With the support of the Erasmus+ Programme of the European Union

Mitigation and adaptation

Climate Change Adaptation

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Presentation outline and highlights

- Understanding of Mitigation Activities and their aim
- Outlining the impacts of mitigation to economic development
- Highlighting climate mitigation activities led by governments, business sector, and individuals
- Understanding adaptation and its relationship with vulnerability

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What is Mitigation?

- We can mitigate climate change by:
  - reducing emissions or
  - by increasing carbon sinks - for example, forests.
- At the current rate of emissions, we will reach global concentration leading to 2 degrees of global warming around the late 2030s.
- When should we start mitigation activities?
- Mitigation and economic development?

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Mitigation and Economic Development

According to the IEA, energy-related carbon dioxide emissions stayed flat for three years in a row (2014 - 2016) even as the global economy grew (IEA, 2017).

This flattening of emissions was due to the growth of renewable power generation, fuel switching from coal to natural gas and energy efficiency gains, among other changes.

This decoupling can also be seen at the country level in 21 nations from 2000-2014.

Why do we need to reduce emissions

- https://www.youtube.com/watch?v=q9HDVnXqabo&feature=emb_logo

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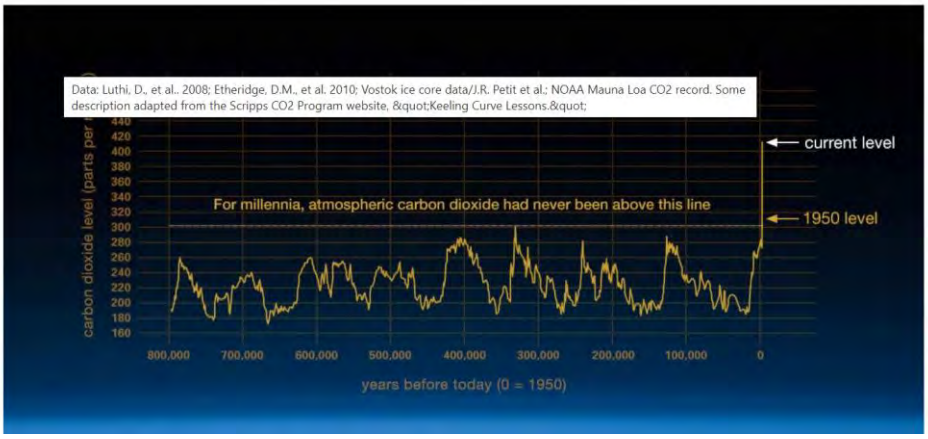
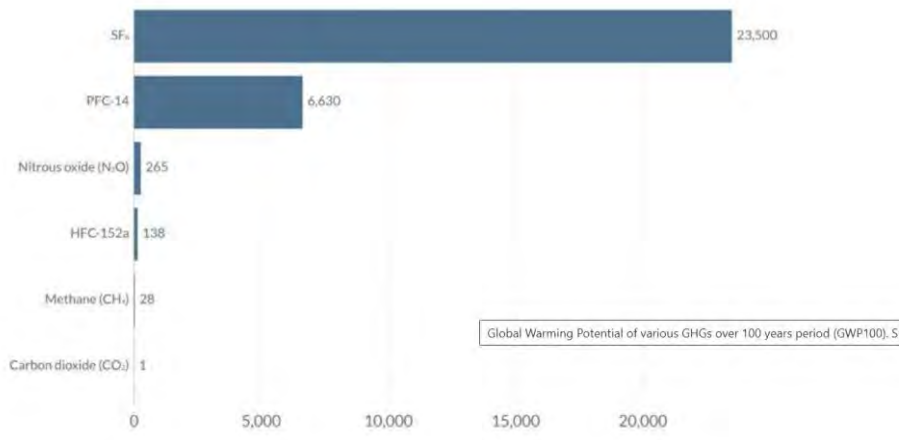
Some figures and facts

Today's atmosphere contains **42 % more CO2** than it did at the **start of the industrial era**.

