



# Ne igrajte se s rijekama

## Klimatske promjene i bujične poplave

|                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Tip pedagoške aktivnosti</b>                       | Učenje o prevenciji poplava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Ključni pojmovi za uključena nastavna područja</b> | opasnost od poplave, bujične poplave, prevencija, klimatske promjene, ublažavanje, prilagodba                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Problematika</b>                                   | Zašto dolazi do bujičnih poplava? Kako su povezane s klimatskim promjenama? Što možemo učiniti u svrhu prevencije?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Tema</b>                                           | Prirodne ugroze                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Nastavno područje</b>                              | Geografija, fizika, građanski odgoj                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Ciljne kompetencije</b>                            | Učenici će:<br>- znati kako umanjiti rizike povezane s poplavama i identificirati ugrožena područja<br>- biti spremniji za suočavanje sa širokim rasponom posljedica koje poplave imaju.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Ciljne skupine (dob, potrebno predznanje...)</b>   | 12 – 15 godina                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Nastavni scenarij (korak po korak)</b>             | <p>Dvije povezane aktivnosti s radnim listovima i obrazovnim materijalom (prilozi na kraju ovog lista).<br/>Za obje aktivnosti učenici rade u skupinama od 4-5 učenika.</p> <p><b>1. Poplava u Mandri</b></p> <p>1.1 Učenici gledaju dio (2-3 min) videozapis poplave u Mandri (15.11.2017., Attika, Grčka) ; <a href="https://www.youtube.com/watch?v=gPsXl91j0ok">https://www.youtube.com/watch?v=gPsXl91j0ok</a><br/>1.2. Svaka skupina čita različite odlomke iz znanstvenih dokumenata koji se odnose na povezanost klimatskih promjena i bujičnih poplava (Dodatak 1: <i>Riječima znanstvenika</i>)<br/>1.3. Korištenjem ključnih riječi iz odlomaka, svaka skupina ispunjava 10 praznih okvira polustrukturirane umne mape (Dodatak 2: <i>Polustrukturirana umna mapa</i>) (Dodatak 3: <i>ključne riječi-koncepti</i>)<br/>1.4. Učenici svake skupine iznose svoje viđenje, rješenje projicira učitelj (Prilog 4: <i>cjelovita karta-rješenje</i>) i, na kraju, svi zajedno analitički raspravljaju o rezultatima. Za raspravu je važno da učenici donose vlastite zaključke o tome što bi se moglo izbjeći u slučaju Mandra.</p> <p><b>2. Napravite više prostora za vodu</b></p> |

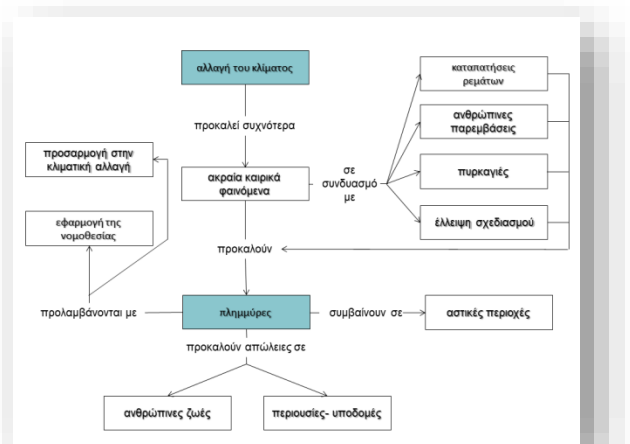
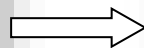




