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How is flood risk explained in the subject of geography in Spanish schools? An approach based on social science textbooks (primary education)

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ABSTRACT

The main natural risk in the Mediterranean region is flooding. Therefore, in Spain, explaining this issue in Primary Education classrooms of Social Sciences should be a priority and is established as such in the current curriculum. The aims of this study are to carry out an analysis of the contents on flood risk included in the Social Science textbooks (3rd cycle; 5th and 6th) of Primary Education of the leading publishers used in Spain (Anaya, Bromera, Santillana, SM and Vicens Vives), in terms of: (1) the meaning of this phenomenon; (2) the causes and consequences of floods; and (3) an analysis of the images (catastrophism and territory location) that are included in the textbooks to explain these events. The results indicate that there is no complete definition of flood risk provided in these textbooks; the information is mainly related to the physical factor (atmospheric event). There is no specific mention of how human beings affect risk (vulnerability and exposure factor). With respect to the causes of floods, the analysis finds confusion in the

explanations from the different textbooks and publishers, and the images that are included are sensationalist, highlighting the catastrophism without indicating to which territory it refers.

KEYWORDS

Flood risk; geography; Mediterranean region; primary education; social sciences; textbooks



Introduction

One of the main natural hazards affecting the Mediterranean region is flooding (Pérez-Morales, Gil-Guirado, & Quesada, 2021). In recent decades, this phenomenon has been aggravated by the increase of the exposure of human beings (growth of the population, occupation of ravines, rivers and floodable areas, spread of the idea of a perception of zero risk, abandonment of traditional crops, etc.). Furthermore, this situation is expected to worsen in the future due to the increase in the frequency and intensity of heavy rains according to the climate change scenarios (Intergovernmental Panel on Climate Change [IPCC], 2022).

On an international level, in recent years different studies have been published that address how flood risk is taught in schools (Duman, 2018), such as those carried out in the USA (Lee, Kothuis, Sebastian, & Brody, 2019), Europe (Williams, McEwen, & Quinn, 2017), Asia (Zhong, Cheng, Zhang, Huang, & Wang, 2021) or Africa (Mudavanhu, 2015). In Spain, most of the scientific research on this topic (from an educational perspective) has been carried out within the subject area of Experimental and Natural Sciences (Garzón, Ortega, & Garrote, 2009). From an educational point of view, these types of studies related to Geography and/or Social Sciences teaching are scarce and recent (Cuello, 2018). With regard to flood risk in the Mediterranean region, studies have been carried out recently on the social representations of the future Primary School teachers (Morote, Hernández, & Olcina, 2021) and didactic proposals (Morote & Olcina, 2021).

The interest in analysing school Social Science textbooks in educational research lies in the fact that they constitute a privileged documentary source that enables us to gain an insight into what is taking place in the classrooms (Lee et al., 2021; Prats, 2012; Valls, 2008). However, even though they have been used less in recent years on a global level, authors such as Bel, Colomer, and Valls (2019) explain that in Primary Education these resources continue to be the main tool used in Social Science classes. This is why there is interest in analysing them. In the case of flood risk, there is an even greater scarcity of studies on the analysis of Geography textbooks, particularly in the Primary Education stage. It is worth mentioning the study by Cuello and García (2019) about how school textbooks teach the fluvial network of a city.

The aims of this study are to carry out an analysis of the contents on flood risk included in the Social Science textbooks (3rd cycle; 5th and 6th; 10–12 years old) of Primary Education of the leading publishers used in Spain in terms of: (1) the meaning of this phenomenon; (2) the causes and consequences of floods; and (3) an analysis of the images that are included in the textbooks to explain these events taking into

account two factors (the degree of catastrophism and its contextualisation with respect to the analysed territory).

Sources and methodology

The first step in this study is to examine the Primary Education curriculum. In Spain, the state establishes the minimum teaching requirements for Primary Education in the Royal Decree 126/2014 of 28 February. From the point of view of Geography, the content on flooding is included in the subject of Social Sciences (Block 2 “The world in which we live”). The teaching contents are transferred to the autonomous regions which are responsible for adapting them to their own curricula. For example, in the Mediterranean region (the case of the Valencian Community; study area), according to Decree 108/2014 of July 4, floods have to be studied in all years of Primary Education (from 6 to 12 years old).

For this study we have analysed Social Science textbooks (3rd cycle of Primary Education: 5th and 6th) of the main publishers used in the Valencian Community (Spain). The 3rd cycle of Primary Education has been chosen as it is the stage preceding Secondary Education when the cognitive level is most complex (10–12 years). In this way, a more comprehensive analysis can be carried out of the complexity of the contents proposed. Specifically, ten textbooks have been examined that were published after the LOMCE was passed (Organic Law 8/2013, of 9 December, for improving educational quality). However, the 17 Spanish autonomous communities have the right to add further elements to the central LOMCE. As previous studies (Fernández-Álvarez, 2020) show these autonomous communities make use of this freedom greatly altering the LOMCE prescriptions particularly in Catalonia and the Basque Country. In this research, with respect to the geographical framework (Valencian Community), this area was chosen for the following reasons: (1) there is previous research on the analysis of Social Science textbooks that justifies the use of the leading publishers (Anaya, Santillana, SM, Bromera and Vicens Vives) both for the review of the contents of History (Bel et al., 2019; Sáiz, 2011; Valls, 2008) and Geography (climate change) (Morote & Olcina, 2020); and (2) the Mediterranean region where is located the study area is one of the European areas most vulnerable to climate change (IPCC, 2022).