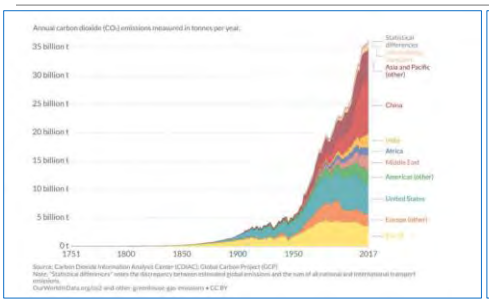


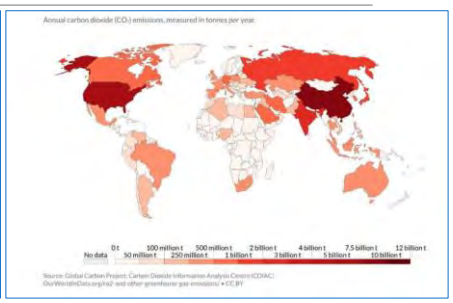
Some figures and facts

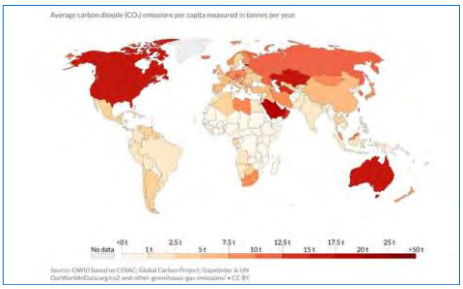
Not All Greenhouse Gases are the Same



Some figures and facts







How to reduce emissions?

- From Linear Economy to Circular Economy
  - Using renewable energy
  - Recycling
  - Efficient buildings
  - Efficient consume
  - Diet choices
  - Electric cars
  - Air industry
  - Etc…
- Increase Carbon Sinks
  - Forests, plants
  - Technology

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How to reduce emissions?

- https://www.youtube.com/watch?v=bYS2DcqHH5Y&feature=emb_logo

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Mitigation action

- Governments:
  - Regulatory tools
  - Market based tools
  - Awareness campaigns and education
- Companies and people
  - Consuming habits
  - Transportation habits
  - Dietary characteristics
  - Shopping habits
  - Energy use
  - Investments choices
- Calculate your own carbon footprint!
  - https://carbon-calculator.climatehero.me/?source=climateherome

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Mitigation in Albania

- Non-Annex 1 Country
- Signed the Paris Agreement
- Climate policy in place
- Mitigation goals:
  - Improve energy efficiency
  - Renewable energy initiatives
- Further need to develop the country's capacities to monitor and report its emissions annually, and to implement the NDC and NAMAs

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What is Adaptation

- "In human systems, climate change adaptation is the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. " (IPCC, Special Report 1.5C)
- Again on vulnerability:
  - Energy
  - Water
  - Transport
  - Health care
  - Agriculture
  - Tourism

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What is Adaptation

- https://www.youtube.com/watch?v=q48SFjcPzoY&feature=emb_logo

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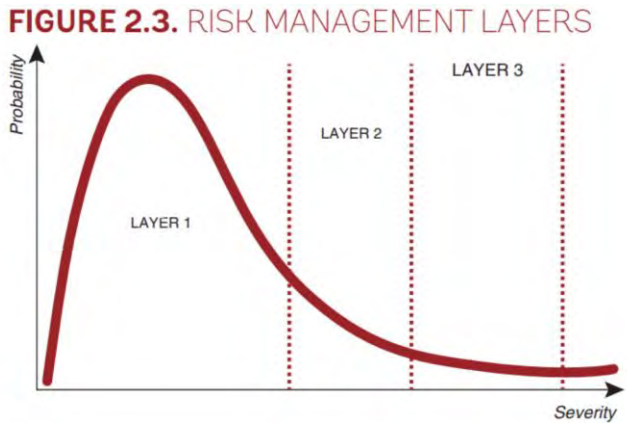
Approaches to CC Adaptation



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Approaches to CC Adaptation

- ***1. Risk mitigation*** or ***Planned adaptation***

This approach is applied when the climate risk is of high frequency and low or medium loss.

- ***2. Risk transfer*** or ***Contingency adaptation***

This approach is applied when the climate risk is of low frequency and medium to high loss. Some extreme events can fall into this category, such as long-term droughts. Risk pooling mechanisms or approaches to manage migration flows might address this risk.

- ***3. Coping*** or ***Loss acceptance***

This approach is applied when the hazard is devastating but very unlikely to happen. Severe extreme events can fall into this category, such as unprecedented cyclones. Relief support and humanitarian measures are taken in these cases.