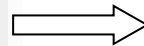
|                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                      | <p>2.1 Učenici gledaju video <i>Mediterransko-korzikanske agencije za vode</i> o tome kako upravljati rijekama, primjenjujući načela obnove rijeka (<a href="https://www.youtube.com/watch?v=iRr0_mVmxq8">https://www.youtube.com/watch?v=iRr0_mVmxq8</a> )</p> <p>2.2 Učenici dobivaju tablicu (<i>Dodatak 5-tablica</i>) s lošim (crveni okvir) i dobrim (zeleni okvir) praksama u upravljanju rijekama i njihovim učincima</p> <p>2.3 Koristeći 12 različitih slika- video snimki (<i>Dodatak 6-slika</i>), treba ispuniti tablicu.</p> <p>2.4 Učenici iznose svoja stajališta, nastavnik projicira rješenje (<i>Dodatak 7</i>) ; rasprava o rezultatima.</p> <p>2.5 Konačno, nakon kratke rasprave, učenici iznose prijedloge o tome kako bi institucije trebale surađivati radi izbjegavanja tragičnih događaja poput poplava</p>                                                                                                                                                                                  |
| <b>Mjesto ostvarivanja aktivnosti (učionica, vanjski prostor...)</b> | Učionica                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Individualne ili skupne aktivnosti</b>                            | Skupne aktivnosti                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Potrebna sredstva</b>                                             | računalo, projektor, papir, markeri, tiskani materijal (prilozi)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Trajanje aktivnosti</b>                                           | 2 sata                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Pokazatelji ostvarenih rezultata</b>                              | samovrednovanje za 2 zadane aktivnosti; učenici će se vrednovati i na temelju prijedloga za ublažavanje / prilagodbu klimatskim promjenama, kako je izneseno u završnoj raspravi.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Aktivnosti eko-građanstva; korisne poveznice</b>                  | <p><b>Poveznice:</b></p> <ul style="list-style-type: none"> <li>- <b>Aktivnosti:</b> <a href="#">Kad voda postane prijetnja; Izrada aplikacije za pametne telefone za slučaj prirodne ugroze</a></li> <li>- <b>Projekti:</b> <a href="#">Stvaranje komunikacijske kampanje od strane učenika za ostale učenike i širu javnost; Prilagodba na glavne prirodne rizike kreiranjem aplikacije za pametni telefon</a></li> <li>- <b>Informativni listići:</b> <a href="#">Climate Change &amp; Floods; Adaptation to Climate change</a></li> </ul> <p><b>Mrežne poveznice:</b></p> <p><b>hrvatske:</b></p> <ul style="list-style-type: none"> <li>• Croatian coastal town hit by heavy floods<br/><a href="https://balkaninsight.com/2017/09/12/croatian-coastal-towns-heavily-flooded-09-12-2017/">https://balkaninsight.com/2017/09/12/croatian-coastal-towns-heavily-flooded-09-12-2017/</a></li> </ul> <p><b>grčke:</b></p> <ul style="list-style-type: none"> <li>• Introduction to water and Climate Change</li> </ul> |












|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        | <p><a href="http://www.edutv.gr/index.php/perivalon-2/nero-kai-klimatologikes-allages">http://www.edutv.gr/index.php/perivalon-2/nero-kai-klimatologikes-allages</a></p> <ul style="list-style-type: none"> <li>Examples of floods in Greece <a href="http://floodlist.com/tag/greece">http://floodlist.com/tag/greece</a><br/><a href="https://geomythiki.blogspot.com/2018/09/blog-post_13.html">https://geomythiki.blogspot.com/2018/09/blog-post_13.html</a></li> </ul> <p><b>talijanske:</b></p> <ul style="list-style-type: none"> <li>Video about the floods in Alba<br/><a href="https://www.youtube.com/watch?v=E8rw92UKSwo">https://www.youtube.com/watch?v=E8rw92UKSwo</a></li> <li>About landslides and flood in Italy<br/><a href="https://www.arpae.it/cms3/documenti/_cerca_doc/ecoscienza/ecoscienza2015_3/guzzetti1_es2015_3.pdf">https://www.arpae.it/cms3/documenti/_cerca_doc/ecoscienza/ecoscienza2015_3/guzzetti1_es2015_3.pdf</a> FR : <a href="http://www.apare-cme.eu/fr/ressources/section-2/topoguides">http://www.apare-cme.eu/fr/ressources/section-2/topoguides</a></li> </ul> <p><b>francuske:</b></p> <ul style="list-style-type: none"> <li>Vaison la Romaine 1992<br/><a href="http://lithotheque.ac-aix-marseille.fr/Affleurements_PACA/84_vaison/84_vaison_index.htm">http://lithotheque.ac-aix-marseille.fr/Affleurements_PACA/84_vaison/84_vaison_index.htm</a></li> </ul> |
| <p><b>Napomene</b></p> | <p>Pilot-provedba aktivnosti realizirana je u učionici s učenicima i na učiteljskim seminarima.<br/>Umne mape, naljepnice, tablica i slike bilo bi dobro imati na A3 formatu.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |



