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City of
Bourj Hammoud

French Ministry of Public Works

Local authorities taking account of the major urban risks

"From a case study to a global approach"

The example of the City of Bourj Hammoud, Lebanon

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Abstract

Municipalities are attaching more and more importance to the need to **factor the major urban risks into local policies**. As well as creating victims and causing material damage, natural and technological catastrophes can have a strong destabilising effect on municipalities and their socio-economic functioning. In order to optimise planning and prevention for possible crises, it is therefore essential to conduct a **territorial diagnostic** of major urban risks with a view to identifying and initiating preventive and management actions.

Seeing the usefulness of this approach, the city of Bourj Hammoud, Lebanon, has proposed to the World Bank and United Cities and Local Governments (Lebanon, Syria, Jordan), to initiate a "major risks" diagnosis on its territory in 2005.

This diagnostic, which was conducted by CETE Méditerranée with logistical support from the City of Marseille, revealed **seismic, flood and technological risk** levels that called for short- and medium-term preventive actions at local level. Without undertaking major works, the municipality can, without delay, take a large number of **simple, efficient, inexpensive actions.** A **programme of pragmatic actions** has been proposed in close collaboration with the City of Bourj Hammoud.

Alongside this study, analysis conducted by CERTU and CETE Méditerranée has led to the proposal of a **gradual process** for the local authorities. The aim of this process is to move from an awareness of risk to the implementation of concrete actions.

The geographical context of the city of Bourj Hammoud

*The city of **Bourj Hammoud** is located on Lebanon's Mediterranean coast, **2 km east of central Beirut**.*

Bourj Hammoud has been an independent municipality since 1952, and is a member of the Metn-North group of municipalities.

*The city covers an area of scarcely **2 square km,** and has a population of almost **150,000 hab : Bourj Hammoud** is one of the most densely-populated cities in the Middle East.*

Novembre 2005

Overview of the challenge

With the backing of ***United Cities and Local Governments*** **(Lebanon, Syria and Jordan),** the **World Bank** and the **City of Marseille** (France) **organised a seminar relative to the prevention of the major urban risks in Amman from 2 to 4 July 2005.** The aim of this seminar was to encourage the local authorities to take initiatives on their territories. To optimise the reflections on this subject, it was decided to conduct a case study. According to its local characteristics and its strong political commitment to initiating actions relating to risks and to the environment, the **City of Bourj Hammoud** volunteered.

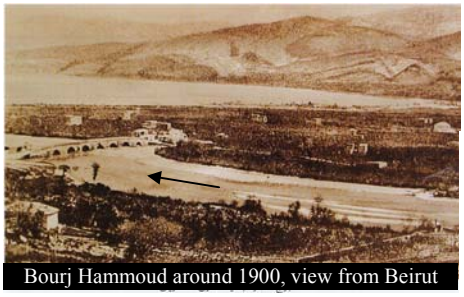
The aim of this case study, which was conducted by **CETE Méditerranée** (France) in June 2005, was to elaborate, **in close collaboration with the municipality of Bourj Hammoud**, a preliminary diagnosis of the **major urban risks** and to describe the **hazards** and **vulnerabilities** of the territory. The objective was to define the principles for a **programme of actions** aimed at ensuring a better integration of the major urban risks at municipal level. As well as being used at local level, the results were also to form the basis for the definition, in collaboration with **CERTU** (France), of a **global approach accessible** for all local authorities.

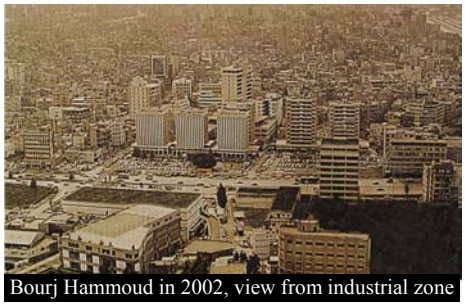
This study required:

- the **collection and analysis of** available local **data**
- **interviews** with key local players (elected representatives, State entities, industrial players, non governmental organizations, etc.)
- **site visits** (from 15 to 17 June 2005)
- the development of a **methodological approach.**

Bourj Hammoud : key characteristics

The town emerged in the 1930s, as a result of the arrival of a large Armenian community in the plain adjoining the right bank of the Beirut river, alongside the northern road.