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Approaches to CC Adaptation

- https://www.youtube.com/watch?v=Umc150tthJw&feature=emb_logo

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Adaptation in Albania

- Climate change issues are being discussed in the environmental policy in Albania
- A National Adaptation Plan have been drafted
- Three National Communication to the IPCC have been prepared and published
- New environmental legislation has included articles about climate change mitigation and adaptation

Background information on the project and the protected area

- The Drini and Mati River Deltas (DMRD) are 2 of 3 deltas found on the northern Adriatic coast of Albania, which harbour significant biodiversity values.
- The DMRD has been identified as a region of critical vulnerability to climate change and variability.
- Climate change scenarios for Albania have predicted an increase in sea surface temperature and sea level rise of up to 61 cm.
- Serious stress on marine and littoral biodiversity as well as livelihoods of local communities.

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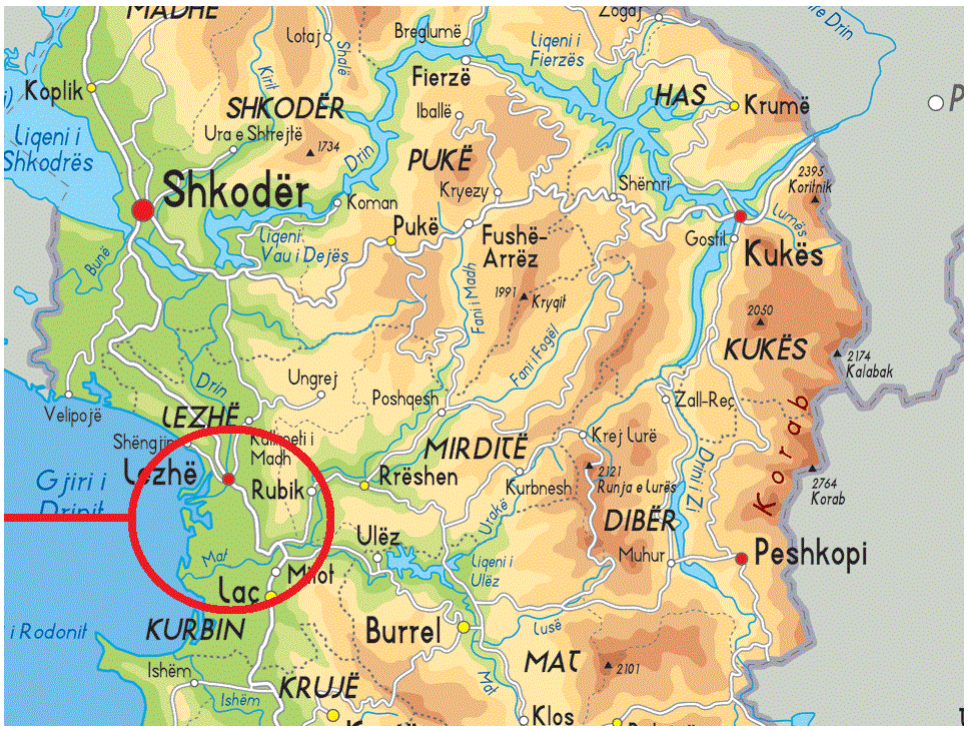

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Communes within the project area

Goals and outcomes

- Funded by: The Global Environment Facility, the UNDP, and the Albanian Government.

- Objective of the project
  - to build adaptive capacities in the DMRD to ensure resilience of the key ecosystems and local livelihoods to climate change.

- Parallel to the policy objectives, the project aimed at:
  - strengthening the research on vulnerability and adaptation
  - connecting scientific results with policymaking processes
  - enhancing local community dialogue on expected changes in ecosystems and their involvement in decision making

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Climate impacts in project area

- Sea level rise
- More frequent and severe droughts with greater fire risk
- Increase of the number of rainy days
- Increase of extreme weather events
- Increased spring temperatures
- Reduction in annual total precipitation
- Warmer winters
- Loss of wetland area

