



Minimization Of the Territorial Impact Of Housing On Non-Developable Land In Areas Affected By Flood Hazard

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Abstract: The occupation of rural land by dwellings, mainly secondaries and in most cases irregulars, has been a widespread practice in Spain, and in particular in the Comunitat Valenciana. The current regulations on spatial and urban planning and landscape want to provide a solution through special procedures to solve many environmental and urban problems posed by houses built on rural land outside of planning.

One of the conflicts that arise with the new regulations is how to manage the minimization of the territorial impact of these homes affected by a floodplain area, in which the owners are required to adopt measures to reduce vulnerability and self-protection for existing buildings, considering the urban planning regulations of the Territorial Action Plan on flood risk prevention in the Comunitat Valenciana (PATRICOVA), whose application began in 2003. In this article, the first thing analyzed is the dimension of the problem using geographic information systems to overlay cartographies and the studies of the procedures and standards involved. Then, a reflection on how to articulate both norms to suppress the conflicts that seem to exist is presented.

Keywords: Non-developable land; Flood hazard; Minimization of the territorial impact; Vulnerability; Second homes

1. Introduction

According to the World Bank, so far in the 21st century, floods and droughts have affected 3 billion people due to the climate crisis [1]. In its latest report, "Floods and droughts: an EPIC response to these hazards in the era of climate change," a particular call is made for the adaptation of societies and to improve governance and risk management by governments to improve the efficiency of the response mechanisms.

Among the Sustainable Development Goals of the Nations, objective 13, "Take urgent action to combat climate change and its effects" has among its goals "Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries" [2].

With the transposition of Directive 2007/60 / EC, of the European Parliament and of the Council, of October 23, 2007, regarding the evaluation and management of flood risks [3], into the Spanish legal system through the approval of the Royal Decree 903/2010, of July 9, on the evaluation and management of flood risks [4], Flood Risk Management Plans have been drawn up by all basin organizations in the Spanish area. Numerous actions have been derived from these Plans, among which we highlight the development of various guides that contribute to the adaptation and resilience of buildings in flood-prone areas, such as Guide to reducing building vulnerability to flooding (Consorcio de Compensación de Seguros) [5], Recommendations for the construction and rehabilitation of buildings in flood-prone areas (Ministry for Ecological Transition) [6] and Guide for evaluating the resilience of urban centers against the risk of flooding: networks, urban systems and other infrastructures (Ministry for Ecological Transition) [7].

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In the particular case of the Valencian Community, which is under the umbrella of all the above, there is a territorial management document called the Territorial Action Plan on flood risk prevention in the Valencian Community (PATRICOVA) [8], which began to be applied in 2003 and was reviewed and approved in 2015, already included resilience measures that are developed in its annex called "Conditions for the adaptation of buildings and urbanization."

On the other hand, there is Royal Decree 638/2016, of December 9, which modifies the Regulation of the Hydraulic Public Domain approved by Royal Decree 849/1986, of April 11, the Hydrological Planning Regulation, approved by Royal Decree 907/2007, of July 6, and other regulations on flood risk management, ecological flows, hydrological reserves and wastewater discharges, which has developed, among others, articles 9, 10 and 14, which establish limitations of uses in flooded areas [9].

The urban planning legislation in the area of the Valencian Community, Law 5/2014, of July 25, on Spatial Planning, Urban Planning, and Landscape, of the Valencian Community was modified by Law 1/2019, of February 5 and incorporated, among others, the procedure for minimizing the environmental impact generated by homes built irregularly on non-developable land [10].

With this regulatory framework and the planning developed, organizational conflicts are being generated to resolve the flood problems of houses built on non-developable land (NDL), many of which are irregular and, in most cases, predate the regulations mentioned above.

2. Methods

The scope of the study is the Valencian Community, located to the East of the Iberian Peninsula, on the Mediterranean coast. It has 542 municipalities, 3,152,031 homes, according to the 2020 Cadastre, of which approximately 307,050 homes (9.7% of total dwellings) are on non-developable land.

The objective of the developed methodology is to know approximately the dimension of the conflict that has been generated in existing dwellings on non-developable land and that are affected by flood hazards based on the different regulatory frameworks referred to above.

To determine the existing dwellings on land classified as non-developable, the cartographies available at the Valencian Cartographic Institute (ICV) correspond to the ground uses of 2015 (SIOSE 2015) and the urban planning as of April 2019 have been used. The result obtained has been the surface area occupied by the building for housing use on non-developable land. In this type of land, it has been considered that the existing housing typology is single-family, and its average size is 200 m².

Subsequently, the area occupied by single-family homes has been crossed, according to the previous calculation, and the maximum floodable size, determined by the union of the flood hazard cartographies of PATRICOVA and the National System of Flooding Zones Cartography (SNCZI) of the Ministry for the Ecological Transition and the Demographic Challenge. With the results obtained, it has been possible to estimate approximately the number of homes in NDL affected by flood hazards, distinguishing between the different hazard levels. Once the size of the surface and the number of dwellings that could be in a situation of organizational conflict are known, the results are analyzed.

