



*Research article*

## FLOOD POLICY IN ALGERIA

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**Abstract:** Through this research, we try to identify the policy of prevention and management of disasters related to the risk of flooding in Algeria, especially by knowing the degree of integration and interest of the State in this risk, and by examining the completeness of legislation and regulation, their complementarity or not, their realistic effects, and the extent of effective control over the phenomenon, and from there, the research focused on various legislation related to land use, insurance, institutional organization, legislation on water evacuation, dam safety, construction techniques for protection, infrastructure, public hygiene, environmental protection, organization of emergency response, first aid, warning systems, information methods, control and maintenance, attempts to raise awareness and rehabilitation. And the construction laws and the knowledge of their real weight. The research has shown late interest in this aspect, as it has clarified some of the problems that prevent finding practical ways to protect cities, such as the lack of plans indicating areas at risk of flooding, the lack of real programming of these plans, the lack of control of irregular urban expansion, the lack of separation and detail in the general guidelines for cities and rural areas in the field, and the lack of control of the tasks assigned to the Local authorities in this aspect in the legal texts, especially with regard to the municipality, the absence of private institutions for insurance for this type of risk and the absence of specialized teams for disaster relief. The research also indicates some means that allow better protection of the risk, such as the possibility of relying on historical plans as a temporary and conditional measure for areas that have been exposed to floods in order to pass the prevention policy on the ground and try to exploit remote sensing techniques and develop modelling methods to achieve real predictions and simulations of areas at risk.

**Keywords:** Flood Risk, disaster Management, legislation, prevention, regulation, Algeria

## 1. Introduction

Many countries in the world are affected by disasters resulting from natural hazards (Miceli et al., 2008), of which floods are one of the most important and frequent (Perrone et al., 2020). Many countries have tried to develop different policies and procedures to deal with the hazard, including structural measures related to the protection of facilities such as the construction of dams and water drainage systems, and non-structural measures such as early warning (Yang & Liu, 2020) and the dissemination of awareness. The risk of flooding can greatly affect the course of development and may cause results that cannot be easily recovered. In terms of large cities with demographic weight and economic importance, Algeria is considered one of the countries frequently exposed to the risk of flooding (Bourenane et al., 2019). Like other countries, it has sought ways to adapt and cope with this danger. It is trying to master laws and regulations to better control this danger and manage the disasters that may result from it.

Most of the opinion is that Algeria has discussed the issue of floods only after the disasters that Algerian cities have witnessed at the beginning of the new millennium, such as the floods of Bab El Oued, and according to this, the assumption that many cities that have experienced housing growth, especially after independence, are threatened by this danger is acceptable, and this even after the publication of texts that attempt to organize the reconstruction process that have not addressed the actual means of prevention and management of disasters and have not clearly detailed the methods of prevention and management.

This poses a major problem related to the enactment of planning and reconstruction laws without really caring about this danger. In an attempt to remedy the situation, the legislator enacted the law on prevention and management of disasters and amended the law on planning and reconstruction, which came after the earthquake of Boumerdes in 2003 (Harkat, 2021). After nearly 4 decades of independence, a period in which residential growth increased and a significant increase in the proportion of urbanization and irregular housing which was associated with safety problems during this period, and from then on, the presence of many buildings in risky areas is very likely due to the direct relationship between the lack of control of urban growth and the increase of flood disasters (Olcina & Sauri, 2016).

## 2. Methodology

Based on the research of legislative and regulatory texts related to flood risk and related to prevention, which can be considered synonymous with protection (Liao et al., 2019) and texts related to disaster management and the texts that are derived from them, as well as the search for relevant texts issued by foreign countries, as well as on the basis of previous research in this area and the subject which is generally related to the management of risks and natural disasters, we try to highlight the strengths and weaknesses of the national strategy followed in this area, and answer some of the questions related to the reason for the recurrence of the phenomenon and the extent of the real willingness shown by stakeholders to take charge of this danger, led by local authorities. and from this, the pivotal attention is to understand why despite the interest of Algeria in the aspects that interfere with the management of risk in general, at the regional and local level, decades ago, it comes back to the fact that the current situation of dealing with natural hazards, especially in terms of preventing the risk of flooding, can not be described at the level required or necessary, because the repeated incidents of floods do not even exclude the new cities, which is supposed to be based on the concept of resilience in its two components related to prevention or post-disaster management, and

does not even exclude the cities that are located in areas that do not experience significant values of precipitation, not even rural areas in different regions. Discovering the real reasons behind this will require research on many topics, but through this research, we will try to understand the state policy towards the subject, and from there the research will try to read and evaluate the texts especially related to land use planning, insurance, institutional organization, legislation on water drainage, dam safety, construction techniques for protection, infrastructure, environmental protection, hygiene, monitoring and maintenance, organization of emergency response and relief, warning systems and information methods, attempts to raise awareness, rehabilitation, building codes, examining whether they are adequate or not, and verifying the assumption that the legislative and regulatory framework is integrated and that it is only a question of activation and implementation.

