

Population and Industrial/City proximity: Ignorance or Complicity? Case of Skikda, Algeria

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Abstract

Today, several Algerian cities are confronted with the risks of industrial accidents that cause social, economic and environmental damage.

Skikda, a medium-sized coastal town housing the second largest petrochemical complex in Algeria, has been in its history the scene of many industrial accidents engendering the death of several people.

The situation is becoming more and more difficult, especially as the industrial site is currently situated in the middle of the urban area.

Indeed, the establishment of the industrial zone was done near the city, at a time when the notion of industrial risk does not exist and where urbanization took place under conditions that do not take into account the impact of the petrochemical industry on man and his environment.

Based on our case study, this article focuses on the role of the population in urbanization around the industrial site. The research has revealed that ignorance of risk, exclusion of the population and non-disclosure of information about industrial accidents are the main contributors to urban production around a dangerous industrial zone.

Keywords : City/industrial proximity, industrial area, industrial risk, inhabitants, Skikda.

INTRODUCTION

Since the mid-20th century, the number of industrial accidents worldwide has continued to increase in both developed and developing countries. These accidents demonstrate their dangerousness and severity and explain the vulnerability of societies. Patrick Lagadec invented the term major technological risk to describe risks whose consequences are very important, but whose probability of occurring is low. (Lagadec, 1981).

Other researchers use the term catastrophe to describe the extent and severity of the consequences of risks on man, property and the environment (Dubois-Maury et al, 2004), (Bailly, 2005), (Dupuy, 2002).

Several others have focused their research on the city's close relationship with the risk. Yvette Veyret explains in this respect that risks are created or aggravated by the urban systems themselves, by their organizational logics and their dynamics (Veyret et al, 2004). Claude Chaline and Jocelyne Dubois- Maury speak of a dysfunction of the city. The risk is then a social production revealing deficiencies or negligence in the organization and functioning of the city (Chaline et al, 1994).

Eric Toutain tried to make the connection between the classified installations and the law of town planning. According to him, this latter is the fundamental element allowing to regulate and prohibit the implantation of new activities or populations near a pre-existing dangerous installation (Toutain, 2000). Valerie November states that risk is a factor in accelerating urban dynamics and that it involves renewal processes (November, 2000).

Further studies have focused on the role of urbanization in increasing risks in general; the case of the work of André Dauphiné. (Dauphiné, 2005). However, Patrick Pigeon evokes the paradox of urbanization which contributed to the increase in risks, but which also allowed them to be reduced. (Pigeon, 2005).

Finally, Blesius's work through a comparative study between France and Quebec emphasizes the role of the industry in the city and the need to control the urbanization around it and propose solutions that allowed a better cohabitation between city and industry (Blesius, 2014).

In Algeria, the industrialization policy adopted just after independence was the key element of the Algerian development experiment. Its strategy, characterized by the valorization and transformation of national wealth, aims to satisfy the needs of the whole country, to bring it out of underdevelopment and to elevate it to the rank of industrialized nations.

Because of the exceptional hydrocarbon resources, the country has opted for a basic industry in which petrochemicals are the backbone. This has been materialized by the creation of industrial zones throughout the national territory.

However, this industrial policy, supposedly a factor of progress, has become responsible for a great number of environmental, ecological and sociological problems.

Indeed, the population of most cities in northern Algeria lives with the risk of an industrial incident, especially as cities have developed and their urbanized areas have joined industrial areas on their perimeters. In total, there are 4000 industrial installations located in urban areas (Mohamed et al, 2015).

Skikda, the object of our study, is the explicit case of this proximity between industry and the city. Its urban development around its industrial zone becomes an inescapable phenomenon. Skikda has experienced recurrent industrial accidents causing considerable human, material and environmental losses. Its industrial zone is classified by law as «zone of major risks». The city also has the greatest number of dwellings adjacent to an industrial area.