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



| ΠΕΡΙΠΤΩΣΙΣ                                    | ΚΑΛΗ ΠΡΑΚΤΙΚΗ                                                                       | ΚΑΚΗ ΠΡΑΚΤΙΚΗ                                                                       | ΑΠΟΤΕΛΕΣΜΑ                                                                          |
|-----------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1 <sup>η</sup><br>ΠΛΑΤΕΣ ΚΟΙΤΗΣ ΜΙΚΡΟ-ΜΕΤΑΛΛΟ |  |  |  |
| 2 <sup>η</sup><br>ΜΑΛΙΑΝΔΡΟΣ ΕΥΘΕΙΑ ΡΟΗ       |  |  |  |
| 3 <sup>η</sup><br>ΣΥΝΟΙΚΙΑ ΛΕΚΑΝΗ ΑΠΟΡΡΟΗΣ    |  |  |  |

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.

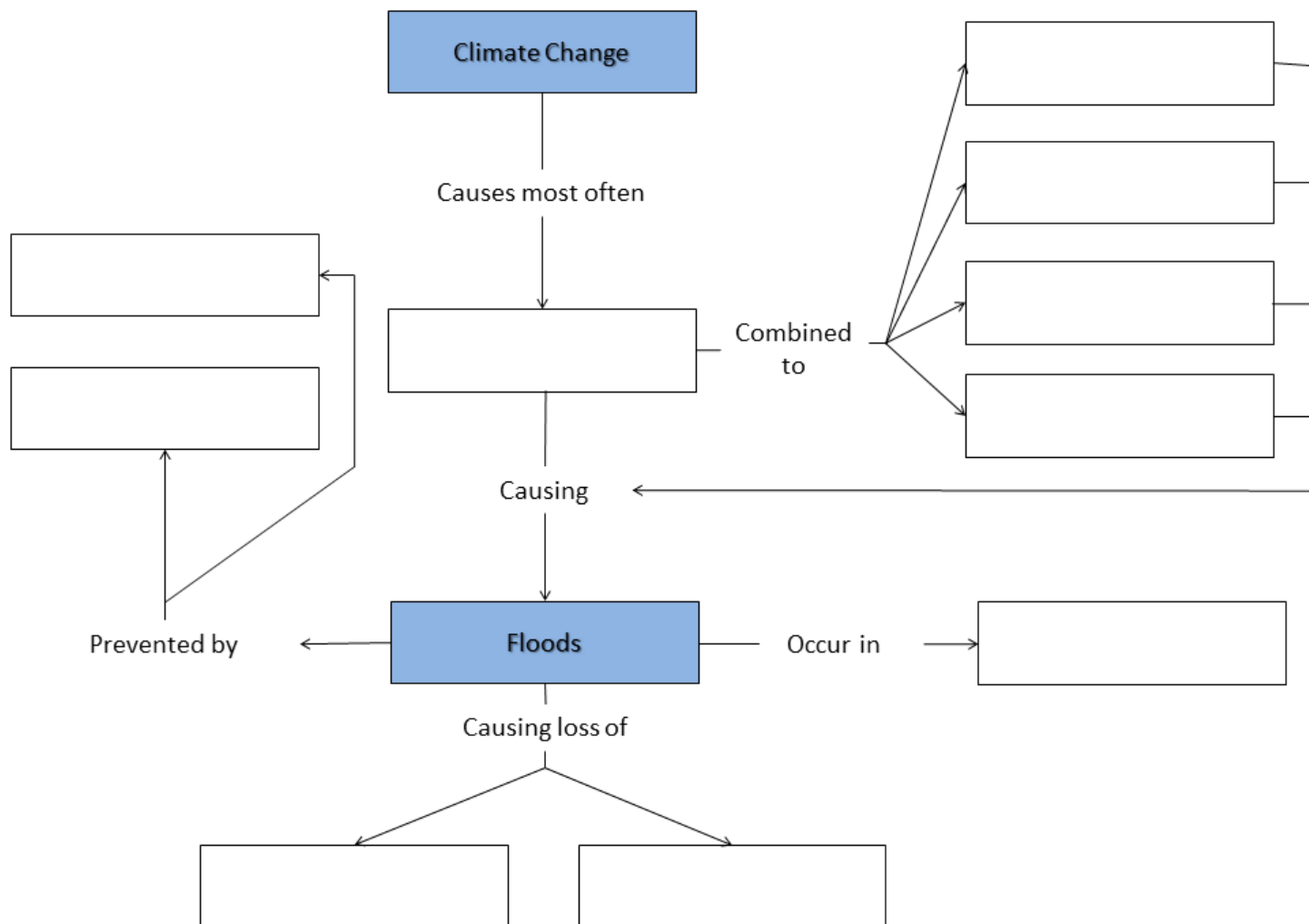
*HAL: Extreme flood phenomena and flash floods in Mediterranean Sea (2017, February)*