With respect to the study of floods and how this risk is analysed in school textbooks, there are no works from the geographic discipline (Social Sciences), and less regarding the analysis of images that are inserted on this phenomenon. Given this fact, a procedure similar to that adopted by previous works on other natural hazards such as drought (Morote, 2021) or climate change (Morote & Olcina, 2020) has been taken into account. These works have focussed their research on the definitions on these phenomena and on their causes and consequences that are explained in school textbooks. In this study, from an inductive approach (from the particular to the general), it has been adapted to the risk of flooding and the textbooks have been analysed taking into account the proposed aims:

1. A qualitative review of the meanings included on flood risk and an analysis of the complete

definition of risk (physical and human factors). The idea, therefore, is to check what definitions and explanations are presented in textbooks on the phenomenon of flooding.

Other items that have been analysed are: the time of year; the territory affected; if the human factor is taken into account in the explanation of flood risk; and if the cold front is explained.

2. The causes and consequences of these phenomena that are described (qualitative analysis). This is intended to verify what factors intervene in the risk of flooding, with special attention to the incidence or not of the human being.
3. A quantitative analysis of the images (photographs, illustrations, maps, etc.). In the analysis, what interests us is how these images contemplate the risk of flooding. These images have been analysed taking into account two criteria: (1) degree of catastrophism (images where it can see material damage, human damage, etc.); and (2) contextualisation of the territory to which is related.

With reference to the catastrophism of the images, it is true that natural risks can lead to disasters in a territory, affecting the population, infrastructure and economic activities, but it is also true that these phenomena have positive effects. For example, the floods in the Mediterranean region traditionally have been considered as a resource (water resources for agriculture, water storage for domestic uses, building of soil fertility, etc.). Therefore, the purpose is to check which perspective prevails over these images in school textbooks.

Second, respect to the territorial context, the criterion that has been chosen is whether an explanation or exact location is inserted in the image itself, in the explanation in the text (when it refers to it) or at the foot of the photography. For example, it has not been taken into account whether it is related to the “oceanic climate” or the “Mediterranean region” since this covers extensive regions with very territorial and physical-ecological peculiarities. In other words, it has been considered a general reference that does not provide valid information to identify it with a specific territory.

Results




The explanation of flood risk. A definition known for the absence of the human factor

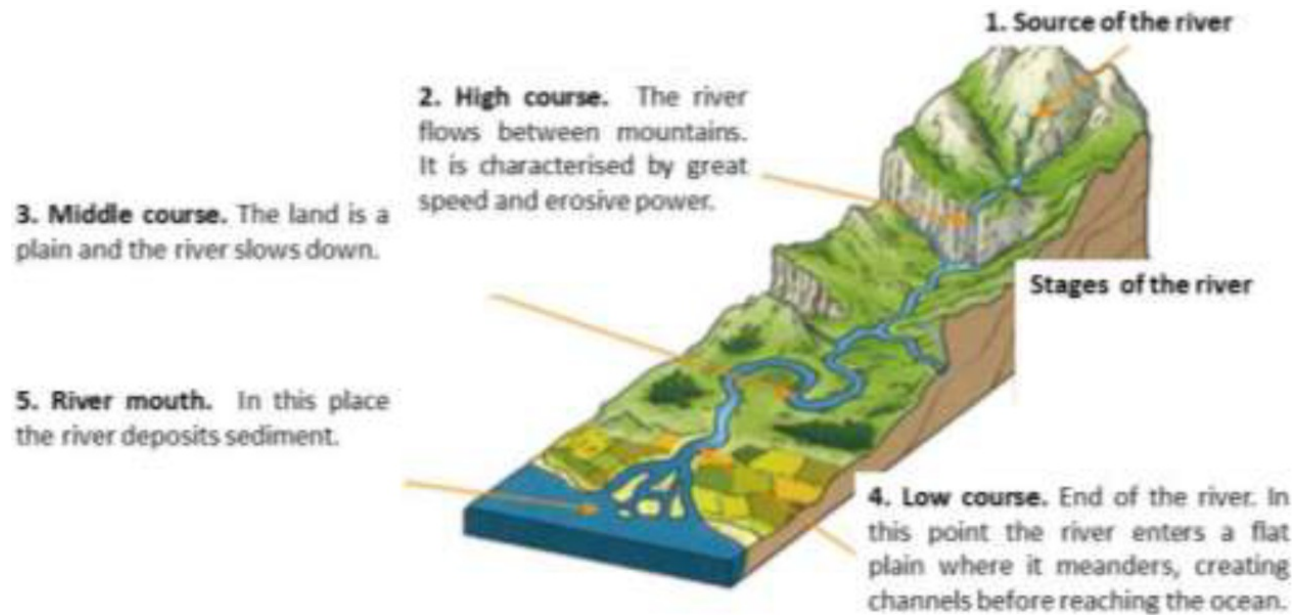
The contents on flooding in the Social Science textbooks are included in the units relating to Climatology. However, as climate and atmospheric weather is a transversal topic, it is usually integrated with other themes such as hydrology, landscape and vegetation. This transversality is more evident in 6th and, therefore, not so

much content is focussed on Climatology.




