Hydrol. Earth Syst. Sci. Discuss.,

Interactive comment on "Assessing changes on urban flood vulnerability through mapping land use from historical information" by M. Boudou et al.

We thank the three referees for their useful comments. The text has been reviewed according to the different comments. We added information on the state of art and on hydrological characteristics of the two flood events. We used a more precise vocabulary on vulnerability and multidisciplinarity.

About 20 additional references have been added plus an auxiliary material, with a detailed list of archives sources used to describe the two flood events.

The 9 figures have been corrected and a new figure has been added on the evolution of the number of inhabitants during the 20th century on the two cities.

Anonymous Referee #1
Received and published: 27 July 2015

General comment

The paper focuses on two flood events that, with a span of twenty years (1910 and 1930), hit two cities in France. The authors analyze how the vulnerability of these towns has changed since then, using detailed maps drawn from historical information. The authors have interesting historical documents. With these they try to define the new vulnerability of the two towns as if a similar event as 1910 and 1930 would arise again today. The study is interesting, pleasant, and definitely improvable. The paper follows the classic pattern: Introduction, General Settings, Methodology, Results, Conclusion, even if the authors do not use these specific terms.

In the paper a number of errors and inaccuracies have been noticed, some grammar ones, others due to distraction. In the introduction it is possible to point out misuse of verbs (use of the present perfect in place of simple past / errors on the paradigm of irregular verbs and use of); in the paragraphs 3.1 and 3.2 some blunders concerning the adverbs; in the paragraphs 3.4 and 4.1, unfamiliarity in the use of conjunctions and verbs again; 4.3 a mix-up in the relative pronouns ("Which return period" should be, instead, "Whose return period"). In the conclusions I also read "the age of population age", that I cannot understand ... The quality is really poor and the result is a very elementary grammar level. I think that a paper written for a French journal and later translated into English.

The English has been checked by an English native teacher, Michael Carpenter, professional translator

In the paper: there is a lack: a paragraph in which the authors analyze similar papers published worldwide. Papers in which other authors have: a) Underlined the importance of the historical data as a tool for risk assessment (Glade et al, 2001; Luino, 2002; Tropeano and Turconi, 2004; Coeur and Lang, 2010 and many other papers) b) Compared floods of the past with the future (also by means of hydraulic modeling) in order to assess the hazard, the risk, and vulnerability. This paragraph is not present and the authors should fill in the void.

A new paragraph has been added (introduction)

I would suggest that the authors, after analyzing the vulnerability, could hint at the forms of insurance provided in France. The calculation of the vulnerability necessarily leads to the conclusion of stipulating some kind of insurance.

The aim of the paper is rather to demonstrate the interest of historical information on land use to better understand the vulnerability conditions during past floods than to go in detail with the recent evolution of vulnerability conditions. We expect these second topic is more in relation with the insurance prospects. Meanwhile, we add in conclusion some perspectives on the interest of vulnerability analysis for the insurance system.

NOTES IN THE TEXT

Page 6152 *LINE 1: The term "diachronic" puzzles me: even if it is used in geology, I would like that the authors would use were using some other term.*

Corrected

LINE 5: "the XXth century–" ADD "– as a function of certain parameters such as the intensity and severity of the flood and spatial extension of damage".
Corrected

LINE 25: Add at least two other references (De Bruijn, K.M., 2005; Schanze, 2006; Cardona et al, 2012).
Added

Page 6153 *To lead, led, led. . . not LEADED.*
Corrected 4 times

Page 6155 *LINE 11 and 23: please, at the end of the sentence insert the estimated damage in French Franc (1910) with today currency revaluation of today (example = 2.5 million of euros).*
Corrected

Page 6156 *LINE 1: for the "accumulation of pieces of wood" the authors can utilize the term "jam log", commonly used for the flood.*
Corrected

LINE 4: which work? Reference.
Added (end of section 2.2)

LINE 17: indicate the source who estimated the damage.
Added

Page 6157 *LINE 6: NOT hundreds! But hundred.*
Corrected

The question is "All the structures and infrastructures realized after the Second World War how are influencing the study area? A new railway embankment or some large commercial centers, or a new bridge how could change the dynamic of the flood?". The authors have considered that?
Corrected in last sentence of section 5

Page 6158 *Line 9: "efforts" can be substituted with "work".*
Corrected

Page 6159 *Line 18: insert the website (http://www.eea.europa.eu/data-and-maps/data/urban-atlas)*
Added