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”.

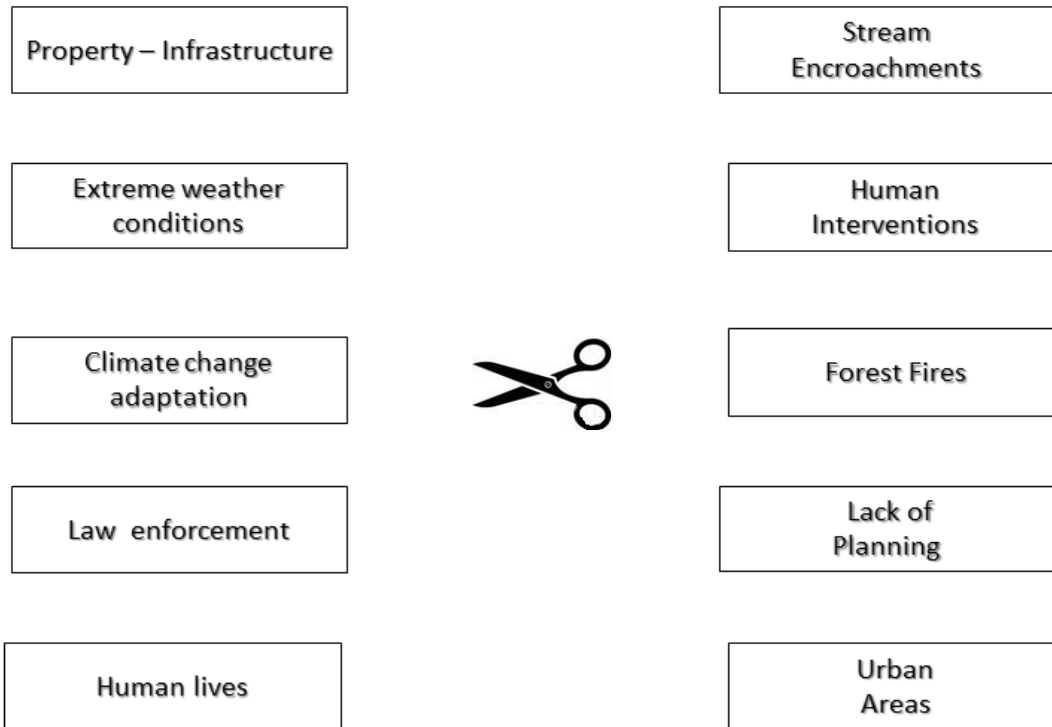
*Intergovernmental Panel on Climate Change(IPCC) Freshwater resources and their management. Climate Change 2007: Impacts, Adaptation and Vulnerability*