Skikda is primarily a town; a center for social life in which various cultural, administrative, religious and political activities take place. «The people of this city are an essential component: they should therefore not be neglected because, in some way, they will evolve the city in one direction rather than another through their choices, their actions...» (Pereira, 2012. p2). Thus, the inhabitants can be considered as specialists in their own right, so it seems that we «cannot make the city without the inhabitants» (Chalas, 2009). These latter must not be longer far from the centers of decision, because they have a detailed knowledge of the functioning of their district and more generally of the specific problems of their city. It is by associating them in all the actions that interest their city and its future, by involving them in the resolution of its problems; it will be possible to improve its management, its functioning and to improve then their living environment.

However, the urban situation in Skikda, particularly its proximity to the industrial area makes us ask: How to explain the urbanization of the surroundings of a dangerous industrial site? Is the population informed about industrial risks? Does she know the danger of such juxtaposition? What about the role of the different actors concerned? These are the main questions to be answered in this research.

Thus, the study is based on the hypothesis that stipulates that the inhabitants around the industrial zone do not know the danger they face, and they are not informed about the problems affecting their health and living environment because of their installation around the industrial zone.

METHOD AND INVESTIGATION TOOLS

The working approach is mostly empirical. The Skikda site was accessible, open for investigations, audit visits and data collection. Data and statistics were selected and collected from a range of agencies and administrations including: prefecture environmental services of Skikda, land agency, domain service, statistics of the wilaya of Skikda, the cadaster, the planning and spatial planning directorate, the town planning research center and the department of town planning, construction and housing.

As well, a questionnaire was conducted among residents. It was administered directly to 150 people interviewed in our investigation area and concerned the population of the three zones: Skikda East, Larbi Ben M'Hidi and Hamadi Krouma. The basic criterion retained is the proximity to the place of residence/industrial zone.

This questionnaire is based on the quota method. The selected sample represents a reduced model of the total population of each of the three areas. To respect the principle of representativeness, the gender and age characteristics of the total population were replicated in the sample.

To delimit the specific quotas for these characteristics, we referred to data from Skikda's monograph. In each of the three survey locations, the surveyed population was consisted of 50 people divided equally according to the criterion of gender and age in accordance with the table below (Tab. 1):

Table 1. Constitution of the studied population.

Age groups	Man	Woman
Under 18	5	5
Between 18 and 29 years old	7	7
Between 30 and 59 years old	10	10
60 and over	3	3
Total	50	

Source: Authors.

A total of 24 questions were examined: knowledge of risks, management resources, safety instructions, dissemination of information and education about industrial risks are the main themes of this questionnaire.

Lastly, mapping and photography have also been used because they are very important tools in consolidating our investigations and observations.

CASE STUDY PRESENTATION

Skikda is located on the eastern Algerian coast. (Fig.1).It borders with the wilaya of Annaba, Guelma, Constantine and Jijel.It has a population of 898,680 inhabitants and covers an area of 413768 km², with 130 kilometers of coastline. The chief town of the wilaya of Skikda is located 510km east of the capital Algiers. The Skikda region and its surroundings are an historic area dating back to the time: Numidian, Roman and Muslim.

During the colonial period, Skikda was considered a natural outlet for Constantine and it was a great pole of storage and transit of oil to France through its port. After independence, it became an important industrial city. Skikda, which forms the industrial triangle of the East with Constantine and Annaba, has a large industrial area specializing in the processing of hydrocarbons (Fig.2).

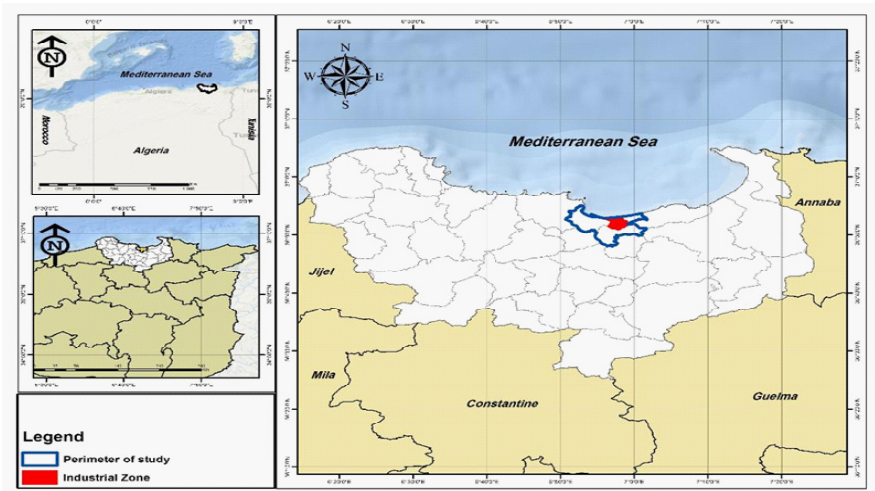


Figure 1. Skikda geographical location. Source: Authors.