Page 6162 *LINE 10: insert new reference Luino et al. (2012).*
Added

Page 6163 *LINE 9: "Ancient" is good for the "Ancient Greece, ancient Rome". I propose: "..by two floods occurred in January 1910 and.."*
Corrected

LINE 14: "Qualitative information (pictures, technical reports, national and local newspaper articles, paintings, marble plaques, etc.)..". It should be better to list all qualitative information we commonly use. . . besides the maps.
Added

Page 6168 *Figure 1: On the right: it is not clear the method adopted. It should be better a short explanation. . . here or in the text. What is the meaning of/what does it mean 3.5 to 14? 3 to 12? 2 to 8? I have found the definition "remarkability score" in the paper "Characterization of remarkable floods in France, a transdisciplinary approach applied on generalized floods of January 1930" (EGU 2014). In addition, in another one "Assessing changes on urban flood vulnerability through mapping land use from historical information" (2015).*
Addition in section 2.1 of the ranges of the three criteria + 1 reference of Boudou et al. (2015)

I suggest changing it in "criticality level", used in many scientific fields.
Caption. I suggest: "..9 most remarkable French floodings selected.."
Legend: NOT 3,5 but 3.5.
Fig. 1 corrected

Page 6172 *In the figure the blue circles are not well distinguishable. Please, use different tone of blue (pale, medium, dark). There are 5 different size circles in the map. Please, check them.*
Fig. 5 corrected. We checked the different 5 size circles, proportional to the number of fatalities and didn't see any error.

Caption: in the figure 4 there is not the date of the event, the year only. Erase "3 March" for uniformity with the previous figure.
Fig. 4 corrected. As the day of the flood is an important information when dealing with the flood chronology, we prefer to add the day on figure 4

Page 6177 *Figure 10: Why the figures in the upper part are cut at the level of the railway. For uniformity with figures 9 it should be better to enlarge them (or cut the figures 9).*
Fig. 10 corrected

Caption: NOT 1910, but 1930.
Corrected

References
De Bruijn, K.M. (2005) - "Resilience and flood risk management: a systems approach applied to lowland rivers".
Luino F., Turconi L., Petrea C., Nigrelli G. (2012) - "Uncorrected land-use planning highlighted by flooding: the Alba case study (Piedmont, Italy)".
Schanze J. (2006) - "Flood risk management – A basic framework"
Tropeano D. & Turconi L. (2004) - Using Historical Documents for Landslide, Debris Flow and Stream Flood Prevention. Applications in Northern Italy. www.eea.europa.eu/dataand- maps/data/urban-atlas
Added

Maria-Carmen Llasat
Received and published: 3 August 2015

This paper offers an interesting approach to the analysis of the changes that could be produced in the flood exposure and vulnerability as a consequence of the changes in land uses, demography and buildings. To this end the authors compare two catastrophic flood events produced in 1910 and 1930 in two little French cities. The main interest of the work would be its application to adaptation and mitigation strategies, and its reproduction in other cases study is revealed as useful for the flood community. For this reason, and although the paper seems to be based in a very rigorous work (the PhD of M. Boudou) I would recommend some minor changes before to be published in order to facilitate to the reader, the criteria and methodology applied.

General Comments
One of the main problems is the concept associated to the expressions flood vulnerability and flood exposure that should be clearly defined in the Introduction. This last is too much short and due credit to other works in the same matter has not been made. I would suggest developing a little more the Introduction, coping with the concepts of vulnerability and exposure (there are a notable controversy between the different authors and administrations about them) and any previous literature on the topic of this paper.
We added a paragraph in the introduction in order to highlight these aspects.

Specific Comments
P. 6154, l.13. *Could you include the criteria to define a "major flood"? You say afterwards that three points are considered, but they are very general. The same in Figure 1*
We added a sentence (beginning of section 2.1) to explain how the 176 major floods in France have been selected.

P. 6154, l.20. *Which is the second level?*
We added a sentence to explain that the first level consists in ranking the 176 major floods, as the second level focusses on 9 flood events, based on a good diversity of flood types and a high position within the ranking. The paper used two case studies belonging to the sample of 9 flood events.