Bourj Hammoud around 1900, view from Beirut

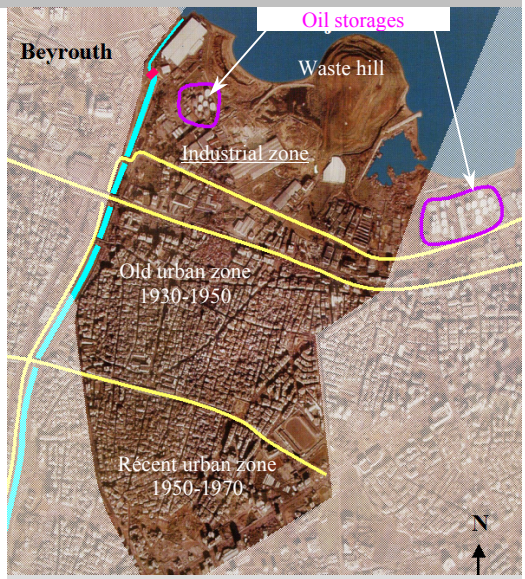

Bourj Hammoud in 2002, view from industrial zone

Its residential housing, which was developed between 1930 and 1970, is mainly comprised of buildings of 2 to 4 storeys, often with commercial activities at street level.

Although the city is dynamic and industrious, Bourj Hammoud suffers from a large number of environmental nuisances due to its location at the edge of Beirut, Lebanon's capital city. It is crisscrossed by motorways, and turns its back on the sea, from which it has reclaimed a few hectares of land.

The planned extension of the port of Beirut, which is currently at the study phase, is a source of much uncertainty as to Bourj Hammoud's future.

Major risks concerning the city are **seismic, flood and technological risks.**



Land use

in the North: the industrial zone (metallurgy, leather / textiles, warehouses, waste treatment, **oil storages** and … a small-scale fishing port)

in the South: the urban, residential and commercial zone.

Project: Ensuring that the major risks are taken into account locally

The results of the study show that, in the short term, **simple, efficient, inexpensive actions** can be implemented by the local authority to enhance risk management and make Bourj Hammoud's experience known to other local authorities.

An operational and integrated action programme

Risk awareness

- Raising public awareness

via NGOs, especially

- Creation of a local information-exchange committee dedicated to risks

for greater responsibility and communication between local players

- Training for local players

schools, construction-sector professionals, ...

Knowledge of the risk

- Local "risk" data collection and archiving system

keeping a record of events and creating a simple database

- Technical studies in order to improve the risk evaluation

characterisation of the imponderables and of the vulnerabilities of strategic buildings and structures

Crisis preparation

- Hazards control

e.g. flood gauges

- Development of a local emergency plan

identification and coordination of players and resources, action cards, identification of strategic buildings and appointment of referral agents by neighbourhood

In the longer term, more sophisticated actions will require additional technical studies and **call for the technical and financial involvement of other players** (the State, neighbouring local authorities and industries, especially).

The three major risks concerning Bourj Hammoud

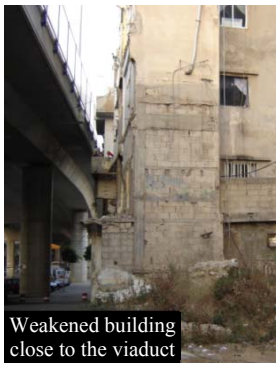
SEISMIC

Context

- o Seismic region / movements of the Arabian and African plates
- o Moderate seismic zone
- o Risks = earthquake + tsunami
- o History of seismic activity

Some recorded earthquakes

- ✓ ***551*** *: Beirut destroyed (M > 7; tsunami)*
- ✓ ***1063*** *: Tripoli (M = 6.5-7)*
- ✓ ***1956*** *: Beirut and other towns (M = 5.8, 136 killed and 23,000 houses damaged)*
- ✓ ***1997*** *: Beirut and other towns (M =5.3; slight damage)* ***M :Magnitude***


Weakened building close to the viaduct


ground-floor transparency


Precarious building

Aggravating factors

- Buildings vulnerable to earthquake damage: *masonry not chained, ground-floor transparency, little maintenance, very high density, etc.*
- Ground potentially liquefiable: *water table 3 metres underground and sandy soil*

Positive factor: earthquake-resistant construction standards for new buildings

RECOMMENDATIONS

Protective measures

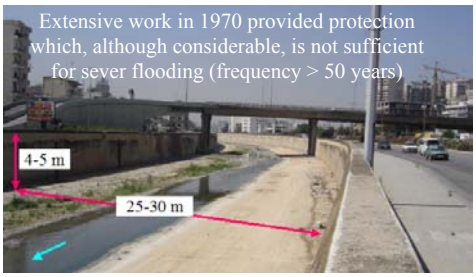
- diagnostic and potential strengthening of strategic buildings and networks: *police station, medical center, fire station, etc.*