The choice of Skikda for the establishment of the industrial zone corresponds to the Algerian spatial model of growth poles, which aims to:

- Achieve regional balance (Arzew and Mostaganem in the West, Algiers and Bejaia in the center, Skikda and Annaba in the East).
- Be a maritime front facilitating export.
- Solve the employment problem.
- Strengthen medium-sized cities like Skikda, and minimize the attraction of Constantine, and Annaba.

The choice of Skikda was concretized by ordinance n° 70-13 of January 22, 1970. Located in the eastern part of the city, with a large surface of more than 1200 ha, the industrial zone includes 11 industrial establishments divided into two main categories (Fig.3):

- Chemical industries: such as ENIP, CP1K, and POLYMED.
- Petroleum or petrochemical industries: such as RA1 / K, GL1 / K.



Figure 2 . View on the industrial area. Source: Authors.

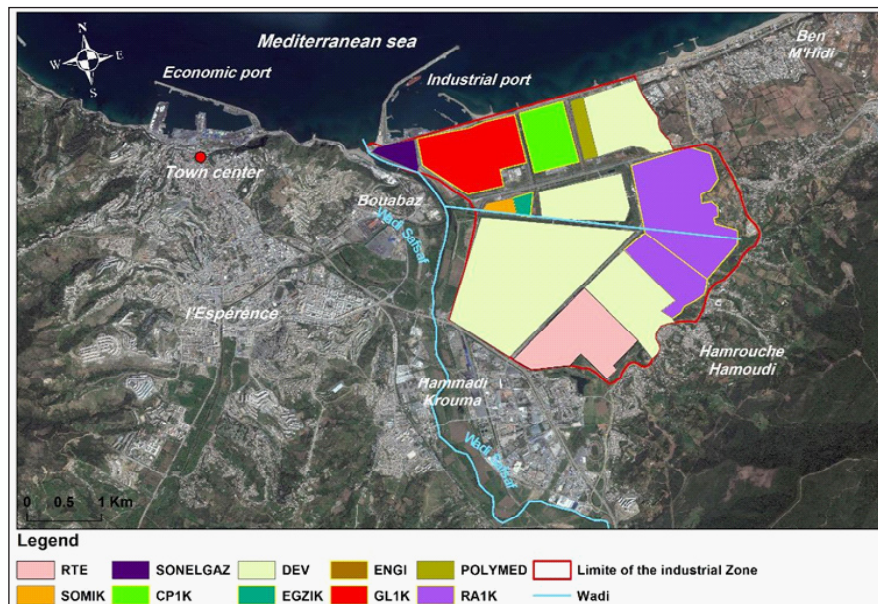


Figure 3. Industrial area and its different unites. Source: Google Earth, Authors.

This zone covers a wide range of activities relating to:

- Transport of liquid and gaseous hydrocarbons.
- Liquefaction and treatment of gases.
- Transformation of hydrocarbons.
- Refining of crude oil.
- Distribution of the petroleum product.
- Export of hydrocarbons.
- Industrial maintenance: human resource training and development. (Boulkaibat, 2004).

