



Don't play games with the rivers

Climate change and flash floods

Type of pedagogical project, activity, action, accompanying	Activity on flood prevention
Key words of relevant disciplines/ Pedagogical content	flood risk, flash floods, prevention, climate change, mitigation, adaptation
Problematic	Why do flash floods occur? How are they connected to climate change? What can we do in terms of prevention?
Thematic	major natural risks
Disciplines (sciences, geography)	Geography, physics, civic education
Pedagogical Objectives/New targeted skills	<p>The students will be able to:</p> <ul style="list-style-type: none"> - know how to minimise the risks they are connected to with floods and identify areas in danger. - become more prepared on facing the wide range of consequences that floods have.
Public target(s) (age, requested skills...)	Students of 12-15 years old
Description (step by step)	<p>Two (2) linked activities supported by worksheets and educational material (appendices at the end of this sheet)</p> <p style="text-align: center;">For both activities students form four groups of 4-5.</p> <p style="text-align: center;">1. The Mandra's flood disaster</p> <p>1.1 All students watch a part (2-3 min.) of a video from Mandra's flood (15-11-2017, Attika, Greece) https://www.youtube.com/watch?v=gPsXI91j0ok</p> <p>1.2. Each group is given four different passages from scientific documents referring to the connection between climate change and flash floods (Appendix 1-In the words of scientists). They read the passages.</p> <p>1.3. Using key words from the passages, each group fills in the 10 blank boxes of a semi-structured concept map (Appendix 2 – Semi structured concept map) (Appendix 3-Key words-concepts)</p> <p>1.4. Students of each group present their view, the solution is projected by the</p>





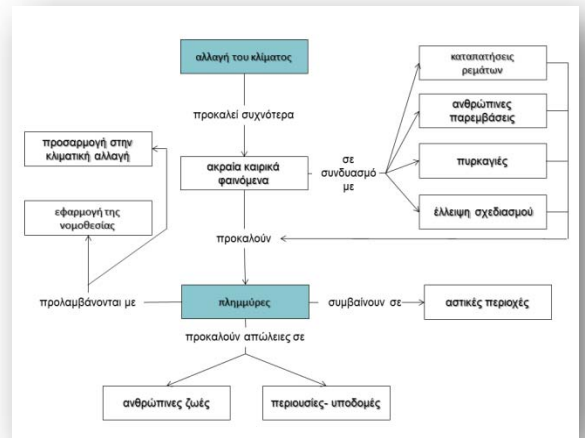
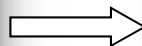
	<p>teacher (Appendix 4-complete map-solution) and, finally, all together discuss the results analytically. It is important for the discussion that the students make their own conclusions on what could be avoidable in the case of Mandra.</p> <p style="text-align: center;">2. Making more space for water</p> <p>2.1 All students watch the video of the Rhone - Mediterranean and Corsica Water Agency on how to manage rivers- taking care of flooding issues and applying river restoration principles. https://www.youtube.com/watch?v=iRr0_mVmxg8</p> <p>2.2 They are given a table (Appendix 5-table) with both bad (red box) and good (green box) practices on rivers management and their effects, respectively</p> <p>2.3 Using 12 different images-snapshots from the video (Appendix 6-images) they are asked to fill in the table.</p> <p>2.4 The students present their views, the solution is projected by the teacher (Appendix 7-solution) and they discuss the results.</p> <p>2.5 Finally, after a short discussion they make their own proposals-suggestions on the way institutions should cooperate in order to avoid events like floods (adaptation)</p>
Place (meeting room, outside space, ...)	Classroom
Individual and / or collective actions	Work in groups
Material needed	PC, projector, printed paper, markers, printed material (appendices)
Duration of pedagogical project or activity	2 hours
Evaluation of the new acquired skills	<p>The groups of students will be self-evaluated on the way they performed in the 2 assigned activities.</p> <p>Students will be evaluated also on the basis of the mitigation/adaptation proposals they will be able to think of in the final short discussion.</p>
Eco-citizen adaptation, knowledge enhancement and links to other topics	<p>Link to:</p> <ul style="list-style-type: none"> - Activity Nr 3: Activity on flood risks in your area - Activity Nr 18: Create a smartphone application to adapt to a natural major risk - Project G: Creating a communication campaign made by students for