3. Results

In the Valencian Community, the surface of the territory occupied by buildings for residential use is 42,127 ha, of which 6,141 ha (14.6%) are found on land classified as non-developable land (NDL), as shown in the map on the left in Figure 1. The latter was determined to define the scope of the "Orientation Guide for the minimization of territorial impact: Regularization of dwellings on non-developable land" [11]. For this research, the surface occupied by the residential building affected by any flood hazard levels defined

in PATRICOVA was calculated, considering the envelope generated by the PATRICOVA and SNCZI cartographies. Levels 1 have been differentiated (drafts > 80 cm and 25-years flood), grouped levels 2, 3, 4, and 5 (drafts <80 cm for 25-years and 100-years flood, and drafts > 80 cm for 100-years and 500-years flood), level 6 (drafts <80 cm and 500-years flood) and geomorphological danger, as observed in the image to the right of Figure 1.

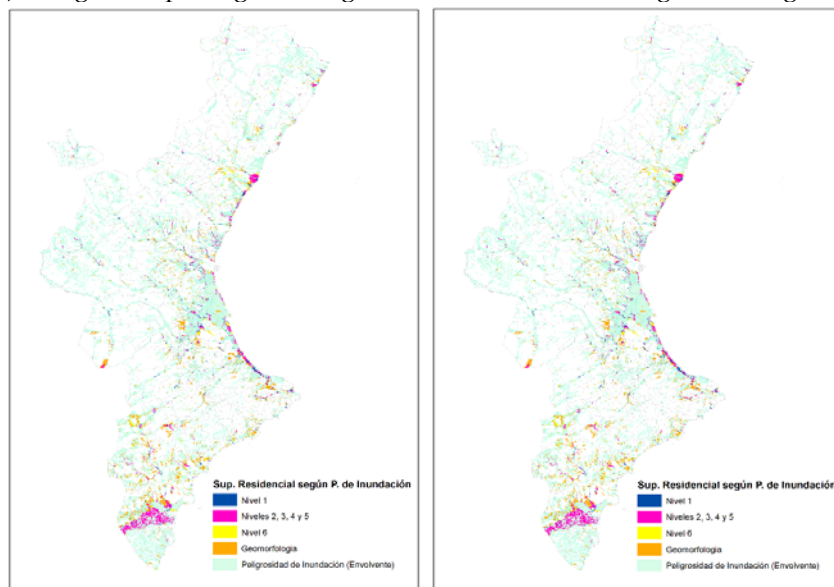


Figure 1. Surfaces occupied by residential buildings in the NDL and surfaces affected by different flood hazard levels.

Table 1 shows the different levels of flood hazard defined in PATRICOVA. The results obtained refer to the area occupied by residential buildings in the NDL and the estimate of affected homes.

Table 1. Surfaces occupied by residential buildings in the NDL affected by flood hazard and estimated homes.

Flood hazard level	Surface Occupied by Residential Building in NDL (ha)	Estimation of dwellings affected by flood hazard in the NDL	% of homes affected by flood hazard compared to the total in NDL
Level 1	49,10	2.455	3,5
Levels 2, 3, 4 y 5	642,76	32.138	45,3
Level 6	208,97	10.449	14,7
Geomorphological	518,17	25.908	36,5
Total	1.419	70.950	100,0

The 1,419 Ha area, affected by flood hazards, corresponds to 23.1% of the space occupied by residential buildings in the NDL (6,141 ha) within the Valencian Community.

With the results obtained and rigorously applying the PATRICOVA urban planning regulations, only the homes affected by flood hazard level 6 (10,448 homes) would have the possibility of being refurbished and regularized by the regulatory frameworks and guidelines referred to above. This would mean that 60,502 homes would not have the option of being regularized, except those affected by geomorphological danger and are really in a dangerous level 6, once these dangerous levels from 1 to 6 are specified after a study of flooding.

Incorporating the law of spatial planning, urban planning, and landscape minimization of the territorial impact would cover the regularization of the 60,502 homes affected

by flood hazards that PATRICOVA rejects. It should be clear that some of the existing homes are regularized and legally established. Still, the ignorance of how many are in that situation forces us to consider the maximum number of existing homes in the analysis.

From the results obtained, it should be noted that a land occupation by houses of 49.1 ha has been identified, in areas affected by flood hazard level 1, equivalent to 2,455 homes, an issue that should be resolved with the demolition of these houses due to the high risk it entails.

4. Conclusions

It is important to note that the PATRICOVA regulations are applied to new developments. However, it has been used to existing homes on undeveloped land in a subsidiary manner. Currently, PATRICOVA should adapt to the current legislation for existing homes to guarantee the safety of people and their property, applying the tools generated by various guides on the adaptation of the building and increasing resilience. Failure to do so means that the affected homes will not be demolished. In most of them, the years in which the administration can sanction and report their demolition, a very poorly developed task, have been exceeded. The population living in these homes will be subject to the risk of flooding, which implies that people and property are affected by not allowing themselves to increase their security.

However, we consider that the occupation of soils affected by any level of flood hazard should not be allowed. In the particular case of level 1, we understand that it should be prohibited; even existing homes should be demolished due to the high risk they would be subjected to.

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