy rain occurred, the risk management department at the city of Saint Affrique provided updates to the hospital on the Sorgue river level every six hours.

Finally, Saint-Affrique hospital's crisis management unit is functional.

6-2 Hospital vulnerabilities

Millau hospital's vulnerabilities mainly deal with the state of its buildings and infrastructure (presented above). The hospital do not have at risk sites (no dangerous sites in the vicinity). Nevertheless, its Health Facility Safety Plan prepares the hospital to cope with a chemical, biological, radiological, or nuclear (CBRN) emergency which would require patients to be transferred to other hospitals.

Regarding Saint Affrique hospital, the ED Director insists on the fact that the hospital is today "**psychologically** vulnerable" due to:

- The creation of a new hospital by 2030 which crystallizes a lot of fears from health staff
- The lack of consistency in the management: there were 3 managing directors over a 1-year period.
- The fact that the hospital is has a small team at the ED and is lacking human resources: it has difficulties attracting young health professionals to work in this mainly rural area (only old ones stay for a long time)
- The Covid-19 pandemics which has tired the team a lot. The ED Director started cooperating with the hospital's psychologist in order to provide mental support to his team.

"If a big disaster happens, we'll have a hard time responding" Saint-Affrique Hospital's ED Director

6-3 Experience dealing with the Covid-19 crisis

In the context of the Covid-19 sanitary crisis, a joint platform between Millau and Saint-Affrique hospitals was set up. Through this platform, Covid-19 patients from both institutions were hosted at Saint-Affrique hospital.

In Millau, one feedback was conducted in January 2021. Using the "FORAP" tool (see below), hospital staff members were invited to answer questions regarding their experience dealing with the Covid-19 crisis. Additional information would need to be gathered to understand if the feedback helped the hospital to improve its crisis management policy and capacities.



Summary of the Covid-19 feedback survey conducted by the Millau Hospital which underlines that the hospital is performing well in terms of logistics and rather unperforming regarding its regulatory framework.

In Saint Affrique:

- Crisis unit meetings were held every week. After each meeting, a report was sent, and weekly updates were made. Initially only crisis unit members were getting these updates, then the heads of departments were put in the loop. Some pitfalls of the crisis management policy were identified, for instance the case of a Doctor, member of the crisis management unit, that the head of the crisis unit forgot to invite to the first meetings.
- A *Poste Médical Avancé* (PMA Medical advanced post) was set up at the entrance of the building as well as a Covid-19 unit.
- No feedback has been developed by the hospital until now.

Main sources and limitation

Interviews were held with Camille Devroedt, head of technical services and sustainable development manager for both Saint-Affrique and Millau hospitals (Buildings and Infrastructure part of the questionnaire), Sylvie Marty, newly appointed director of the 2 hospitals (Governance part), Ophélie Salam, deputy director of both hospitals, Estelle de la Réberdière, Risk management officer at Saint-Affrique Hospital, Céline Tierrey, Risk management officer at Millau Hospital, Dr. Loïc Descamps, head of the ED at Saint-Affrique Hospital (Crisis Management part). Written responses were also provided by Camille Devroedt regarding the buildings and infrastructure part of the questionnaire.

This document is the first draft of the Rapid Climate Resilience Capacity Profile produced based on the interviews conducted.