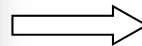


	<p>students and general public</p> <ul style="list-style-type: none"> - Project H: Adaptation to natural major risks by creating an application for smartphone - Knowledge sheet KS1: Climate Change & Floods - Knowledge sheet KS7: Adaptation to Climate change <p>Croatian:</p> <ul style="list-style-type: none"> • Croatian coastal town hit by heavy floods https://balkaninsight.com/2017/09/12/croatian-coastal-towns-heavily-flooded-09-12-2017/ <p>Greek:</p> <ul style="list-style-type: none"> • Introduction to water and Climate Change http://www.edutv.gr/index.php/perivalon-2/nero-kai-klimatologikes-allages • Examples of floods in Greece http://floodlist.com/tag/greece https://geomythiki.blogspot.com/2018/09/blog-post_13.html <p>Italian:</p> <ul style="list-style-type: none"> • Video about the floods in Alba https://www.youtube.com/watch?v=E8rw92UKSwo • About landslides and flood in Italy https://www.arpae.it/cms3/documenti/_cerca_doc/ecoscienza/ecoscienza2015_3/guzzetti1_es2015_3.pdf FR : http://www.apare-cme.eu/fr/ressources/section-2/topoguides <p>French:</p> <ul style="list-style-type: none"> • Vaison la Romaine 1992 • http://lithotheque.ac-aix-marseille.fr/Affleurements_PACA/84_vaison/84_vaison_index.htm
<p>Observations</p>	<p>Pilot implementation has been conducted in the classroom with students and in teachers' seminars</p> <p>Concept map, labels, table and images would benefit in being printed on A3 sheets.</p>





Implementation in teachers' training: *The Mandra's flood disaster* (Picture: ACEE)



ΠΕΡΙΠΤΩΣΕΙΣ	ΚΑΛΗ ΠΡΑΚΤΙΚΗ	ΚΑΚΗ ΠΡΑΚΤΙΚΗ	ΑΠΟΤΕΛΣΜΑ
1 ^η ΠΛΑΤΕΙ ΚΟΙΤΗΣ ΜΙΚΡΟ-ΜΕΤΑΛΛΟ			
2 ^η ΜΑΛΑΚΙΣΤΕ ΕΥΘΕΙΑ ΡΟΗ			
3 ^η ΣΥΝΟΙΚΙΑ ΑΞΕΛΑΝΗ ΑΠΟΡΡΙΦΤΕΣ			





Implementation in the classroom: *Making more space for water* (Picture: ACEE)



APPENTIX 1: IN THE WORDS OF SCIENTISTS

A. "...This extreme meteorological condition combined with deforestation of nearby forest due to forest fires and human interventions on streams resulted to this tragic event. ...Destabilization of climate in Greece due to human interventions has started the last 40 years and it is expected to continue for the next 100. The frequency of extreme weather conditions appearance is going to become more frequent and more intense for the next decades. This is proved through all scientific models we have worked through the last years. There is a necessity for institutional framework's redesigning of climate change adaptation concerning extreme weather conditions such as floods and other phenomena."

Christos Zerefos, Professor of Atmospheric Physics (about Mandra-Attica floods)

B. "...Floods are connected to continuously increasing extreme weather conditions resulting to multiple indirect impacts like destructions, loss of property, social discontent etc. Shrinkage of permeable surface of Athens, deforestation of suburbs due to forest fires, restriction of the old streams due to their covering combined with increasing storm water, lack of rainwater system resulted in more frequent flood phenomena in Attica basin in early 2000, namely already before the climate change deterioration."

diaNEOsis Climate Change Impacts to Development. Vulnerability of Athens basin to Floods. (2017, June)





C. “«... Floods are high risk phenomena connected to weather conditions and badly affected by climate change. They are the most frequent, most costly and most fatal natural disasters in a global level. International data base of disaster has listed 85 million euros damages since 1900 connected to floods, in the Mediterranean countries. Destructive floods occur more frequently in some Mediterranean countries than the rest of Europe. It is due to local climate which usually causes sudden rainfalls.