### **3. Results and Discussions**

#### **Legislation and regulation related to spatial planning:**

The basic law that defines the tools of local planning, which is Law 90-29 related to planning and reconstruction, did not address the side of natural hazards with regard to preparing the master plan for development and urbanization or the land occupation plan, and the amendment that includes that did not come until fourteen years later within Law 04-05 which includes the amendment to the previous law and despite the issuance of this amendment, until today, the concern of the local planning tools PDAU and POS does not concern the danger in the required manner; because The easements that are set for the valleys are still subject to the discretion of the directorates and general engineering offices, which are not actually empowered to rule on this issue(Harkat, 2021).

The regulations also stipulated, according to Executive Decree 15-19, which includes the procedures for preparing and handing over construction contracts, which cancels the provisions of Executive Decree 176-91, that the building certificate explains the building rights and the agreements made regarding plots of land, including natural hazards that may affect the site Concerned and plots of land at risk of flooding.

Likewise, the prevention of major risks and the protection of the population has been taken care of by Law 06-06, which includes the directive law for the city, which is among its objectives.

The legislator has also stipulated that the plan of new cities must include measures to prevent major hazards. This is indicated by Executive Decree No. 11-76, which defines the conditions and procedures for the development, preparation and approval of the plan for new cities

And with regard to regional planning, it was stated within Law 02-10, which includes the approval of the national plan for planning the Territory, that within the strategy set in order to prevent major risks, risks must be identified and foreseen, and technical capabilities for control and anticipation must be developed, as well as ensuring information and sensitization and providing training to mobilize competencies And the actors in the policy of prevention and management, but this law concerned the various dangers in general and focused more clearly on seismic risks, and the risk of floods has not been taken care of as much, and the law related to the state 12-07 also did not clarify the responsibilities of the state in this context Rather, he only indicated that within the powers of the State People's Assembly in the framework of agriculture and irrigation, it must initiate work to prevent flood risks and other natural disasters. Likewise, Municipal Law 10-11 did not refer to the role of the municipality in the work of protecting cities or rural areas.

Despite the interest of previous laws for the prevention of flood risk, it can be said that the real concern for flood risk was contained in laws 04-20, the law 05-12 and executive decree 09-399. as the Provisions for flood prevention in law 04-20 on prevention One of the major hazards and disaster management in the context of sustainable development is that the general plan that defines the provisions to reduce susceptibility to injury and prevent its consequences must include a national map of sensitivity to floods that defines the areas likely to be exposed to floods and what can be blamed for this law is that it has not indicated the period of updating the prevention plans and the possibility of revision or not.

And among the objectives of Law 12-05 was to control floods by controlling the course of surface waters in order to protect property and people in urban areas or other areas exposed to floods, and it indicated the possibility of developing mechanisms to anticipate floods and measures for warning and intervention in relation to the areas located Below the water barriers and adjacent to the valleys, which is what came within Executive Decree 09-399, which is considered an implementation of what was stated in Article 53 of Law 05-12, as it was concerned with the mechanisms of anticipating floods, specifically to protect the sites below the water barriers and dams and the areas adjacent to the valleys, and perhaps This special interest is due to the ability and possibility of accurate identification of the areas at risk, since the studies related to this type of flood are based on realistic or estimated values with a small percentage of error for the volumes of water within the water barrier under study, and from that, identifying the areas located in the danger area, which can be Affected by the flood wave as a result of the scenario of cracking the water barrier, its results will be practical, realistic and acceptable even to the public.

#### **Development of prevention techniques:**

This is what came within the principles and rules for the prevention and management of major dangers, which were included in Law 20-04, where it was stressed the need to follow up on technical developments for the prevention of major dangers and the development of forecasting and weather forecasting systems and technical monitoring of protection facilities in anticipation of any deterioration in their condition which may constitute Danger, and the executive texts contained in Decree 17-333, which defines the rules for the exploitation and maintenance of surface water barriers, indicated the need to take into account some technical operations that aim to ensure a safe condition for the dam, as well as the possibility of its cracking, deterioration, or the possibility of it producing floods as a result of being affected by seismic activity. Or flooding it with water as a result of rockslides or soil erosion, in addition to what was determined by Decree 09-399, which specifies the mechanisms for anticipating floods in relation to this framework, and in general, these rules and measures call for the protection and the prevention of property, people and environment whenever the need arises. And the use of the best techniques in terms of preventive work.