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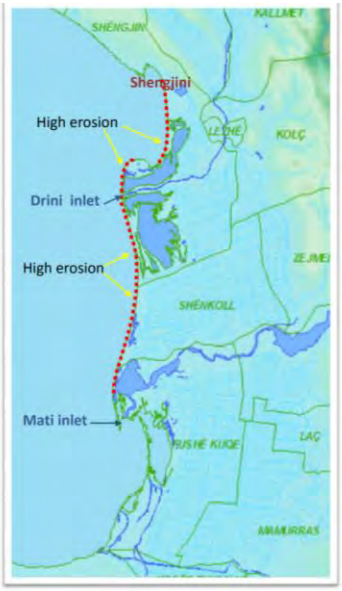
Parameters	Unit	2030	2050	2080	2100
Annual temperature rise	°C	1.2 (0.8-1.3)	1.8 (1.3-2.4)	2.8 (2.1-4.1)	3.2 (2.3-5.0)
Number of days with temperatures ≥ 35°C	Days	4-5	6-7	8-9	10-11
Number of days with heat wave	Days	60	80	95	120
Precipitation decrease	%	3.9 (2.6-5.4)	8.1 (5.5-11)	12.9 (8.4-21)	15.5 (9-26)
Hazardous precipitation	Days	1-2	2-3	3-4	4-5
Sea level rise - Average scenario - Maximum scenario	cm	8 (5–14)	15 (7-28) 16 (9-29)	28 (12-53) 35 (15-62)	38 (15-72) 49 (21-91)
Coastline erosion for maximum scenario of sea level rise	Ha	520	1450	2860	5350

Pressure of the Erosion

DMRD ecosystems are subjects to significant erosion. Sea invasion, due to erosion along the Drini River delta was approximately 500 m during 1971-2005



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Impacts of sea level rise and coastal erosion		2050		2100	
		av. min	av. max	av. min	av.max
Net loss of wetland area	km^2	0.14	0.58	0.41	1.04
People actually flooded	1000/year	0.019	0.040	0.006	0.007
Coastal floodplain area	km^2	56.14	59.20	57.19	65.95
Coastal floodplain population	thousands	4.14	4.33	3.99	4.61
Total wetland area	km^2	4.5	4.06	4.22	3.60
Coastal forest area	km^2	1.14	1.01	1.12	0.91
Low unvegetated wetlands area	km^2	3.37	3.05	3.10	2.69

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Projection of coastal line in 2030

Source: Ndini, Mucaj 2010

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Projection of coastal line in 2050

The most risked zones are:

- Both sides of river mouths
- Kune lagoon
- Patoku lagoon

Source: Ndini, Mucaj 2010

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Projection of coastal line in 2080

Source: Ndini, Mucaj 2010

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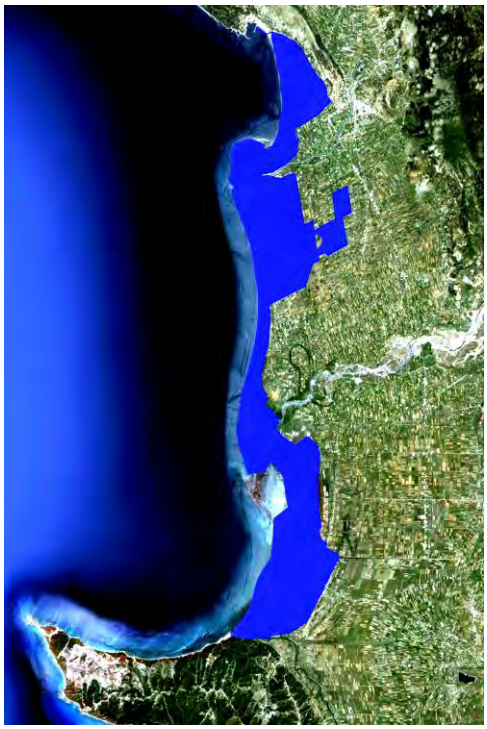
Projection of sea level rise in 2100



Source: Ndini, Mucaj 2010

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Sectors at risk

- Biodiversity
- Agriculture
- Tourism
- Fishing
- Human settlements
- Ecosystem carbon

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Proposed Adaptation measures

- Adaptation framework
- CBA objectives
- Biodiversity measures assessment
  - Assumptions
  - Appraisal for each lagoon
- Community measures assessment
  - Assumptions
  - Appraisal for each commune
- Results and investment priorities

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Adaptation framework within the area

- **Starting point** - Strategic risk assessment:
  - Identify and prioritise the potential risks of climate change to the DMRD region.
  - Identify and prioritise adaptation strategies to address the identified impacts.
  - Build capacity of DMRD stakeholders (regional and local) to evaluate the impacts of climate change and develop adaptation strategies.
- **Objectives**:
  - Resilient natural environment;
  - Resilient infrastructure and buildings;
  - Resilient economy;
  - Resilient society