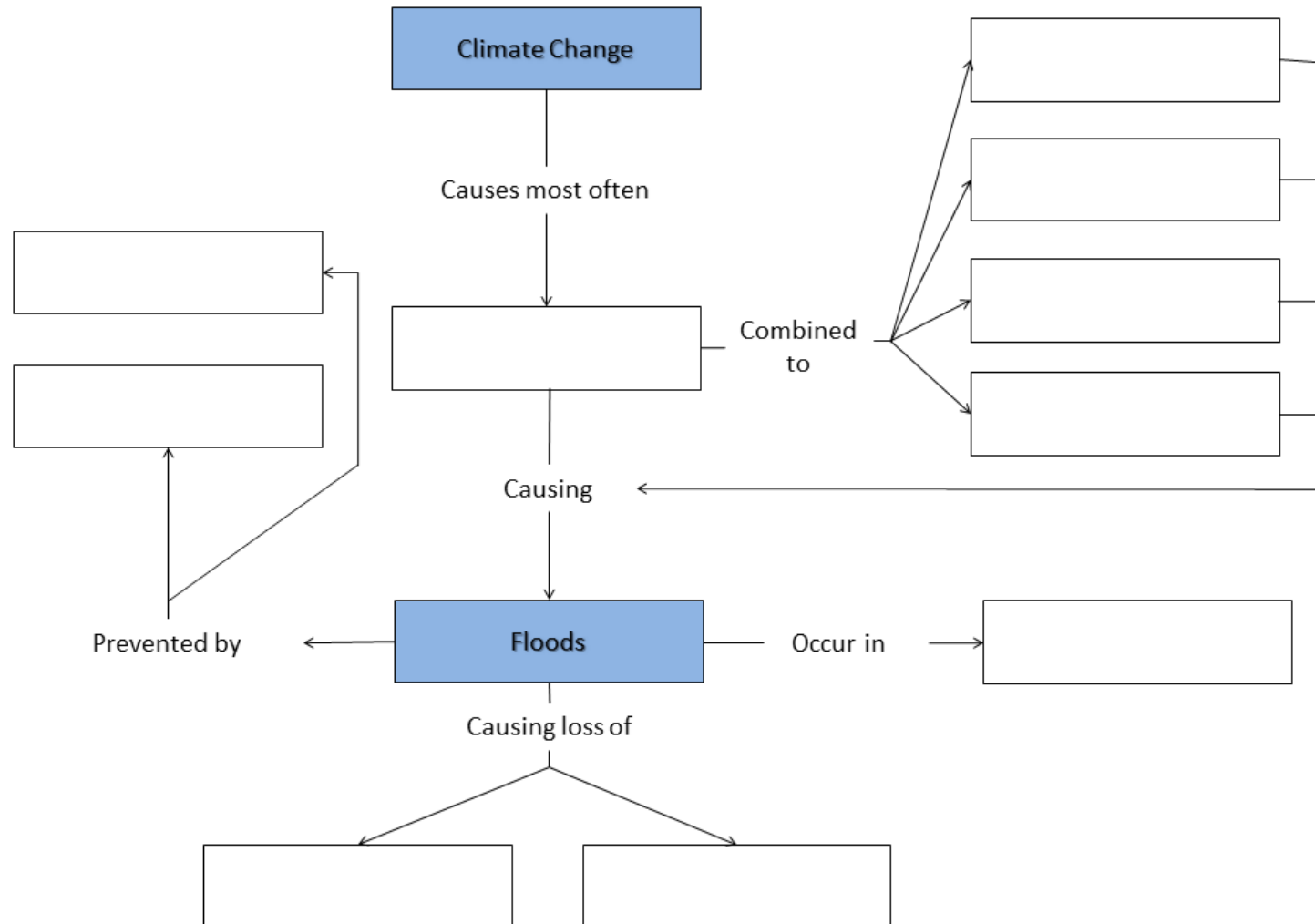
HAL: Extreme flood phenomena and flash floods in Mediterranean Sea (2017, February)