With respect to the definitions, first we should explain that there are differences between “flood risk” and “flooding.” In the case of the former, the risk is explained as the sum of the hazard (physical factor) and the vulnerability factor (human beings: occupation of ravines, floodable areas, human exposure, perception of zero risk, etc.). On the other hand, flooding refers to the episode of heavy rains, that is, to the atmospheric event. After analysing the textbooks, it should be pointed out that none of the textbooks include a correct explanation of risk (hazard + vulnerability). In addition, this term is frequently confused with danger (Annex 1). The only publisher that introduces human beings as a factor that can influence floods (and as a mitigation factor) is Bromera (5th). This textbook explains that the reservoirs “prevent the fast rise of river flows on which they are built, so overflowing is avoided” (Gregori & Viu, 2014, p. 64).

All of the publishers and textbooks include the explanation of the phenomenon of flooding. In other words, an explanation based on an atmospheric origin, that is, how flooding is associated with heavy rains. Furthermore, it is worth pointing out that they usually associate this phenomenon with the Mediterranean climate, although they also name other Spanish regions, for example, the publisher Anaya (5th) (see Annex 1). It should be also noted that the classic explanation of the river stages is usually included (birth, course, channel and mouth), their characteristics (length, flow, regular or irregular regime), and the factors that can influence these characteristics (landform and climate) (Figure 1). In the teaching units analysed, floods are associated with a phenomenon characteristic of the Mediterranean climate, although the textbooks state a direct relationship with climate change (Annex 2).

Figure 1. Stages of the river (publisher SM; 6th Primary Education). Source: Martin et al. (2015). Own elaboration.   



As flood areas, wetlands are rightly included (characteristic of the Mediterranean coast), although only in the textbook published by Bromera. It explains that these areas “are lands where the surface is flooded permanently or periodically. They are common in the Mediterranean area and they are highly important as they provide shelter to a large number of birds and aquatic plants that cannot live anywhere else” (Gregori & Viu, 2014, p. 63). An interesting description is included in the explanation: “human beings have dried out these wetlands in order to obtain more crop lands. This is why their area has been reduced considerably, and the few that remain have been legally protected in order to prevent their disappearance” (Gregori & Viu, 2014, p. 63). Several ideas can be drawn from these descriptions with respect to flooding. The first is that the explanation indicates that these spaces are characteristic of the Mediterranean area. Secondly, they have been modified by society. It would have been a good opportunity to add that these spaces have been occupied for urban uses, specifically for tourist-residential purposes, have a valuable role in regulating the hydrologic cycle (Bullock & Acreman, 2003), and providing valuable ecosystem services (Mitsch, Bernal, & Hernandez, 2015), including habitat and enhancing biodiversity (Junk et al., 2006; Kumari et al., 2020; see Figure 2).

Figure 2. Aerial view of the Vega Baja (low floodplain) (village of Dolores, Alicante) after the floods of 12–13 September 2019. Source: Diario Información (2019).   





Causes and consequences of floods. A holistic explanation?

With respect to the causes of floods, all of the textbooks except one (5th of Bromera) indicate that one of the main causes of these phenomena is climate change. In relation to the causes and consequences, no distinction is made between fluvial and pluvial flooding. It should also be noted that there is a misunderstanding in some books about the causes of floods (characteristics of the Mediterranean climate and the effects of climate change) (5th of Santillana and SM). Indeed, one of them, Vicens Vives (6th), gives no explanation about the causes (Table 1). And, with respect to the consequences, the majority of the textbooks refer to human, economic and environmental losses (Table 1).

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Table 1. Causes and consequences of flooding in school Social Science textbooks. 

Publisher	Causes	Consequences
Anaya (5 th)	<ul style="list-style-type: none"> • It only states that they are generated by the cold front, but does not explain the functioning of this phenomenon. • It suggests that one of the causes of flooding is climate change. 	<ul style="list-style-type: none"> • “They usually give rise to floods and amendments in the land” (Benítez et al., 2014, p. 63) (Unit 4). • “Heavy rains, which only last a few hours and cause large floods. This is known as the cold front” (Benítez et al., 2014, p. 68) (Unit 5).
Anaya (6 th)	<ul style="list-style-type: none"> • In Unit 3 it is indicated that more rains and storms are generated by climate change. 	<ul style="list-style-type: none"> • No information.
Bromera (5 th)	<ul style="list-style-type: none"> • It notes that it is a natural factor and hazard derived from the climate: “in our territory there are sporadic downpours. When it rains a lot in a short space of time, the river courses cannot flow and the fields and villages are flooded, which gives rise to economic damage and, sometimes, the loss of human lives” (Gregori & Viu, 2014, p. 30). 	<ul style="list-style-type: none"> • Economic and human losses.
Bromera (6 th)	<ul style="list-style-type: none"> • In the section on climate change, it indicates that climate change is one of the main causes of flooding (Gregori & Viu, 2015). 	<ul style="list-style-type: none"> • Sudden rises in the levels of rivers and overflowing.
Santillana (5 th)	<ul style="list-style-type: none"> • Aggravation of the phenomenon due to climate change: “the periods of heavy rainfall will become more frequent” (Grence, 2015, p. 59). 	<ul style="list-style-type: none"> • Heavy rains can cause floods.
Santillana (6 th)	<ul style="list-style-type: none"> • In Unit 5, it is indicated that one of the possible consequences of climate change is flooding. 	<ul style="list-style-type: none"> • “Swelling of rivers and, particularly the watercourses and ravines when there are heavy storms” (Grence & Gregori, 2015, p. 38).
Source: Own elaboration.		