P. 6154, l.26. *You speak about a "evaluation grid", could you provide it?*
The main features of the evaluation grid are presented on the beginning of section 2.1. We added the reference of Boudou et al. (2015).

p. 6155, l.7. *In the figure 1, the 1910 event has not one of the "highest score".*
The rank is fifth. It has been corrected in the text

p. 6155, l.8. *Return period near 100 years, for flow or rainfall? In which river was it? The Seine? Or in Besançon?*
It is related to discharge within the Seine basin. Added to the text (section 2.2)

p. 6155, l.10-11. *What is the mean here of "indirect deaths"? How do you know that 150000 people was affected by the 1910 event in Paris?*
We added some explanation on the indirect deaths (section 2.2)

p. 6155, l.11. *1,5 billion of euros of which year? Usually damages are adjusted by changes in the gross value to a specific year near to the present. Could you indicate it? The same for l. 23, and other economic damages estimated along the paper.*
Same remark than Anonymous Referee #1. We add the estimated damage in French Franc (1910) with today currency revaluation (2015) + reference to Picard (1910)

p. 6155, l.17. *Could you introduce in a bracket the value of this maximum water level?*
We added a reference to figure 3 where the longitudinal water level profile has been reported for 3 floods (1910, 1882, 1896).

p. 6155, l.17-19. *This short meteorological explanation should be placed at the beginning or at the end of the paragraph, but not in the middle of a section focused on the impacts.*
In fact, we started section 2.2 by some sentences on the 1910 flood on the Seine basin. Then, we explained that we will focus on the Doubs basin. That is why the meteorological explanation is placed here. We added some words to explain that the meteorological genesis on Doubs basin is different from the Seine basin.

p. 6156, l.4. *Attending the description the problem was in the flood "management".*
We suspect that the remark is related to **p. 6157, l.4**
The problem was in fact twofold: surprise effect due to flash flood and dyke breaking, plus specific houses vulnerability. The text has been refined (section 2.3).

p.6156, l.13. *Could you include the flow value achieved in the Tarn? I suppose is 8000 m3/s, following your explanation, but in this case, which would be the return period? (significantly larger than 100 years could be 200 or 500…). What is the average discharge of the Tarn in Moissac?*
Additional information has been inserted in the text
The average discharge at Moissac is 230 m^3/s (section 2.3).

p.6156, l.16. *In English language is 20th century, not XX century.*
Corrected (section 2.3).

p.6158, l.5-9. *Could you indicate the historical sources of information you have used?*
Please refer to auxiliary material

p.6158, l.19-24. *Could you include a table with those "simplified descriptors"?; why you associate structural exposure with urban growth but structural vulnerability with land-uses? Usually structural vulnerability refers to the capacity of the buildings in front of the specific risk. In the following page, lines 16-20, it seems that you interchange the concepts because you associate structural exposure to land-use classification. The same problem is observed in p.6161, l.3, when you associate structural vulnerability to urbanized area. Figure 6 cannot help to understand it*

We corrected the use of structural vulnerability and structural exposure and decided to use the terms of susceptibility and exposure with regards to the state of arts available on this question.

p. 6159, l.4. *How many historical maps? For which years?*

We added the number of historical maps and aerial photograph used and their complete description is available in the auxiliary materials (3rd paragraph of section 3.3).

p. 6160, l.13. *How do you know the building height? Does Equation 1 explain the volumetric method?*

The building height is provided by the BD Topo data set. A phrase has been added to explain this fact.

p. 6161, l.21-23. *When you represent the flood extension in 2013, do you consider the existence of new structural flood protection measures like the river channeling or new dikes?*

In section 4.2 we reported the 1930 flood extent on two maps representing the land use in 1930 and in 2013. We finish the paper (end of section 5) by the mention of a future possible work on the mapping of flood extent of past floods, accounting for the morphological changes of the river, river engineering work and settlements within the flood plain, from the past to today. A sentence has been added at the end of section 5

p. 6162, l.12. *Why the flood risk vulnerability decreased since 1910?*

The sentence has been corrected (section 4.3)

Anonymous Referee #3

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General Comments

The topic of Boudou et al.'s article is perfectly suited to the thematic issue of HESS entitled "Floods and their changes in historical times - a European perspective". It combines in an interesting way data from historical archives, an original cartographic analysis together with flood management issues in urban areas and research policy from different perspectives. I think, it can be published in this issue. However, several paragraphs require modifications, supplementary informations and important clarifications.