D. “A warmer climate, with its increased climate variability, will increase the risk of both floods and droughts. Human encroachment into flood plains and lack of flood response plans increase the damage potential. As there are a number of climatic and non-climatic drivers influencing flood and drought impacts, the realisation of risks depends on several factors. Floods depend on precipitation intensity, volume, timing, antecedent conditions of rivers and their drainage basins (e.g. soil character, urbanisation, and existence of dikes, dams). Human encroachment into flood plains and lack of flood response plans increase the damage potential. A robust result, consistent across climate model projections, is that higher precipitation extremes in warmer climates are very likely to occur. Precipitation intensity increases almost everywhere, but particularly at mid- and high latitudes where mean precipitation also increases. This directly affects the risk of flash flooding and urban flooding. Storm drainage systems have to be adapted to accommodate increasing rainfall intensity resulting from climate change”.

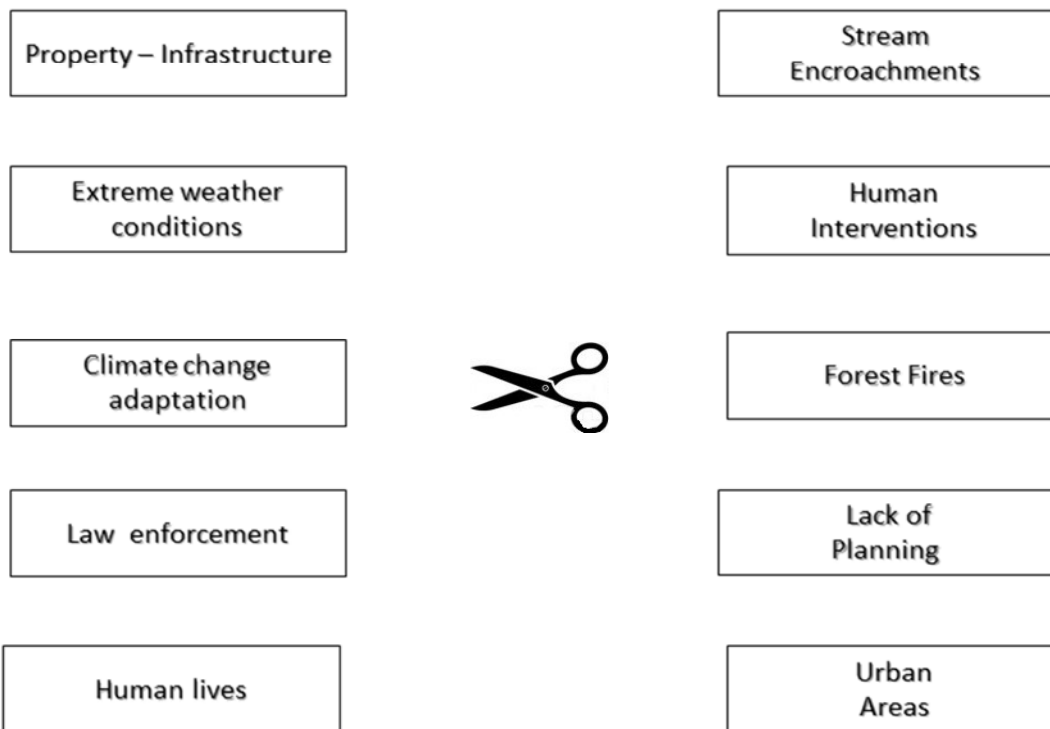
Intergovernmental Panel on Climate Change (IPCC) Freshwater resources and their management. Climate Change 2007: Impacts, Adaptation and Vulnerability