Publisher	Causes	Consequences
SM (5 th)	<ul style="list-style-type: none"> • Due to the heavy rains (characteristic of the Mediterranean climate). • In one of the activities proposed it is suggested that the cause of floods is climate change: “relate the floods and droughts to climate change. How do they affect people?” (Parra et al., 2014, p. 45). 	<ul style="list-style-type: none"> • Heavy rains can cause floods. • “Damage to landscapes, crops and inhabited areas” (Parra et al., 2014, p. 45).
SM (6 th)	<ul style="list-style-type: none"> • Unit 1 (natural origin). • Unit 2 (caused by climate change). 	<ul style="list-style-type: none"> • Strong swelling of rivers in the autumn resulting in heavy erosion.
Vicens Vives (5 th)	<ul style="list-style-type: none"> • Caused by climate change. “In recent years the number of floods, droughts, heat waves and tropical cyclones has increased” (García & Gatell, 2014, p. 53). 	<ul style="list-style-type: none"> • The consequences are not explained. The catastrophic images included suggest that they are floods in inhabited areas.
Vicens Vives (6 th)	<ul style="list-style-type: none"> • No information. 	<ul style="list-style-type: none"> • “Large swelling of rivers with heavy rains” (García et al., 2015, p. 29).
Source: Own elaboration. 		

The images of the floods. Catastrophism and landscapes without location

In all the school textbooks analysed, it has been identified a total of 640 images. The images that are related with some type of natural risk are 34 (5.3%). Those that have to do with floods amount to 10 (29.4% with respect to the total that are linked to natural risks). The results show that, in relation to the level of catastrophism, the majority (90%; n = 9) have that purpose. Regarding the territorial context, in 90% (n = 9) it is not known which territory they refer to, thus making it difficult to explain the explanatory text with which these images are linked.

Some textbooks overuse the catastrophic message in the explanation of these extreme events. Similar observations are made in the publication of Morote and Olcina (2020) on education and climate change for Primary Education. The images all refer to disasters, including the one we have included in this research (Figure 4). This actually corresponds to a positive image since Mediterranean populations considered that the benefits of using rainwater in an agrarian-based society outweighed the damage and therefore did not consider it as a risk in itself (Figure 3). The tendency to take a catastrophic point of view is also observed in

some of the sections in which the contents are articulated. For example, in the SM textbook (5th) there is a section titled “The strangest day” which describes that “on the news there have been reports about the strangest atmospheric phenomena that have been recorded in Spain in the past few months” (Parra, Martín, Navarro, & López, 2014, p. 40). This conveys a feeling of alarmism and can even confuse the learners because when the Mediterranean climate is explained it is indicated that the floods (heavy rains) are a characteristic feature of this climate. Describing something as being unusual but also common can lead to a misunderstanding of the factors and relationships that explain the causes and consequences of flooding. Furthermore, this text includes two images that do not explain or contextualise the contents. On the one hand, there is a photograph of a snow-covered beach (not strange, as this usually happens each year in the winter in some part of the Spanish Mediterranean coast).

Figure 3. Image that highlights the main economic activities of the Mediterranean coast (publisher—Vicens Vives; 6th Primary Education). Source: García et al. (2015). Own elaboration.   



Source: García et al. (2015). Own elaboration.

The addition of photos with the effects of flooding is common in the textbooks. However, in some cases, the location of the phenomenon is not identified or the images refer to other climate regions very far from the Mediterranean area to give a more catastrophic idea. On the contrary, some texts include interesting images that illustrate the historic management of floods (Figure 4). Using these images in the classroom can help to explain the traditional uses of land and water in the Mediterranean region, and more specifically the flows in the rivers due to heavy rains which has given rise to the construction of hydraulic infrastructures since ancient times. This explanation introduces the perspective that floods also have a positive aspect (see Figure 4), as we will explain in the Discussions section. This image depicts a weir (diversion dam installed in the riverbed). Its purpose is to manage flows when heavy rains occur since, given the rainfall regime (300 mm/year), in most river courses water only flows in the event of heavy rains and, therefore, are termed ravines or “dry rivers.” Since historical times (from the Muslim period—around the ninth century, although some authors refer to even earlier periods—Roman times), the inhabitants of these lands built these “dams” in the beds of the ravines with a double purpose (Hernández, Olcina, & Morote, 2020). On the one hand, to manage flows from the river to minimise damage from downstream flooding, and on the other, to provide resources with which to water farmland.

Figure 4. Image of the weir of Sant Joan (Alicante) on Monnegre River during an episode of heavy rains (publisher Bromera; 5th Primary Education). Source: Gregori and Viu (2014, p. 25). [✎](#) [💬](#) [+](#)



Discussions

The findings of the analysis of the floods in the Social Sciences textbooks reveal that: (1) there is no complete definition of flood risk and the information is mainly related to the physical factor (atmospheric event); (2) with respect to the causes of floods, the analysis finds a confused explanation between textbooks and publishers; and (3) the images that are included are sensationalist, highlighting the catastrophism and the audience cannot know the location.