Preventive measures :

- application of earthquake-resistant construction standards

FLOODING

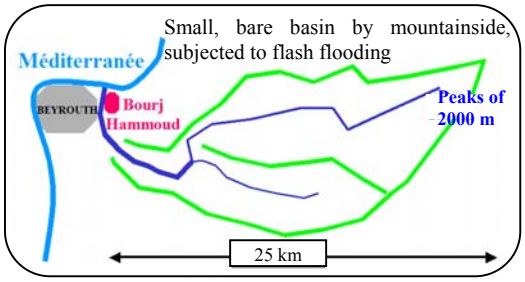
If the Beirut river bursts its banks, Bourj Hammoud could be suddenly flooded



Aggravating factors

- o flat site, 30% between 2 and 4m
- o insufficiency – or absence – of rainwater treatment network
- o poor condition of dykes

Positive factor: upper floors in housing *would allow residents to seek refuge*



RECOMMENDATIONS

Protective measures

- o **Priority 1**: Demolition of ruined bridge
- o Modification of sea outflow
- o Cofferdams at ground level

Preventive measures

- o Inspection of wall resistance,maintenance of bed
- o Water levels control (gauge to be installed)
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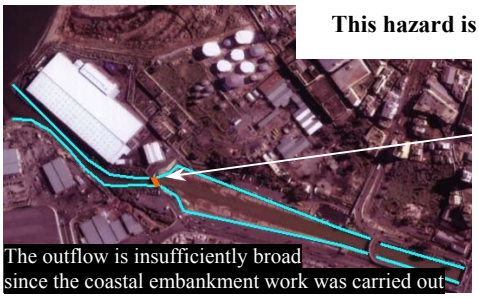
- o Recording of events (as regards basin)
- o Mapping of easily-flooded zones

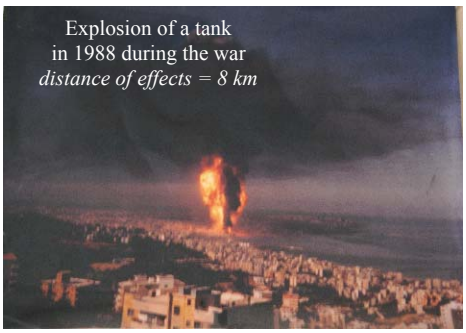
This hazard is enhanced by development errors

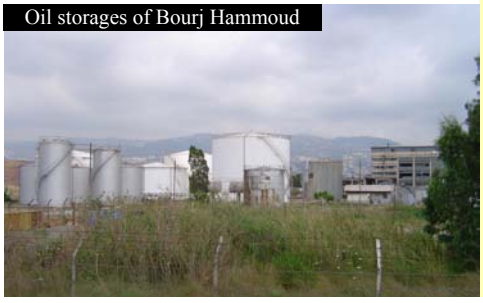

The outflow is insufficiently broad since the coastal embankment work was carried out

TECHNOLOGICAL

Context: risks encountered

- ✓ Fire or explosion in **oil storages**
- ✓ Warehouse fires
- ✓ Transport of dangerous materials


Explosion of a tank in 1988 during the war
distance of effects = 8 km


Oil storages of Bourj Hammoud

Aggravating factors

- Weakness of safety and emergency systems
- Risk of domino effect between industrial installations
- Sites vulnerability to natural risks
- Urbanisation and presence of roads near the sites at risk

Positive factor: none

RECOMMENDATIONS

Protective measures

- o Measures to prevent domino effects between dangerous sites

Mesures de prévention

- o Improved knowledge of the risks *hazard report*
- o Ensure appropriate safety levels and compliance with the regulations *inspection*
- o Control urbanisation around the sites at risk

Towards a global approach accessible for all local authorities

Municipalities are key players in the control of major risks. They have in-depth knowledge of the realities in their territories, serve as an interface with the inhabitants and play a role in development and in the regulation of activities. They are responsible for policing, and take an active part in crisis management before, during and after major events.
In an urban environment, risks are complex, and a wide range of expertise needs to be called on. Municipalities can therefore play their full roles in the management and prevention of risks only by means of a gradual **process** of which they themselves are in control. This process, which has been tested in Bourj Hammoud by CETE and presented in Amman by CERTU, is based on three initial stages which form its backbone :

1 **Risk awareness**. It takes time, not only to come to terms with the reality of the danger, but also to gain an awareness of the objective measures which can be taken to limit the effects of a major accident on the territory. The way in which this stage is approached determines the pertinence and durability of the territorial risk-management initiative.