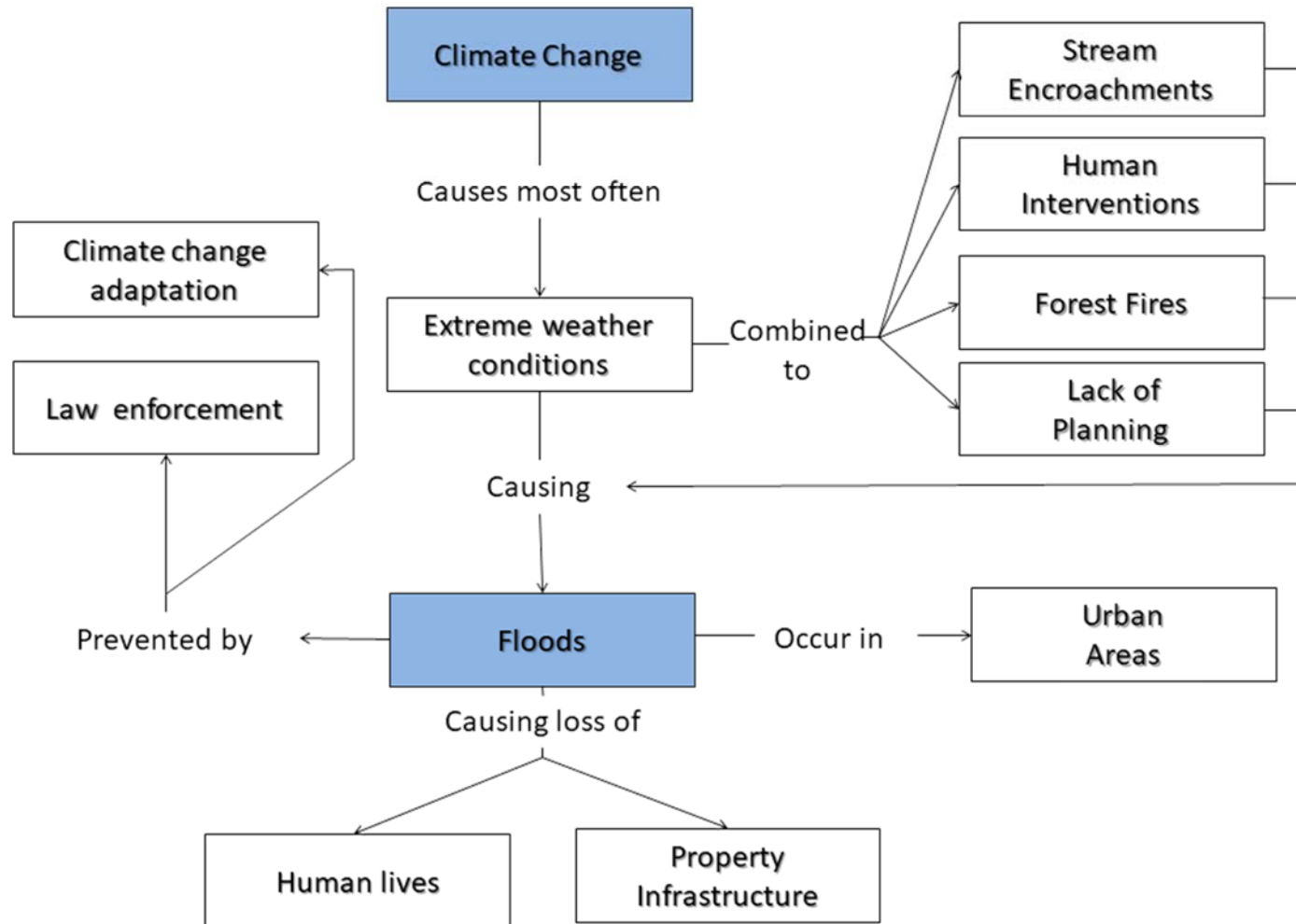
APPENTIX 2: SEMI STRUCTURED CONCEPT MAP



APPENTIX 3: KEY WORDS - CONCEPTS



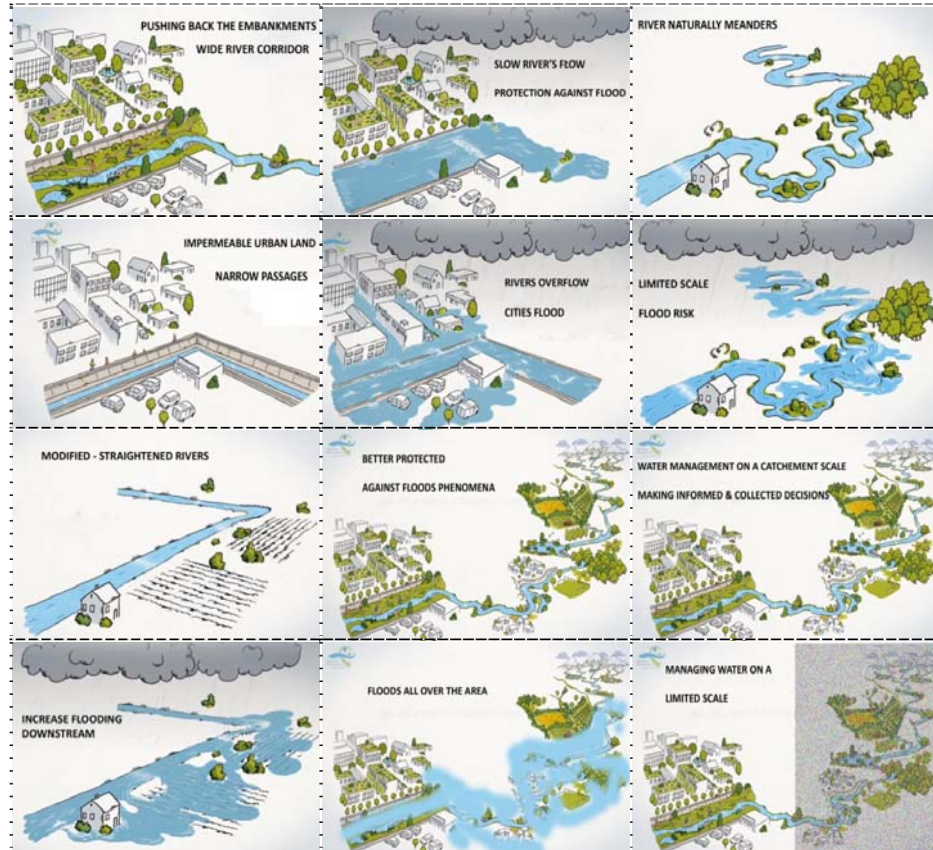
APPENTIX 4: COMPLETE MAP (SOLUTION)



APPENDIX 5: TABLE

CASES	GOOD PRACTICE	BAD PRACTICE	RESULT
1 ST RIVER'S CORRIDOR (NARROW- WIDE)			
2 ND RIVER'S FLOW (MEANDER-MODIFIED- STRAIGHTENED)			
3 RD CATCHMENT (PARTLY-TOTALLY MANAGED)			

APPENDIX 6: IMAGES



APPENDIX 7: COMPLETE TABLE (SOLUTION)

CASES	GOOD PRACTICE	BAD PRACTICE	RESULT
1ST RIVER'S CORRIDOR (NARROW- WIDE)			
2ND RIVER'S FLOW (MEANDER-MODIFIED- STRAIGHTENED)			
3RD CATCHMENT (PARTLY-TOTALLY MANAGED)			