How can these results be of interest to the international audience? First of all, because this work can be a guide for other authors who want to carry out some research on the analysis of natural risks from school textbooks (definitions, causes and consequences, images, etc.). It has already been indicated that neither in

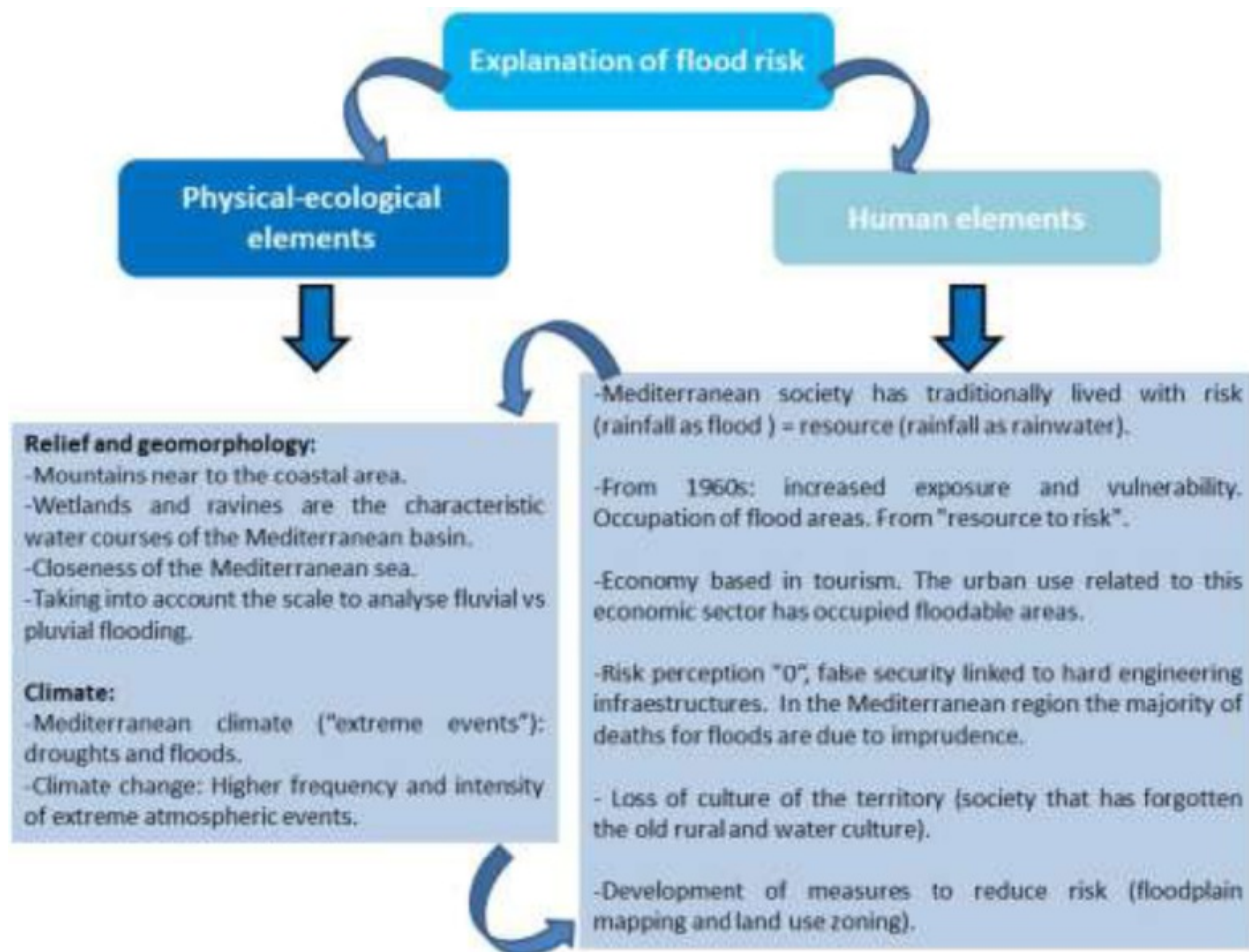
Spain nor internationally there are previous works that analyse the role and meaning of the images that are inserted in textbooks when examining natural risks. In the school textbooks analyses here, no publisher clearly explains the definition of the risk with its elements (physical and human). The textbooks identify the flood processes with the cause that leads to them (heavy rain), focussing exclusively on the climatic factor.

Bagoly-Simó (2021), in relation with the landscape in the Secondary school textbooks of Hungary and Venezuela, analysed that these resources served to uncover: (1) the way curricular requirements translated into textbooks; and (2) what kind of geographical and cross-curricular knowledge acquisition the landscape concept supports. The content analysis showed that landscapes remain outside the key concepts of school Geographies. Secondly, the analysis in terms of Physical Geography predominates in textbooks and that it was very incipient in those that incorporated the role of individuals as producers of landscapes, that is, a vision from Human Geography.