2 **Risk Knowledge** . During this stage, the characteristics – spatial and otherwise – of those potential territorial events which are often referred to as "imponderables" are analysed. What is the frequency or probability of such-and-such an event ? What of its intensity and duration ? Can it be forecast ? Has it already happened and, if so, in what way ? Also, which people, goods and activities are exposed to the risk ? What is their degree of vulnerability to a given event – i.e. what immediate and delayed consequences would they suffer ?

3 **Risk evaluation**. This stage involves risk prioritisation, taking account of the context and the defined scenarios of event. This risk evaluation allows to develop an appropriate and beneficial programme of actions for each situation which is likely to arise.

These three stages are essential for the initiation of action and for ensuring that it can be sustained over time. They form the basis for **a decision to act**, without which the efficiency of the actions taken could not be ensured.

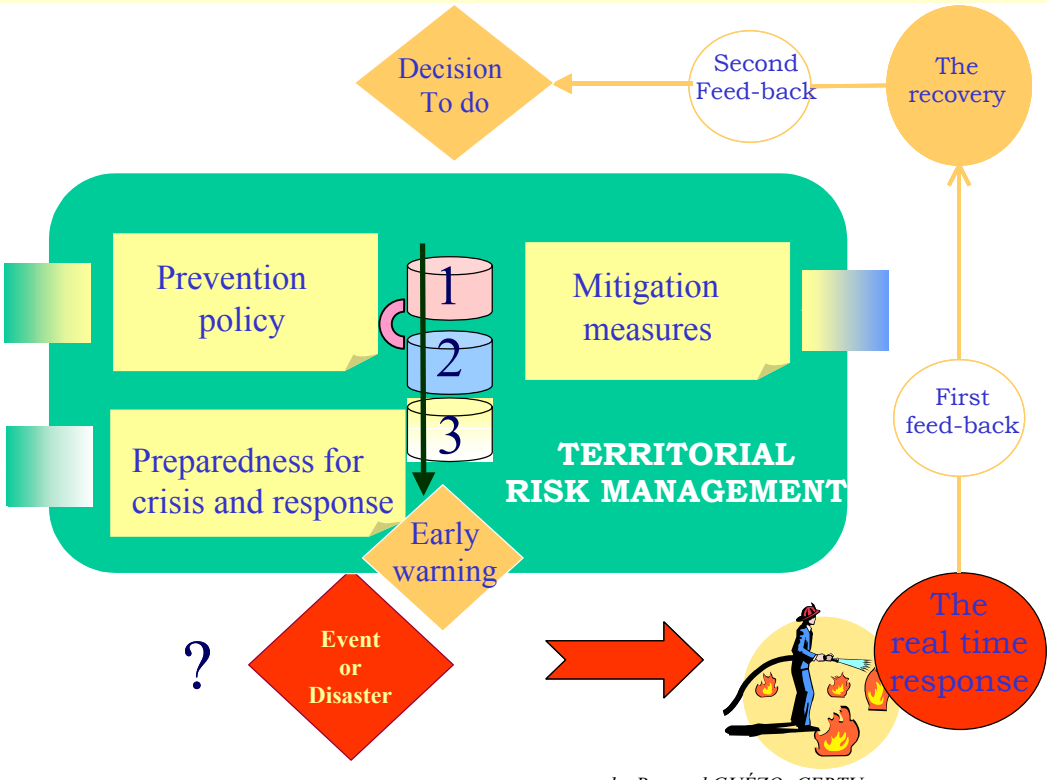
They lead to the definition of **a territorial action plan for the prevention and management of risks**, based on measures spread across the three key crisis-management components – i.e. prevention, mitigation* and preparedness.

The implementation of this action plan requires a useful **management strategy** that facilitates the involvement of municipal staff and outside partners (administrative entities, companies and citizens) while enabling a long-term approach combined with a capacity for reactivity in the event of a crisis. It requires a **monitoring and updating mechanism.**

* measures to limit vulnerability

The territorial diagnosis

The implementation of such a diagnostic is a concrete way of initiating a global process. Aware to be exposed to risks, a municipality can, by means of a territorial diagnostic, identify the nature of the relevant hazards, qualify its overall territorial vulnerability, and define action priorities.



by Bernard GUÉZO -CERTU

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