RESULTS AND DISCUSSIONS

A Dangerous Industrial Area with Permanent Accidents

Skikda remains one of the most cities exposed to various risks. According to official declarations, 12 of the 20 major national hazards are present in Skikda. Its industrial zone is declared a major danger area by law. Its dangerous installations combined with a lack of prudence and precaution have led to many incidents in the city since the 1970s. The first major incident in the industrial zone dates back to the early 1980s, when massive leaks of chlorine gas from the CP1K petrochemical complex suffocated thousands of people. The Skikda refinery was also the scene of a major xylene spill in 1996 that had caused a major ecological catastrophe (Hadeff, 2008). The explosion of the N106 storage tank on October 4, 2005, with a storage capacity of 51,200 m³, containing 35,000 m³ of crude oil, caused two deaths and five injuries. The deflagration that spread released smoke more than 200 m in height, the great heat was felt more than 500 meters from the site. The cooling of the remaining tanks was the first priority in order to avoid any possibility of chaining, the consequences of which would be catastrophic.

On January 5, 2016, a strong explosion occurred in a GN1LK gas line, followed by a fire. As a result, 20 people suffered burns and property damage.

The complex also experienced a number of more or less severe accidents in November 2021, August and September 2022. However, the most catastrophic remains, without a doubt, that of January 19, 2004. On the night of January 19 to 20, 2004, a gas leak from a GNL1/K liquefaction train resulted in an explosion that destroyed three out of six liquefaction trains. These infrastructures, realized by the British company Pritchard, date from 1978 and were put into production in 1981.

The Skikda GNL1/K explosion could have been more lethal if it had occurred during the daytime.

It is estimated that if all the trains had been affected, the explosion would have destroyed everything in a radius of 45 km, that is to say the whole city of Skikda and its inhabitants.

Fortunately, the fire was controlled, thus avoiding a real Chernobyl at Skikda. The accident caused 27 deaths, 74 injuries and significant damage. The destruction of the three units is estimated to cost 500 million dollars (for renovation), 300 to 400 million dollars in deficits in the complex's total revenue, and 200 vehicles damaged. For the thermal power plant, the damage is estimated at 4 million dollars.

Concerning the houses destruction, it is difficult to make an assessment, but according to the testimonies, the devastations are recorded within a 4 kilometers radius.

An Anarchical Urbanization Around the Industrial Zone

Since independence, Skikda has been undergoing significant demographic change and rapid and very unfavorable urban expansion. Unfortunately, the urban space is now bordering an industrial zone with major risk endangering a large number of people.

The creation of the new industrial activity, coupled with strong population growth, contributed significantly to the urban growth of the city. Skikda has become a much more attractive urban environment because of the favorable hospitality facilities: employment, housing, and services.

The rural exodus to the city was the main factor in its population growth. The need for infrastructure, equipment and housing increased considerably. The response to the deficit was perceived through key habitat programs, especially following the establishment of the land reserve policy in 1974 and the programs of the New Urban Housing Zones. The sites chosen were largely peripheral and agricultural, which gave the anarchical and disorderly appearance to the expansion of the city.

From the 1980s, several projects were launched with the objective of creating a new city center corresponding to the old one, due to the saturation of the latter. However, the problem of the housing and equipment shortage was strong. The result was an unrestrained urbanization characterized by the consumption of agricultural land in the South (Mer djEddib, Saker brothers), the proliferation of slums in districts such as; Salah Boulkeroua, Briqueterie, and the occupation of neighboring lands of the industrial zone.

The 1990s were significant for the city and its development. Among the new elements that will allow the urban space to undergo important and profound changes, we retain the implementation of the new land policy, the major elements of which are the law on land orientation (Law n° 90-25) and the law related to country and town planning (Law n° 90-29). Unfortunately, this arsenal of urban planning did not lead to the expected role. The territory of the city continued its rapid growth in the same disordered and anarchic way.

Skikda's urban area has quadrupled in 23 years, from 162 hectares in 1962 to 688 hectares in 1985. According to the most recent research, Skikda requires 30 hectares per year for its expansion. The latter is to the detriment of agricultural lands and towards the industrial area (Fig.4).

The urban planning instruments, derived from the planning and town planning law (Law n° 90-29), which were supposed to control the situation, were themselves incapable of managing the excessive extensions of the city.

Thus, they have accompanied the urban expansion movement rather than controlling it. Designed as a tool for land regulation and rational use, the Master Plan for Development and Urbanism and the Land Use Plan are often transformed into tools to waste land and transform landscapes.

The main difficulty in applying them is the gap between the time required to prepare and approve these instruments.