#### **Effective institutions in the prevention and management of flood risks:**

Accurate assessment of a risk of this kind and complexity requires data related to prevention and the formation of data banks, which have been assigned to the National Delegate for Major Risks, it represents one of the pillars of the prevention policy, and In this context, it is also entrusted with promoting the media to protect those involved and the population. It also contributes to the development of knowledge and techniques in this field. From this, it is an important support for controlling this danger. Its president is also tasked with preparing an annual report that includes an evaluation of the knowledge and preventive measures embodied and various suggestions that aim to reduce risks.

The National Agency for Water Resources whose legal nature has been transformed to become industrial and commercial in accordance with Executive Decree 148-19, was previously called the National Institute of Water Resources. It is mandated within the framework of the state's development policy to carry out hydrological and hydrogeological studies, explorations and analyses related to water harvesting studies, soil studies and data collection related to water resources.

The National Bureau of Meteorology is also a public institution of an industrial and commercial nature, as stated in Executive Decree No. 98-258, which, in addition to being tasked with acquiring meteorological data and preserving and exploiting the archive of data related to that, is also tasked with monitoring climate changes, monitoring weather developments, broadcasting warnings to the public and Exploited.

The Fund for Natural Disasters and Major Technological Risks established by Decree 90-402 is one of the means that has been established in order to support reconstruction and recovery after trauma. Some of its expenses are represented in compensating disaster victims, financing prevention studies and rescue expenses.

### **Hygiene:**

One of the most important areas related to the management of the risk of floods, especially in urban areas, is the field of waste management, as preserving waterways and drainage channels in an unpolluted condition and allowing the smooth flow of water is important to preserve natural environments and to prevent valleys from deviating from their paths and clogging channels and Flooding the adjacent areas, and this is more related to mud, dead waste, building materials, and waste resulting from demolition and construction works, although the law made it clear that the municipality is the one who takes care of everything related to household waste starting from its collection, and this was included in Law 90-08 and Law 11- 10 He also clarified that the waste resulting from construction and demolition works is the responsibility of its producers, which is what was included in Law 19-01 and the prohibition of placing building materials on the roads according to Law 15-08 that relates to the leveling of buildings, but what is not yet clear is the responsibility for purifying the valleys and Watercourses and protection facilities such as small dams and basins collecting and dividing water, which regulate the process of rainwater drainage, and which currently can be said that the process of cleaning it is subject to political volunteering and the few initiatives of civil societies.

### **Sewage:**

In the interest of the state on the quality of the water that is thrown into the natural spaces, and because many cities adopt a joint drainage system for rainwater and sewage water, it required individuals and industrial establishments to take various measures that allow reducing pollutants to the lowest level, and water filtration plants were adopted in accordance with Reducing the effects of human activity in a way that does not affect the biological diversity of the discharge environment and the protection of groundwater and natural landscapes, and it is one of the controls that have been approved on the connection to public networks for wastewater discharge, and in this aspect, one of the factors that prevent this is the absence of actual control, so currently it is not Contribute as necessary to prevent connection to public networks, which is a phenomenon that spreads widely in chaotic neighborhoods where the lowest standards of connection are not adopted, such as ensuring the appropriate slope for water drainage, and this may constitute a great danger to public health in the event of flooding. Appropriate flow values are still absent in many cities, as the phenomena of blockage due to waste and dust are frequent phenomena.



### **Information, early warning and communication:**

Among the rights that individuals have is the right to be acquainted with the state of the environment and the measures directed to protect it, which is stated in Law 03-10 as a right to environmental information. The individual also has the right to know the danger that threatens him and his property and the means of prevention. As well as preventive information, and the principle of participation within Law 20-04 included this right and includes the right to be informed of the expected risks, ways of prevention, and arrangements related to taking care of the effects of disasters. What can be referred to in this regard is the problem of preparing and distributing this information, despite its importance in minimizing losses. (Shih et al., 2019) especially with regard to local warnings for isolated areas, as these areas do not have an actual technical support that allows for the wide spread of information and to receive sufficient attention, and the absence of media and warnings may contribute to the spread of misinformation and Spreading fear and panic, which could contribute to the aggravation of the situation (Torpan et al., 2021), and all actors are invited to invest in this aspect in a way that allows the public and the private and guarantees sufficient time to make decisions related to personal protection for lives and properties.