First, with regards to the poor English level of the paper, I agree with the first anonymous reviewer's comment. The full manuscript (text, figures and legends) should be proofread carefully and corrected for spelling, grammar, and content by a native English speaker because the standard of English does not reach the required scientific level of a journal like HESS. In some cases authors need to choose more appropriate expressions and to avoid invented words (see the following proposals for text and figures). You frequently use inappropriate terms in many of your sentences. Some expressions don't exist in English. . . or you use them in wrong place sometimes (awkward turns of phrase)! Authors should use more accurately the existing English vocabulary especially about hydrological and geomorphological questions. Punctuation should also be checked and adjusted. For now, the result is sloppy and quite unpleasant to read. And, from this point of view, it should be redone neatly.

The English has been checked by an English native teacher, Michael Carpenter, professional translator

I agree with the other reviewer about the lack of a paragraph in which the authors analyze similar papers published worldwide. A brief panorama dealing about main floods for both cities throughout their respective histories is also lacking, it's the leading subject of this thematic issue of HESS... (between 4 and 5 lignes for each city). Such addendum seems needful in paragraphs 2.3 and 2.2. (quoting, for example, Champion

(1858-1864) and Alexandre (1987) but also local existing bibliography referring to historical floods). About this aspect, authors have to complete their bibliography which is too sketchy.
A new paragraph has been added in introduction with references of works using historical information for a better risk management. Additional references have been added about the hydrological characteristics of the two events (sections 2.2 and 2.3)

Much more detailed explanations are needed about these rainfall events (January 1910 flood and March 1930 flood): intensity, duration, quantity, etc. The maximum flood peak discharges reached during these two events are also required (more the annual mean discharges and the 10/100/1000-year flood peak discharges, if available). Does it exist recent explanations about origin of these phenomena? How were they related to known specific critical meteorological mechanisms? For example, the St. Mary Magdalene's flood, the largest recorded flood in central Europe in July 1342, was attributed to the well-known Genoa Cyclogenesis, Ligurian Depression (or V(5)-track cyclone). Maybe, is this the case for these two unusual climate events?
Additional information is now available about the hydrological characteristics of the two events (sections 2.2 and 2.3)

Have you considered the evolution/variation of the floor elevation in each city over time and riverbeds' elevation (aggradation or incision)?
The main subject of the paper is to compare the flood vulnerability, when the flood occurred (e.g. in 1910 or 1930) and today. So, we didn't account on changes about flood hazard. The last sentence in section 5. Conclusion leaves open this question for future work.

You must also add informations about physical and geographical characteristics of both studied catchments (local floodplain topography) but also dimensions of the runoff area upstream from Besançon and Moissac (including the number of tributaries). All these informations should be summarized in a large table then set in a file for the additional material.
We added the catchment area of Doubs and Tarn rivers (resp. at Besançon and Moissac). The detailed presentation of the catchments is already available in Lang and Coeur (2014).

Moreover, a detailed checklist of each document from archives (reference numbers, databases) together with their exact locations (Municipal, District or National archives) must be given. This is a minimum requirement in a work mainly based on historical written/cartographic archives!
We added an auxiliary material including the main sources exploited and their location. A foot note has been inserted at the end of section 2.1

In the paragraph named "Census of the exposed population within the flood extent" (3.4) it would be interesting to describe at length data involved in analysis (equation) that you mention in your article (additional material) but also to present numerical results used to draw various maps shown in figures.
Please refer to auxiliary material

A graph showing evolution of the population for both cities since the early XXth century would also be very welcome.
A new figure 7 has been added + corresponding text (first paragraph of section 3.4)

What kind of solutions/measures was found by both cities (or by local societies) to cope with floods throughout the twentieth century?
Such point has been addressed in section 4.3. At Besançon, the reference flood is larger than the 1910 flood, and some engineering works are in process to close the free postern-gates , which allowed in 1910 to have water inlets within the old city centre. At Moissac, building quality has been improved and flood warning efficiency has been largely improved.

At last, the conclusion paragraph is too short, especially the "perspectives" part, it should be improved by highlighting more clearly implications of obtained results in (urban) river flood risk management policies (local, national or transnational). So, the Xynthia storm was not a good example because dramatic floods and their resulting damages which have occurred didn't originate in a flooded river. . ., it exist many other relevant examples in France and Europe.
See additional sentences in section 5

Instead, unlike what is stated in the report of the first anonymous reviewer, the term "diachronic" don't bother me. Indeed, it is frequently used in environmental history, in landscape ecology or in paleoecology.
The term "diachronic" has been removed