Figure 4. Skikda urban extension around the industrial zone. Source: Google Earth, Authors.

Today, the industrial zone is located in the heart of a growing urban area, 2 km from the center of Skikda, separated by Mount Mouader, but only a few dozen meters from the inhabitants of Hammedi Krouma, Hamrouche Hamoudi, Barrot, El Guelta, Msouna and other localities on the way to Larbi Ben M'hidi.

The urban anarchy in the city, the ambiguous spatial configuration and the excessive consumption of the urban land are proof of the failure of this policy, which finally produced a sterile and monotonous environment. (Hadeff, 2013).

In that regard, the Skikda Master Plan for Development and Planning revised in 2011, following the tragic accident of 2004, through its orientations and proposals of extension scenarios, further reinforces the urbanization around the source of the danger. The notion of risk appears nowhere in its futuristic vision of urban extension. The seven zones identified for future urbanization (short term and medium term) are close to the industrial zone: the lack of urban land is the only reason to legalize this dangerous urbanization form (Fig.5).



Figure 5. Houses adjacent to the industrial zone. Source: Authors.

The analysis of the hazard study carried out in 2005 by the French consulting firm “VERITAS”, based on a maximum situation of effects, indicates that the urban area alongside the industrial zone is exposed to 16 envelopes (Thermal, toxic and overpressure), corresponding to 9 dreaded accident scenarios spread over four industrial sites considered as the most dangerous on the site: ENIP, GNL1/K, RA1 / K and ENGI.

The analysis of the different potential consequences of a possible accident indicates that at least one third of the areas bordering industrial installations are exposed to a major risk, with very high population density and very high vulnerability (Chaguetmi, 2011). The estimates made by environmental experts predict destruction within a radius of 80 kilometers in the event of an oil tanker explosion.

Moreover, the delimitation of risk-prone areas, as defined by law, does not take into account the nature and intensity of the risk incurred. In the case of Skikda, the security perimeter is 60 m, although studies show that a potential accident can attenuate a radius exceeding 10 km.

Thus, the two most exposed areas: the county town of Skikda and Hamadi Krouma have densities of about 3287 inhabitants / km² and 841 inhabitants / km², respectively, which are the highest relative to regional densities.

An Ignorance, an Exclusion of the Population and a Non-Dissemination of Information

In terms of participation, the law (04-20) relative to major risk prevention in Algeria considers participation as its fifth founding principle. It explains that: « The principle of participation under which each citizen must have access to the knowledge of the hazards that he / she incurs, information related vulnerability factors, as well as the overall scheme for the prevention of these major risks and disaster management ». This section and others were verified with the population by means of a questionnaire survey, which highlighted the following facts:

First, it appears that all respondents have been living in individual dwellings. Their proximity of the industrial zone is undesirable but it is necessary. It actually results from an inability to be anywhere else, proximity to the workplace (31%), family inheritance (28%), private property (19%) and moderate rent relative to other places (22%).

Industrial risk is misperceived by the population surveyed. The inhabitants mix nuisances with risks. For (67%) of respondents, pollution is perceived more as a nuisance than as a form of risk. Thus, (48%) of respondents are unaware of the existence of an isolation distance, (52%) on the contrary confirm their knowledge.

About the instructions to adopt in the event of an industrial accident, (86%) of the surveyed population had no idea. In addition, (92%) of those interviewed confirm the lack of information, awareness and communication by local authorities and the media on industrial risks.

Finally, the interpretation of the survey results confirms that the population around the industrial zone is ill informed on the question of risk. This explains in large part its responsibility in urban production around a major risk area.

As for possible solutions, the majority of the population surveyed insists on its urgent displacement to safer and healthier sites.

CONCLUSION

From the above, it appears that the population around the industrial area are not aware of the danger they face on a daily. Moreover, the study showed that the population is largely responsible for the urbanization around the industrial site, but there are others, particularly local managers and industrial site managers, who do not play their role in informing and educating about industrial risks.