Strategic risk assessment

Impact category	Risk ID	Consequence	Likelihood rating	Consequence rating	Risk rating	Controls
Ecosystems	Population and species extinctions Increasing of invasive types	Biodiversity loss	Likely	Major	High	2
		Reduced ecotourism that indicate to MDGs	Likely	Major	High	2
	Reduced ecosystem resilience to stress	Increase in management requirements	Likely	Moderate	Medium	2
	Increased pressure on dunal systems.	Biodiversity loss	Almost certain	Major	Extreme	2
		Reduced recreational amenity	Almost certain	Major	Extreme	1
		Biodiversity loss resulting in regional species endangerment and/or extension.	Almost certain	Major	Extreme	2
	Increases in ecological disturbances.	Reduced recreational amenity	Likely	Major	High	2
	Fragmentation of habitats	Increasing maintenance costs for housing/agricultural buildings	Likely	Major	High	1
	Ground subsidence as the ground dries out	Biodiversity loss leading to peril or regional extension of species.	Almost certain	Major	Extreme	2

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CBA Objectives

- Summing the present value of flows of benefits and costs
- Costs
  - Market costs
  - Investment costs –e.g. labour & materials
- Benefits
  - Combination of market and non market elements
  - Market values - Tourism, fishing and flood losses
  - Non market values - biodiversity
  - Benefits transfer

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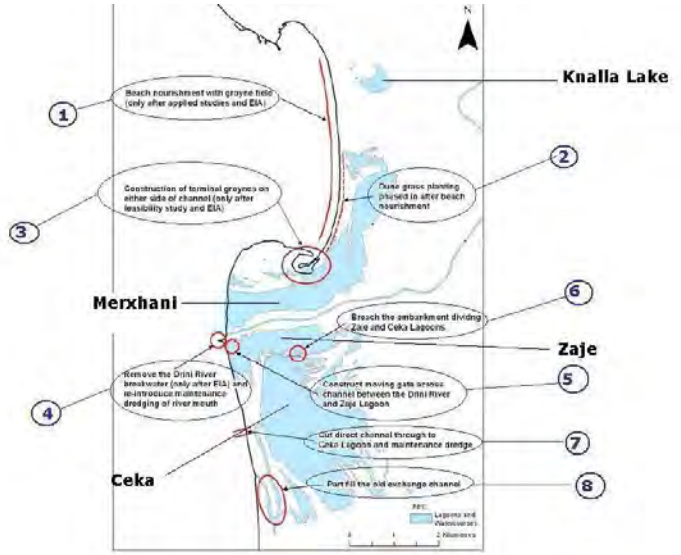
Adaptation proposals: Biodiversity



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Biodiversity measures assessment

Assumptions:

- Initial costs, C - defined by engineering reports
- Assumptions about the flow of benefits $B_{1\text{-}n}$
  - Wetland values (biodiversity)
  - Tourist values
  - Fishing values
- Time horizon = 40 years
- A discount rate 5%

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Adaptation proposals - Costs

COSTS	PRESENT VALUE
Removal of Drini River breakwater to release sand supply to the north and re- instatement of maintenance dredging of river mouth.	USD 100,000.00
Maintenance dredging of Drini River mouth	USD 958,436.09
Beach nourishment at Shëngjini Beach/Kune Spit	USD 12,902,494.33
Construction of a groyne field across the beach nourishment receiver site	USD 58,571.43
Dune planting at degraded sites along Kune Spit	USD 12,957.56
Terminal groynes	USD 156,190.48
Ceka Lagoon tidal inlet cut and partfill the old exchange channel	USD 58,571.43
Maintenance dredging of Ceka Lagoon tidal inlet	USD 575,061.65
Breaching Zaje-Ceka Lagoon embankment	USD 50,000.00
Bridge over Zaje-Ceka Lagoon breach	USD 250,000.00
Moving gate at Drini River-Zaje Lagoon inlet	USD 250,000.00
Total	USD 15,372,282.97
Total (Euro)	**11,529,212.23**

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Adaptation proposals - Benefits

BENEFITS	PRESENT VALUE
Wetland value (0% growth value)	1,068,155.07
Wetland value (10% growth value)	22,324,151.67
Wetland value (5% growth value)	4,671,718.24
Tourist visits	6,488,875.59
Fishing	9,615,983.07
Total (Euro) (0% growth value)	17,173,014
(5% growth value)	20,776,577
(10% growth value)	38,429,010

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CBA results

Total Cost	11,529,212.23
Total Benefits (0% growth value)	17,173,014
Total Benefits (5% growth value)	20,776,577
Total Benefits (10% growth value)	38,429,010
NPV (lower bound)	**5,643,802**
NPV (Mid range)	**9,247,365**