Flood risk is a topic of great interest in the Mediterranean region due to the economic damage and loss of human lives that it causes (Pérez-Morales et al., 2021). However, we should also note that this risk affects the whole of the Iberian Peninsula. This fact is not mentioned, except in one of the textbooks analysed (Anaya). As an explanatory factor of flooding, it rightly states that it is generated by the cold front phenomenon, but with no further explanation or illustrative images such as a satellite image. In order to explain how a cold front results in an event of heavy rains, four factors must be mentioned: 1) the jet stream undergoes a rupture that isolates a small portion of cold air from the general circulation, placing it in clearly warmer environments; 2) areas near the Mediterranean sea. In the late summer months, the seawater has high temperatures. This high temperature facilitates a high evaporation and the accumulation of vapour in the atmosphere; 3) surface wind circulation between the sea and the coastal areas (easterly winds in the Mediterranean region) that lead the humid air to move from the sea to land; and 4) importance of the orographic factor (mountains near the coast) since it forces the air to rise, thereby cooling it and reaching the dew point, it starts to rain. This would be a simple explanation of the operation of the atmospheric factor (the rain episode) that should be inserted, with the use of figures and diagrams, in the analysed topics on Climatology.

Besides, the role of human beings is ignored as a factor in risk processes (occupation of floodplains, transformation of fluvial courses, derivation of flows, etc.), and even in managing flow regime through structures such as dams. An example of this is the drying up and occupation of wetlands along the Mediterranean coast. The wetlands have traditionally played a role in helping to regulate the hydrologic cycle and as a natural buffer to manage flooding. In this region, since the 1960s these areas have been occupied by urban and tourist uses, aggravating the risk of flooding. This occupation has been reflected in an indirect way in some textbooks (see Figure 4). Nevertheless, when included, it is not explained how the increase of urban uses can aggravate the risk of flooding (see Figure 5). That is to say, it is not explained that they are former swampy areas that were drained and given an endorheic nature and that flows accumulate in these areas.

Figure 5. Proposal of contents that should be addressed in the Social Science textbooks (Primary Education) to explain flood risk in the Mediterranean area. Source: own elaboration.   



Finally, the textbooks have been found to give a very little value to images as a basic resource for a critical education, particularly when addressing an issue with such a major social impact as flood risk. Based on an analysis of the Social Science textbooks, Bel et al. (2019) find that a decorative use is made of images. All these results in the adoption of uncritical postures towards the visual messages by the students rather than their communicative competences in interpreting graphic information. Along similar lines, Morote and Olcina (2020) highlight that, in relation to climate change, the images are included to attract the reader's attention. And these pictures in fact, are practically unrelated to the consequences of this phenomenon. They are, therefore, images that can confuse the student, when they are included for merely decorative purposes with no critical sense (Sáiz, 2011). This can also be compared with other studies, such as the carried out by Korfiatis, Stamou, and Paraskevopoulos (2004) from the analysis of the images about nature in the textbooks of Primary Education in Greece. The results showed a nature where humans have absolute

control over a nature whose only value was its usefulness as a resource although mention was made of the interrelationships between different elements (physical and human). This approach presented many contradictory elements and inconsistencies that can cause confusion in students. For example, the image of nature dominated by humans contrasted with that in which the promotion of relationships aimed at the stewardship and care for nature.

Conclusions

Floods are the main natural risk affecting the Mediterranean area, which is considered as a high-risk region. An appropriate teaching of this phenomenon in schools is of vital importance for several reasons: (1) due to its territorial repercussions, the increased knowledge about this phenomenon would reduce the damage; (2) to disseminate knowledge about the impact that the human factor has on the implementation of the Sustainable Development Goals (SDGs); and (3) the current Primary Education curriculum establishes it as mandatory. An analysis of the results reveals that there is a lack of coherence between what the curriculum indicates and the contents of most textbooks. To this we should add that this risk can be aggravated if we take into account the climate change scenarios.

With respect to the limitations of the study, we can indicate that the school textbooks provide an approximation of what happens in the classroom (Valls, 2007). However, they do not supply information about what is actually discussed in class or what the students learn, which is the ultimate goal of education (Wu & Otsuka, 2021). But, the analysis of the textbooks is highly relevant because in Primary Education they continue to be the main or the only tool used (Bel et al., 2019). Nevertheless, the aim of this study is not to investigate the practices in the classroom from a training or learning perspective. This constitutes a future line of research so as to be able to compare what is really taught in schools with the information provided in the textbooks. Another future research challenge would be to analyse how this issue (floods) is treated in other educational systems and even to compare it with other stages (Secondary Education and Baccalaureate). A third future line of research would be to deepen into the analysis of the images. In other words, carry out a more detailed analysis, not only of those that have to do with the risk of flooding, but of all the images linked to natural risks. For this, the methodology used in this work would be applied, that is, to determine their degree of catastrophism and if they present a location with respect to the territory analysed. Other research challenges that could be proposed is the analysis and quantification of the type of resources and activities or the complexity of them, such as the studies carried out by Sáiz (2011) for History or by Morote (2020) for Climatology.

It is highly positive that content on flood risk is included in textbooks, as shown in this study. However, a major challenge is to be able to adapt and improve the explanation of these phenomena in the school textbooks: (1) integrating the human factor. This should be a priority, as is raising awareness of the fact that this variable is equally (or more) important than the climate factor (hazard); and (2) explaining that floods are not a direct cause of climate change, but these events will be more frequent and intense in the future (IPCC,

2022). All of this will generate citizens who are more aware and trained in these risks. This should be a priority so as to reduce the vulnerability factor with respect to these phenomena and adapt to climate change as indicated by the United Nations (2015) in its Goal on “Climate action.”