But conversely, the notion of "transdisciplinarity" appears more problematic. "Transdisciplinary" generally refers to "a paradigm or vision that transcends narrow disciplinary worldviews through overarching synthesis", it's the last level - the ultimate degree of coordination - in integrative research approaches. You surely use data from various academic disciplines (e.g. "interdisciplinarity") but do you combine this interdisciplinarity with a participatory approach? I'm not sure that your work (Ph.D) was really a participatory research! "Transdisciplinary research is projects that involve academic researchers from different unrelated disciplines as well as nonacademic participants, such as land managers, user groups and the general public, to create new knowledge and theory and research a common question (Tress et al., 2005)". This junction between various academic disciplines/scholarly research and non-academic participants, towards a common goal to overcome the split between science and society, is specific to transdisciplinarity but unfortunately its implementation is uncommon In research practice (disputes between academic scholars, supremacy of the hard sciences over the Humanities and Social Sciences or trouble of communication between paradigms because of a problem of translation -> the famous "Thomas Kuhn theory", etc.). I suggest you read specific and relevant articles of Tress & Tress (2001) and Tress et al. (2005) summarizing pluridisciplinarity, interdisciplinarity and transdisciplinarity research concepts. After having read these articles you could redefine your view of "transdisciplinarity".
In fact, the use of "transdisciplinary" term was excessive. It has been changes (2 times) by "multidisciplinary".

Proposals of corrections to the original text
- PAGE 6152: ligne 2 *"two ancient floods" -> "TWO PAST FLOODS"*
Corrected (abstract)

- PAGE 6155 : ligne 11 *"There were a relatively small number of fatalities (4 direct + 11 indirect deaths), but the impact within the Paris region was extremely high, with 150 000 affected people and about 1.5 billion of euros of damages" -> (A REFERENCE PLEASE ?)*
Reference to Picard (1910) has been added

- PAGE 6157: ligne 7 *"vulnerable to water crushing forces"-> "VULNERABLE TO FLOOD-INDUCED FORCES (SUCH AS FLOTATION, LATERAL PRESSURES, OR MOVING WATER)"*
Sentence has been reworded (end of section 2.3)

- PAGE 6157: ligne 8 "*damaging process"-> "DESTRUCTION PROCESS"*
Sentence has been reworded (end of section 2.3)

- **PAGE 6159: ligne 27** *"for ancient time" -> "EARLIER HISTORICAL PERIODS" or "EARLIER TIMES"*
Corrected (end of section 3.3)

- **PAGE 6161: ligne 16** *"(reduction of inhabitants per building)" -> "(A DECLINE IN THE NUMBER OF INHABITANTS PER BUILDING)"*
Corrected (end of section 4.1)

- PAGE 6161 : ligne 20 *"surface areas spread by" -> "INCREASE" or "EXPANDE"*
Corrected (end of section 4.2)

- PAGE 6163: ligne 2 *"especially due to progress in flood warning and population evacuation by the civil protection services" -> "DUE TO PROGRESS IN BOTH FLOOD WARNING DECISION-MAKING AND EMERGENCY POPULATIONEVACUATION SCHEME BY THE CIVIL PROTECTION SERVICES"*
Corrected (end of section 4.3)

- PAGE 6163: ligne 5 *"is considered as the reference flood hazard in the local regulatory document of flood risk" -> "IS CONSIDERED AS THE REFERENCE FLOOD HAZARD BOTH FOR THE LOCAL FLOOD RISK MANAGEMENT STRATEGY AND PLANNING AND DEVELOPMENT DOCUMENTS".*
Corrected (end of section 4.3)

- PAGE 6163: ligne 9 *"ancient floods" -> "PAST FLOOD EVENTS"*
Corrected (section 5)

- PAGE 6163: ligne 17 *"as well from ancient censuses" -> "AS WELL FROM OLD CENSUSES"*
Corrected (section 5)

- PAGE 6164: ligne 5 *"taking into account modifications of the river and flood topography and hydraulic works (dikes, weir, dams . . .)" -> "TAKING INTO ACCOUNT CHANGES IN RIVERBED ELEVATIONS AND FLOODPLAIN TOPOGRAPHY BUT ALSO IMPACTS OF HYDRAULIC INFRASTRUCTURES (LIKE DIKES, WEIR, DAMS, ETC...)"*
Corrected (end of section 5)

Proposals of corrections to the original figures and legends:
Presentation and layout of maps and figures must be exactly the same (e.g. shape and color of symbols, north arrows, please select always the same location for copyrights and authors, kilometers in English not Kilomètres in French, etc.).
Corrected