- Overall measure benefits > costs i.e. a good investment overall .
- Lagoon specific analysis relevant if funds are limited

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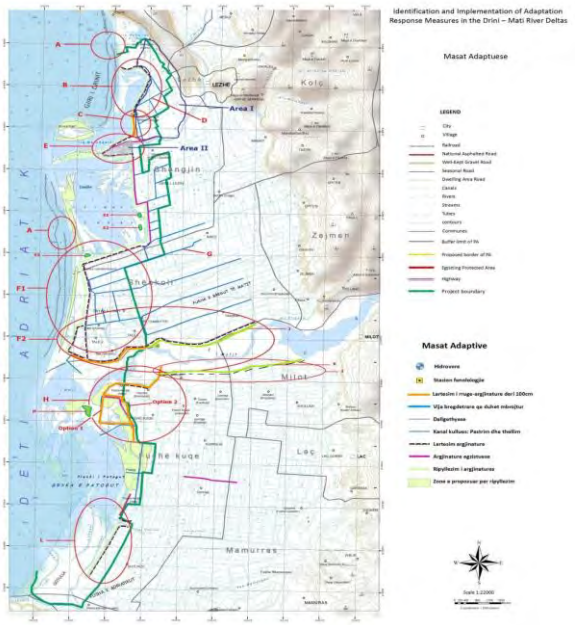
Adaptation proposals: Community



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Adaptation proposals: Community

Assumptions

- Initial costs, C - defined by engineering references
- Assumptions about the flow of benefits $B_{1\text{-}n}$
  - 20% of households of each area flooded every 4 years
  - 20% and 50% losses in agricultural production in a flooding episode every 4 years
- Time horizon = 40 years
- A discount rate 5%

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Shengjini		
Costs Shengjin		**Present value Costs**
C	Sublimation of the road up to 100 cm - embankment	28854
D	Cleaning and deepening irrigation channels + maintenance	94825
E	Sublimation/maintenance of the embankment	29430
S1	Reforestation	12610
S2	Reforestation	10088
Present value cost		**175807**
Benefits Shengjini		**Present value Benefits**
Agriculture		
20% WHEAT (loss)		538,226
50%W WHEAT (loss)		1,345,564
20% VEG (loss)		10,943,921
50% VEG (loss)		27,359,802
Households		
Flooding		19,456,004
NPV		**19,818,423**

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Shenkoll		
Costs Shenkoll		**Present value Costs**
F1	Maintenance of the embankment	159700
F2	Sublimation of the road up to 30 cm and maintenance of the embankment	59778
G	Cleaning and deepening irrigation channels: Immediate.	262,268.15
J	Reforestation of embankment F2 (green line along the embankment)	5044
S3	Reforestation	15132
Pv costs		**501922.1522**
Benefits Shenkoll		**Present value Benefits**
Agriculture		
20% WHEAT (loss)		2,652,740
50%W WHEAT (loss)		6,631,851
20% VEG (loss)		53,939,054
50% VEG (loss)		134,847,636
Households		
Flooding		6,226,904
NPV		**8,377,722**

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Fushekuqe		
Costs Fushekuqe		Present value Costs
H	Sublimation of the road up to 30 cm- 2 Options	124236
I	Sublimation/maintainance of the embankment	52600
K	Reforestation of the embankment I	2653.144
M	Reforestation	35308
L	Sublimation of embankment	26355
Present value Costs		241152.144
Benefits Fushekuqe		Present value Benefits
Agriculture		
20% WHEAT (loss)		2,942,313
50%W WHEAT (loss)		7,355,777
20% VEG (loss)		53,939,054
50% VEG (loss)		134,847,636
Households		
Flooding		1,556,726
NPV		**4,257,887**

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Results and conclusions

NPV Shengjin	**19,818,423**
NPV Shenkoll	**8,377,722**
NPV Fushekuqe	**4,257,887**

Sensitivity analysis:
- Changing flooding damage costs
- Changing the frequency of flooding events
- Changing crop mix

Decision:
- CBA results
- Recourses available (budget)
- Financing mechanisms (sources)

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More information

Project synthesis report, available at:

http://www.al.undp.org/content/albania/en/home/library/environment_energy/drini-mati-project-synthesis-report/

Readings

- *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Chapter 20*

- *MoE and UNDP: Third National Communication of Albania to UNFCCC: https://www.al.undp.org/content/albania/en/home/library/environment_energy/third-national-communication-to-the-united-nations-framework-con/*

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