Disclosure statement

No potential conflict of interest was reported by the authors. [AQ2](#)

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Annex 1. Definition of “flood risk” and “flooding”

Note: The table layout displayed in ‘Edit’ view is not how it will appear in the printed/pdf version. This html display is to enable content corrections to the table. To preview the printed/pdf presentation of the table, please view the ‘PDF’ tab.

Anaya (5 th)	Definition of flood risk:
Definition of flooding: <ul style="list-style-type: none"> • Related to heavy rains. • For example, Unit 4 “Climate” notes: “those that occur in a very short period of time and discharge a large amount of water. They usually give rise to floods. They take place in autumn on the Cantabrian and Mediterranean coasts” (Benítez, Cano, Fernández, & Marchena, 2014, p. 63). • Unit 5 “The climates and hydrography of Spain” explains that “the rainfall is scarce and irregular and takes place mainly in spring and autumn. In summer it hardly rains. These areas are known as the dry Spain, although at times there are downpours and heavy rains, which last just a few hours and cause large floods. This is known as the <i>gota fría</i> (cold front)” (Benítez et al., 2014, p. 68). 	<ul style="list-style-type: none"> • No definition.
Anaya (6 th)	Definition of flood risk: <ul style="list-style-type: none"> • No definition. Definition of flooding: <ul style="list-style-type: none"> • The only information is related to climate change as the cause of the increase in rainfall and storms (Benítez, Cano, Fernández, & Marchena, 2015).
Bromera (5 th)	Definition of flood risk: No definition.
Source: own elaboration.	


Anaya (5 th)	Definition of flood risk:
	<ul style="list-style-type: none"> • No definition. <p>Definition of flooding:</p> <ul style="list-style-type: none"> • Although there is a paragraph titled “Some meteorological risks” (Unit 2 “Climate and Landscape”), it does not refer to risk, but to the hazard factor. • Examples: “in our territory there are sporadic downpours. When it rains a lot in a short period of time, the river courses cannot drain the water and they overflow and flood the fields and population nuclei, giving rise to economic damage and, sometimes, the loss of human lives” (Gregori & Viu, 2014, p. 30). Unit 4 “The climate and rivers of the Region of Valencia,” when explaining the Mediterranean climate points out that: “rainfall is scarce in winter, minimum in summer and maximum in autumn with a risk of a cold front” (Gregori & Viu, 2014, p. 58).
Bromera (6 th)	<p>Definition of flood risk:</p> <ul style="list-style-type: none"> • No definition. <p>Definition of flooding:</p> <ul style="list-style-type: none"> • It only states that floods are typical of the Mediterranean climate, where “sudden” rains are frequent and cause the overflowing of rivers (Gregori & Viu, 2015, p. 26). • The section on climate change indicates that this could be a cause of the increase in floods (Gregori & Viu, 2015).
Santillana (5 th)	<p>Definition of flood risk:</p> <ul style="list-style-type: none"> • No definition. <p>Definition of flooding:</p> <ul style="list-style-type: none"> • It explains why floods happen (Unit 3 “The waters of Spain”): “when there are strong storms, the river overflows; in other words, so much water enters the river that it comes out of the river bed, giving rise to floods. Floods usually happen in the spring and autumn, when the areas with a Mediterranean climate record the most abundant rainfalls” (Grence, 2015, p. 48).
Source: own elaboration.	


Anaya (5 th)	Definition of flood risk: <ul style="list-style-type: none"> • No definition.
Santillana (6 th)	Definition of flood risk: <ul style="list-style-type: none"> • No definition.
	Definition of flooding: <ul style="list-style-type: none"> • It only mentions that in the Mediterranean region, the rivers have an irregular regime with low levels in the summer and overflows in the spring and autumn (Grence & Gregori, 2015).
SM (5 th)	Definition of flood risk: <ul style="list-style-type: none"> • No definition.
	Definition of flooding: <ul style="list-style-type: none"> • It explains that, in the Mediterranean climate, rainfall is scarce and irregular and sometimes heavy (Parra et al., 2014).
SM (6 th)	Definition of flood risk: <ul style="list-style-type: none"> • No definition.
	Definition of flooding: <ul style="list-style-type: none"> • The only reference made is that floods usually happen in autumn (Martin, Parra, De la Mata, Hidalgo, & Moratalla, 2015).
Vicens Vives (5 th)	Definition of flood risk: <ul style="list-style-type: none"> • No definition.
	Definition of flooding: It explains that, in the Mediterranean climate, rainfall is scarce and irregular and, in the spring and autumn, it is usually heavy (García & Gatell, 2014).
Vicens Vives (6 th)	Definition of flood risk: <ul style="list-style-type: none"> • No definition.
Source: own elaboration.	