The legislator was also interested in coordinating communication and consultation between the various sectors and actors, and although this is necessary in preparing prevention plans, it becomes more important when it comes to managing disasters and crises, especially organizing field interventions. And in order to ensure a national strategy for communication related to managing natural and technological hazards, a national strategy was established. A committee, according to Executive Decree No. 04-181, is called the Liaison Committee and is tasked with controlling media material related to prevention and management related to dangers, as well as ensuring responsible delivery of information and raising awareness, etc., which ensures the practical and safe employment of the media in the management of dangers and disasters.

### **Organizing emergency interventions and first aid:**

It came in Executive Decree No. 59 -19, which determines the modalities for preparing and managing rescue plans, which cancels the provisions of Decree 231-85, which defines the conditions for organizing interventions and first aid and their implementation when disasters occur, as well as the modalities for that. that Rescue organization schemes are prepared based on knowledge of the history of risks and their maps, as well as based on an analytical summary of risks. These foundations remove one of the obstacles facing the efforts to protect cities, as this decree gives historical maps their value and opens the door for them to be valued, and perhaps they can be considered an ideal means of compensation for maps Resulting from modelling processes and especially related to torrents resulting from exceptional rains that result in direct floods because the actual problem and complexity related to determining the extent of the areas at risk based on the probability values of expected rain raise doubts about the realism of the studies, which may lead in the end to the lack of serious consideration of the studies. However, the adoption of historical maps that reflect the areas flooded as a result of floods is in itself a challenge. This is not related to updating these maps and preparing them for employment based on geographical reference. Rather, the problem is related to access to them, which is something that all ancient colonies may share. In which the colonizer takes possession of all property and seizes it, even documents and maps related to the floods.

And for Algerian cities, the flood maps starting from the sixties may be eligible for approval for the establishment of protection projects or the approval of relief and aid measures, provided that it takes into consideration the various interventions that occurred in the field, especially those that include the construction of dams or the diversion of valleys or Exploit-

ing it or making modifications to it, and this should not be related to major projects that are made for long periods, as they require taking into account many other factors, such as climate change, the impact of vegetation cover, and the change of soil properties, especially about permeability.

**Insurance and rehabilitation:**

Insurance plays an important role in mitigating the effects of disasters and recovering from them (Koks et al., 2015). Ordinance 95-07 related to insurance included the possibility of insuring against the risks of hail, storm, ice and floods according to the conditions stipulated in the insurance contract, and it was not mandatory Natural disaster insurance until the issuance of Ordinance 03-12 related to compulsory insurance for natural disasters and compensation for victims, and it was approved by Law 03-16. The order also indicated that determining the prices applied to take care of the effects of natural disasters, guarantee limits and exemptions are related to With the development of the level of risk, which is also linked to the area of exposure and the vulnerability of the building, but on the other hand, the technical difficulties facing the process of identifying these two others could constitute an obstacle for insurance companies in controlling premiums or contributions, and imposing unified premiums on large areas would not be acceptable from In general (Koks et al., 2015), which may reflect negatively on attempts to direct individuals towards this type of insurance and accept these financial burdens.

**Building awareness:**

Without a doubt, building preventive awareness involves many factors (Raikes et al., 2019), especially awareness of natural hazards, as they represent unexpected dangers. Hence, the first stage in mobilizing efforts to support prevention is to build awareness, and the media can be used more effectively. And it can have a pivotal role in that after that one of the proposals that encourage society to invest in protecting themselves can be applied, and this is accompanied by a broader scope for accepting their views (Smith et al., 2016) Also, resorting to the application of the deterrent texts contained in the various laws that are related may affect positively the policy of protecting the city from these dangers will have a significant impact in managing these risks.

## 4. Recommendations

The basis for passing the national policy to take care of the risk of flooding from papers to the field is to develop flood plans that will contribute to reducing losses (Khalaj et al., 2021) and based on which construction can be prevented in areas exposed to a high level of danger (Erdlenbruch et al., 2009). Despite the difficulty of defining the areas exposed to flooding accurately, relying on geographic information systems may acceptably allow this. The development of these maps is a very important element of prevention, as it constitutes the cornerstone for other procedures related to managing the risk. Care must also be given to prevention in the first place, since the burdens that It will be borne by the public and private sectors in the event of disasters, and will exceed many times the costs of prevention. It would have been more appropriate for the authorities to draw up maps of the areas that were previously affected, acquire them, and use them to prevent construction accordingly, which did not happen. It is also possible to develop a digital platform to be updated that identifies the areas at risk of flooding. Depending on the amount of rain recorded or expected, and it can attach with a warning system.