## APPENTIX 2: SEMI STRUCTURED CONCEPT MAP

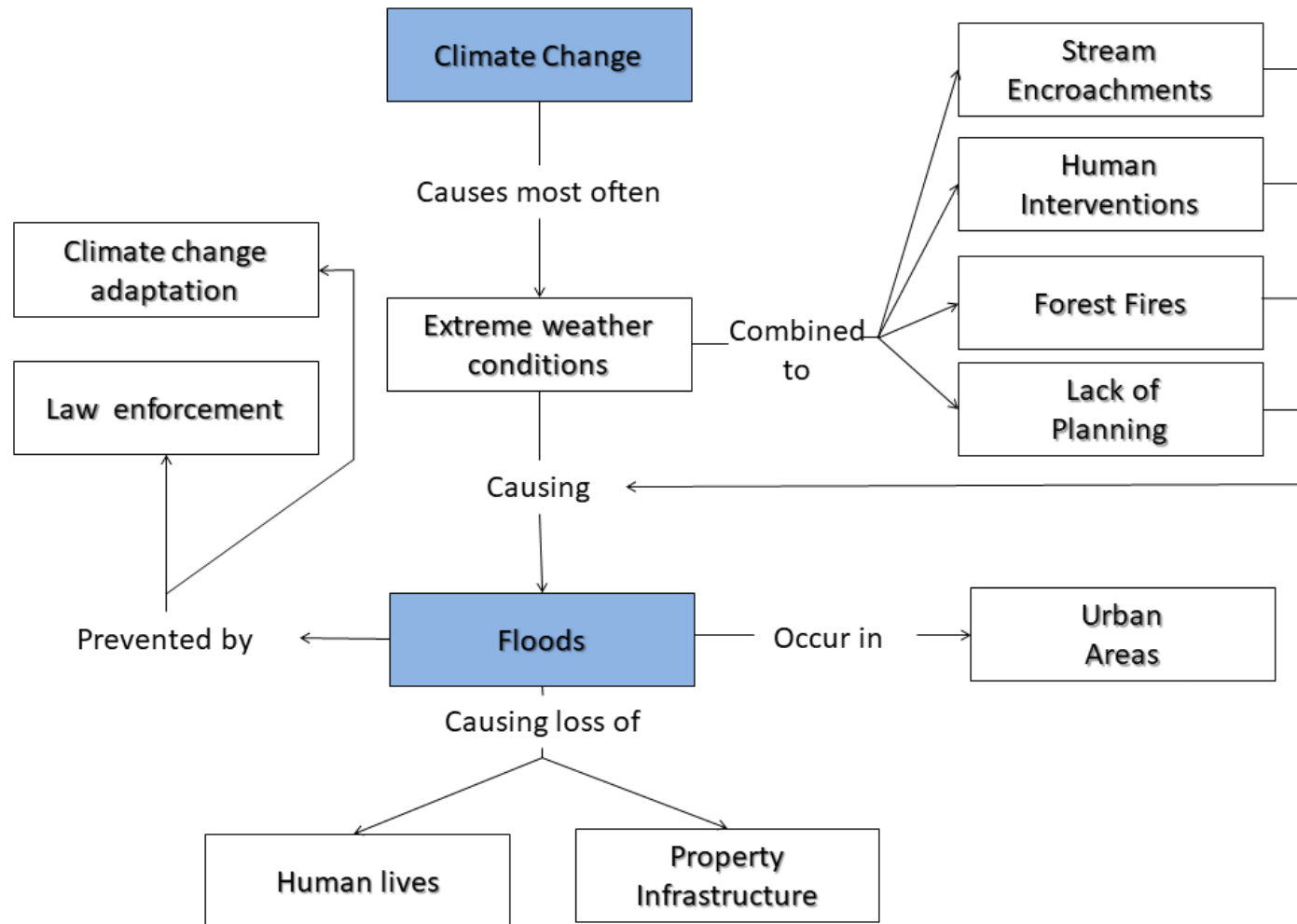


### APPENTIX 3: KEY WORDS - CONCEPTS





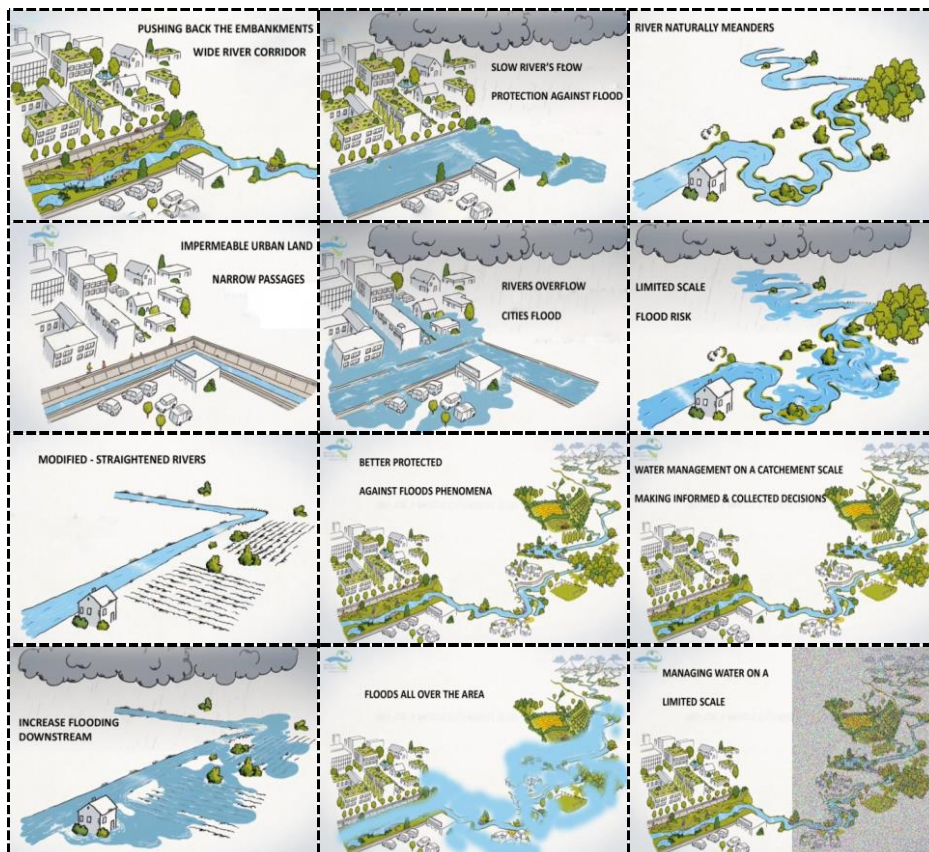
## APPENTIX 4: COMPLETE MAP (SOLUTION)



### APPENDIX 5: TABLE

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






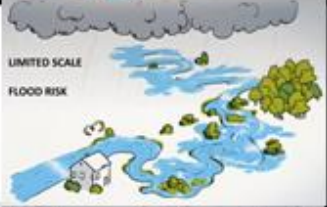

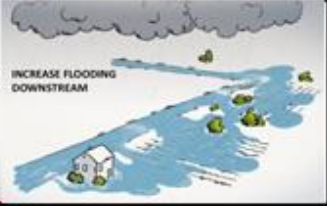




## APPENDIX 6: IMAGES





## APPENDIX 7: COMPLETE TABLE (SOLUTION)



| CASES                                                                                         | GOOD PRACTICE                                                                                                                                                                  | BAD PRACTICE                                                                                                                          | RESULT                                                                                                                                     |
|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>1<sup>ST</sup></b><br/><b>RIVER'S CORRIDOR</b><br/>(NARROW- WIDE)</p>                   | <p>PUSHING BACK THE EMBANKMENTS<br/>WIDE RIVER CORRIDOR</p>                                   |                                                                                                                                       | <p>SLOW RIVER'S FLOW<br/>PROTECTION AGAINST FLOOD</p>   |
|                                                                                               |                                                                                                                                                                                | <p>IMPERMEABLE URBAN LAND<br/>NARROW PASSAGES</p>  | <p>RIVERS OVERFLOW<br/>CITIES FLOOD</p>                |
| <p><b>2<sup>ND</sup></b><br/><b>RIVER'S FLOW</b><br/>(MEANDER-MODIFIED-<br/>STRAIGHTENED)</p> | <p>RIVER NATURALLY MEANDERS</p>                                                             |                                                                                                                                       | <p>LIMITED SCALE<br/>FLOOD RISK</p>                   |
|                                                                                               |                                                                                                                                                                                | <p>MODIFIED - STRAIGHTENED RIVERS</p>             | <p>INCREASE FLOODING<br/>DOWNSTREAM</p>               |
| <p><b>3<sup>RD</sup></b><br/><b>CATCHMENT</b><br/>(PARTLY-TOTALLY<br/>MANAGED)</p>            | <p>WATER MANAGEMENT ON A CATCHMENT SCALE<br/>MAKING INFORMED &amp; COLLECTED DECISIONS</p>  |                                                                                                                                       | <p>BETTER PROTECTED<br/>AGAINST FLOODS PHENOMENA</p>  |
|                                                                                               |                                                                                                                                                                                | <p>MANAGING WATER ON A<br/>LIMITED SCALE</p>      | <p>FLOODS ALL OVER THE AREA</p>                       |