The issue of industrial risk is a shared responsibility. If deficiencies and malfunctions exist in each sector, the various actors have important competences, but they are not coordinated. Policies and administrations do not play the roles assigned to them, especially when the problem must be taken as a whole; sectoral management has shown its limits. The phenomena associated with urbanization and industrial risks are systemic and ignore the administrative specialization.

The adoption of a participative and coordinated management policy, assuming a close collaboration between the different actors, is essential to control urban development around industrial sites.

Thus, the citizens participation and involvement in matters affecting their living environment must therefore take priority, because «whether it's the planner, the politician, the research scientist, it is valuable to know how the inhabitants of a city, of a neighborhood, of a building, appreciate the environment where they live, what they reproach him for or what satisfies them, what are the errors to avoid, the shortcomings to correct, the arguments to use, the results to improve». (Beaujeu-Garnier, 1997 . p 224).

Citizen participation and education require information about risks. People must be informed of the risks to which they are confronted, of the alert procedures and of the behaviour to be adopted through the means information and communication; local radio, study days and open houses on risks, posters, leaflets, creation of local industrial risk information committees and by organizing public awareness meetings.

Finally, the politics of participation, consultation and exchange of ideas is a real school for the acquisition of the best attitudes and the strengthening of collective life, because no project can be conceived without the citizen's approach and the active participation of the population.

REFERENCES

1. Bailly, A. (2005). La géographie des risques in les concepts de la géographie humaine. Paris, Armand Colin.
2. Beaujeu- Garnier, J. (1997), Géographie urbaine, Paris, Armand Colin/Masson.
3. Blesius, J-C. (2014). Vivre avec les industries ? De la maîtrise de l'urbanisation à l'éducation aux risques ; cas de Vitry-sur- Seine (France) et de Montréal -Est (Québec). Doctorate thesis, University of Paris-East.
4. Boulkaibat, A. (2004). La question du risque industriel en Algérie, cas de la ville de Skikda et sa zone pétrochimique. Thesis of DEA, University of Caen.
5. Chaguetmi, F. (2011). Urbanisation autour des sites industriels à haut risque, cas de Skikda. Thesis of magister, University of Constantine.
6. Chalas, Y. (2009). L'urbanisme participatif, Conférence présentée au Forum Démocratie participative de Saint-Jean Charmillles. Online: http://www.forum1203.ch/IMG/doc/Urbanisme_participatif.doc.
7. Chaline, C, et al. (1994). La ville et ses dangers. Paris, Masson.
8. Dauphiné, A. (2005). Risques et catastrophes. Observer, spatialiser, comprendre, gérer. Paris, Armand Colin.
9. Dubois-Maury, J, et al. (2004). Les risques urbains. Paris, Armand Colin.
10. Dupuy, J-P. (2002). Pour un catastrophisme éclairé. Quand l'impossible est certain. Paris, Seuil.
11. Hadeif, H. (2013). Ville et développement durable : Territoires périurbains et consommation des terres agricoles en Algérie. Cas de Skikda. Doctorate thesis, University of Constantine.
12. Hadeif, R. (2008). Quel projet urbain pour un retour de la ville à la mer, cas de Skikda. Thesis of magister, University of Constantine.

13. Lagadec, P. (1981). *La civilisation du risque : catastrophes technologiques et responsabilité sociale*. Paris, Seuil.
14. Mohammed, F-Z, et al. (2015). Cartographie des risques industriels du dépôt pétrolier à Hussein Dey, Alger, Algérie. *Review of five continents; Romanian journal of geography*, volume 5, issue 12.
15. November, V. (2000). *Les territoires du risque : le risque comme objet de réflexion géographique*. Berne, Peter Lang.
16. Pereira, P. La participation de la population dans les projets urbains. Les cas de VIANA DO CASTELO et CHAVES. On line : http://www.apgeo.pt/files/docs/CD_V_Congresso.../D1_14Out_Paolo%20Pereira.pdf
17. Pigeon, P. (2005). *Géographie critique des risques*. Paris, Economica.
18. Toutain, E. (2000). *Installations classées et préventions des risques technologiques majeurs*. Thesis of DEA environmental law, University of Paris I, Paris II.
19. Veyret, Y, et al. (2004). *Les risques*. Rome, Bréal.

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