Even with these legislations, there is a gap between the legislation and the actual possibility of the application first as a result of the current knowledge in the field of prevention from the risk of floods and torrential rains and the various problems facing the preparation of prevention schemes. Also, the current laws do not control the required form in all stages of management and do not address other types of floods. From this, the application of new and effective flood risk management standards will require a response from the legislation and may call for changes to the current legislation and regulation (Nikolić Popadić, 2021).

The laws of local authorities must specify their responsibility and increase their powers in preventing major dangers before referring to their role in managing disasters. The sector of managing natural hazards in the urban centre is among the sectors that do not receive sufficient attention in the state and municipality and the interest of local officials who are supposed to have a greater awareness of the local situation and relevant experience (Becker et al., 2014) where generally comes as a secondary interest and The practical side of it is usually absent within the work plans, and the controls for cleaning waterways, waste, mud, and trees must be clear within the waste management law. Prevention, protection, and management measures must also be defined for rural areas, and better control of agricultural activity because of its impact on increasing the risks associated with floods. Even in the neighbouring urban areas (Howe & White, 2010) and the need to include environmental protection within the various prevention schemes and the protection of floodplains because of their value in supporting biodiversity from the risk of floods by studying the quality of water that is thrown into natural estuaries and the controls of surface water infiltration into Groundwater, Laws related to agriculture should also clarify the ways to protect agricultural areas.

The national network of monitoring devices affiliated with both the National Agency for Water Resources and the National Bureau of Meteorology needs to be renewed and the traditional ones should be replaced with automatic ones, to avoid technical errors related to obtaining data or errors related to saving data values, and they also need to be strengthened and intensified in particular. In areas that express different natural characteristics, especially about topographical basins with a wide area, large urban mass, high population density, economic value, and complex topography, and give access to climatic data, especially those related to the maximum daily rainfall, should be allowed, even if limited or monitored and also give access to the various historical documents and plans in scientific research, as those data are being the basis for building any study related to floods.

It is also necessary to involve citizens at various levels, starting from planning to supporting implementation, monitoring and maintenance, and this will not be done except by clarifying the level of danger, as the lack of vision that embodies the danger makes the initiative that is concerned with risk prevention weak and does not receive listening ears. It is also supposed to encourage interest in water economy and a culture of storage. And the use of rainwater and the transition from considering it as a risk to considering it as a resource, especially for arid and semi-arid areas, for local groups or for private individuals who have the right to dispose of real estate, and clarifying the legal ways for that, as the current laws do not take into account the aspect of rainwater valuation.

The planning and construction laws must include general directives for protection or minimum standards for protection from the danger of flooding in particular, which is what needs the diligence of researchers. It must also refer to ways of prevention and facilitate the work of rescue teams at the level of the city, neighborhood and residence. also, current laws do not deal with the procedures related to the current buildings located within the risk areas or the procedures related to the built-up areas. From here, it can be said that the current plans are not duly consistent with the prevention standards, and they require urgent intervention, and it must also put special provisions to put an end to soil impermeability and find methods



to increase its permeability. Such as increasing the per capita share of green spaces, as well as the construction of roads must include conditions for protection from flooding and surface runoff, which could pose a danger to individuals or property.

Even with taking measures to prevent danger, the emergence of disasters must be taken into account, and there is a need to prepare and form specialized intervention teams from the various relief and rescue groups affiliated to the Ministry of the Interior or the Ministry of National Defense and provide them with the necessary means and update their equipment, and it must also ensure the possibility of applying plans prepared in advance and Ensure the safety of the means and facilities necessary to implement these plans in the event of disasters

The insurance sector should not only relate to compensation and rehabilitation assistance but should also intervene in the factors of the prevention industry. To set well-considered contributions and premiums, insurance institutions should invest in scientific and technical aspects. The authorities can also encourage the establishment of special institutions for insurance against this type of risk. These institutions can also contribute to financing protection projects.

## 5. Conclusions

Managing the flood risk cannot depend on political volunteering. Resilience towards this risk requires integrated elements in prevention, management and rehabilitation. These are the elements on which the national policy must be built to take care of the flood risk. Although the state has made an important journey in that, the associated legal system It still has not found the ideal formula for controlling this danger. It can also be said that the current initiatives are concerned with managing the disaster more than it does with prevention, which is supposed to come in the first place. Although the state has monitored some organization to take care of this aspect, there is a problem of activation, and from this One of the most important needs of the risk management reality is to support the legislative and regulatory texts to better control the various types of floods and overcome the difficulties in developing plans for areas at risk of floods and local intervention plans in order to pass the policy of prevention, management and rehabilitation to the field.

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