- FIGURE 1 : *"Hydrographic districts" -> "HYDROGAPHIC BASINS" or "DRAINAGE BASINS"*
Corrected

- FIGURE 2: *"catchement area studied"-> "CATCHEMENT STUDIED"*
Corrected

- FIGURE 3: *"longitudinal profile" -> "LONG PROFILE OF THE DOUBS RIVER"*
"Longitudinal profile of the Doubs River and flood inter-comparison" -> LONG PROFILE OF THE DOUBS RIVER AND WHAT IS THE PRINTING DATE OF THE ORIGINAL PROFIL (ARCHIVE NUMBER) ? FROM THE SERVICE HYDRAULIQUE OF THE DOUBS DISTRICT? IN WHICH PART OF THE RIVER BASIN THIS LONG PROFILE IS LOCATED? AND, HOW FAR FROM THE CITY OF BEANÇON ? IN MY OPINION THIS FIGURE IS NOT RELEVANT FOR THIS ARTICLE. ITS REMOVAL MUST BE DISCUSSED.
In fact, this figure gives a very interesting information on specific energy losses in the center of the city, that explains why the water level was so high despite the discharge was not extreme. We added some cross-reference with figure 4 that helps to locate the bridges and the complete source of the document).

- FIGURE 4 : *"water entries" -> "WATER INLETS"*
Corrected

- FIGURE 5: *"City center" or "city centRE" ?*
Both are possible. We choose the following naming convention "City centre" (fig. 4, 5)

- FIGURE 7 : *"Land use classification" -> "LAND-USE TYPE CLASSIFICATION"*
"Land use and occupation within the 1910 flood extent in Besançon: (a) in 1910; (b) in 2013" -> "LAND-USE TYPES AND SOIL OCCUPATION WITHIN THE 1910 FLOOD EXTENT IN BESANÇON: (A) IN 1910; (B) IN 2013"
Continous urban fabric -> "HIGH DENSITY URBAN AREA"
Discontinuous urban fabric -> "MEDIUM DENSITY RESIDENTIAL
" parking -> "PARKING LOT"
Economic activity building -> "INDUSTRIAL, BUSINESS PARK, RETAIL CENTER"
Garrison/barrack -> "MILITARY LAND"
Education -> "EDUCATIONAL"
Administrative, cultural, religious or health building -> "INSTITUTIONAL, PUBLIC FACILITY, OFFICE,..."
Corrected

- FIGURE 8 : *"Estimated population per building within 1910 flood extent in Besançon: (a) in 1910; (b) in 2013" -> "ESTIMATED NUMBER OF INHABITANTS PER BUILDING WITHIN THE 1910 FLOOD EXTENT AREA IN BESANÇON (A) IN 1910; (B) IN 2013"*
THERE IS A PROBLEM IN THIS FIGURE: 1910 OR 1911?
"Estimation of the population living in the building" -> "ESTIMATED NUMBER OF INHABITANTS PER BUILDING"
Corrected

- FIGURE 9 : *Land use classification -> "LAND-USE TYPE CLASSIFICATION"*
Residential discontinuous sparse building -> "SMALL LOT RESIDENTIAL"
Residential discontinous building -> "MEDIUM DENSITY RESIDENTIAL"
Residential continous building -> "HIGH DENSITY RESIDENTIAL"
Economic activity building -> "INDUSTRIAL, BUSINESS PARK, RETAIL CENTER"
Education -> "EDUCATIONAL"

Parking -> "PARKING LOT"
Administrative, cultural, religious,... -> "INSTITUTIONAL, PUBLIC FACILITY, OFFICE,..."
FOR THE "BUILT-UP AREA" MAYBE YOU COULD USE THE SAME CLASSIFICATION AS FOR THE WHOLE CITY?
Corrected
In fact, the built-up area does correspond to the locations outside the flooded area

- Figure 10: "*Estimation of the population in the building" -> "ESTIMATED NUMBER OF INHABITANTS PER BUILDING"*
Estimated population per building within 1930 flood extent in Moissac: (a) in 1910; (b) in 2013" -> "ESTIMATED NUMBER OF INHABITANTS PER BUILDING WITHIN THE 1930 FLOOD EXTENT AREA IN MOISSAC (A) IN 1910; (B) IN 2013."
THERE IS A PROBLEM IN THIS FIGURE : 1910 OR 1930?
Corrected