Anaya (5 th)	Definition of flood risk:
	<ul style="list-style-type: none"> • No definition. <p>Definition of flooding:</p> <ul style="list-style-type: none"> • It states that “the level of the rivers rises greatly in the rainy season” (García, Gatell, & Batet, 2015, p. 10) and the rivers in the Mediterranean area “record low levels in the summer but rise a lot when there are heavy rains” (García et al., 2015, p. 29).
<p>Source: own elaboration. </p>	

Annex 2. The main features of the explanation of flooding in Social Science school textbooks

Note: The table layout displayed in ‘Edit’ view is not how it will appear in the printed/pdf version. This html display is to enable content corrections to the table. To preview the printed/pdf presentation of the table, please view the ‘PDF’ tab.

	Time of year	Territory affected	Is the human factor taken into account in the explanation of flood risk? Is the cold front referred to?	
Anaya (5 th)	In autumn (Unit 4). In spring and autumn (Unit 5).	Cantabrian and Mediterranean coast.	No	Yes
Anaya (6 th)	–	–	No	No
Bromera (5 th)	In spring and autumn (Unit 2). In autumn (Unit 5).	In “our territory” (understood as the Mediterranean region).	Yes. But only for the wetlands (Unit 5, page 63) and in the dam-building projects (to mitigate their risk).	Yes
Bromera (6 th)	Autumn and spring.	In the Mediterranean region (Mediterranean climate).	No	No
Santillana (5 th)	Overflows in spring and autumn.	Mediterranean region (linked to ravines).	No	No
Santillana (6 th)	In spring and autumn.	Mediterranean area.	No	No
SM (5 th)	No.	Mediterranean coast.	No	No
<p>Source: own elaboration. </p>				

	Time of year	Territory affected	Is the human factor taken into account in the explanation of flood risk?	Is the cold front referred to?
SM (6 th)	Autumn.	Associated with the Mediterranean climate.	No	No
Vicens Vives (5 th)	Spring and autumn.	Mediterranean region (Mediterranean climate).	No	No
Vicens Vives (6 th)	–	Associated with the Mediterranean climate.	No	No
Source: own elaboration.				

Author Query

1. **Query [AQ0]** : Please review the table of contributors below and confirm that the first and last names are structured correctly and that the authors are listed in the correct order of contribution. This check is to ensure that your names will appear correctly online and when the article is indexed.

Sequence	Prefix	Given name(s)	Surname	Suffix
1		Álvaro-Francisco	Morote	
2		Jorge	Olcina	
3		María	Hernández	

Response by Author: "Ok" ↑

2. **Query [AQ1]** :Please confirm that the edits made in the affiliation and correspondence sections are appropriate.

Response by Author: "Ok" ↑

3. **Query [AQ2]** :Please confirm that the edits made in the affiliation and correspondence sections are appropriate.

Response by Author: "Ok" ↑

4. **Query [AQ3]** :Please provide the publisher location.

Response by Author: "I do not know the city" ↑

5. **Query [AQ4]** :Please provide complete details for United Nations 2015 in the reference list or delete the citation from the text.

Response by Author: "United Nations (2015). Sustainable Development Goals. UNDP, Sustainable Development Agenda. 2015.

<https://www.undp.org/content/undp/es/home/sustainable-development-goals/resources.html>.

↑

6. **Query [AQ5]** :There is no mention of Adam et al. 2000, Lataoui et al. 2013, Pérez-Morales

et al. 2018, Schmidt-Thomé & Klein 2013, Ward et al. 2020, Generalitat Valenciana 2020, and Ministerio de Educación Cultura y Deporte 2020 in the text. Please insert a citation in the text or delete the reference as appropriate.

Response by Author: "Delete these references." ↑

7. **Query [AQ6]** :Please provide the publisher location.

Response by Author: "Madrid" ↑

8. **Query [AQ7]** :Please provide the publisher location.

Response by Author: "Madrid" ↑

9. **Query [AQ8]** :Please provide the journal title.

Response by Author: "Journal of Geography Education" ↑

10. **Query [AQ9]** :Please provide the publisher location.

Response by Author: "I do not know the location. It is a school textbook." ↑

11. **Query [AQ10]** :Please provide the publisher location.

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12. **Query [AQ11]** :Please provide the publisher location.

Response by Author: "Alzira (Spain)" ↑

13. **Query [AQ12]** :Please provide the publisher location.

Response by Author: "Alzira (Spain)" ↑

14. **Query [AQ13]** :Please provide the publisher location.

Response by Author: "I do not know the location. It is a school textbook" ↑

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Response by Author: "I do not know the location. It is a school textbook." ↑

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17. **Query [AQ16]** :Please provide the publisher location.
Response by Author: "I do not know the location. It is a school textbook." ↑

18. **Query [AQ17]** :Please provide the publisher location.
Response by Author: "I do not know the location. It is a school textbook." ↑

19. **Query [AQ18]** :Please provide the publisher location.
Response by Author: "It is an online
library:<https://onlinelibrary.wiley.com/doi/book/10.1002/9781118548165>
" ↑

20. **Query [AQ19]** :Please provide the publisher location.
Response by Author: "Madrid" ↑

21. **Query [AQ20]** :Please provide the publisher location.
Response by Author: "Buenos Aires" ↑

22. **Query [AQ21]** :Please note that the ORCID section has been created from information
supplied with your manuscript submission/CATS. Please correct if this is inaccurate.
Response by Author: "Ok" ↑

Author Approve Comments

1. **Author** [10/12/2022 10:02:22 PM] : I confirm