

IMPLEMENTATION OF CC ADAPTATION MEASURES THROUGH COASTAL PLANNING: EXAMPLES

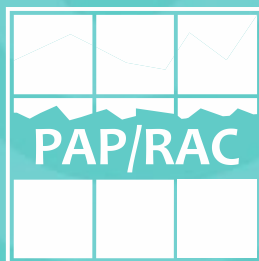
Marko Prem, UNEP MAP PAP/RAC Deputy Director



United Nations
Environment Programme



Mediterranean Action Plan
Barcelona Convention



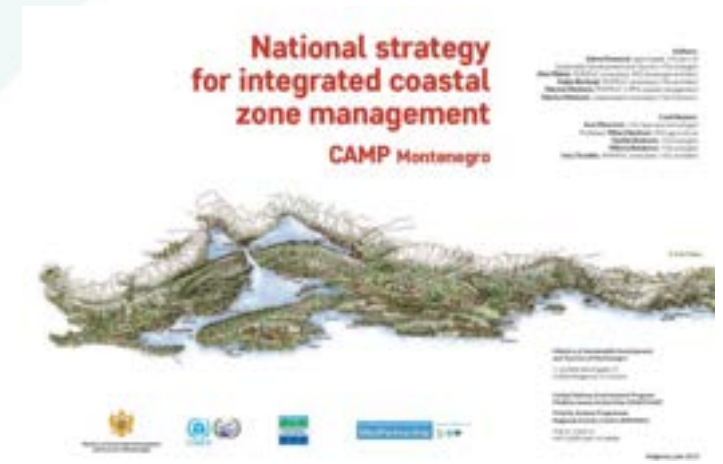
POLICY TOOLS FOR ICZM IN THE MEDITERRANEAN



Article 18: NATIONAL COASTAL STRATEGIES, PLANS AND PROGRAMMES

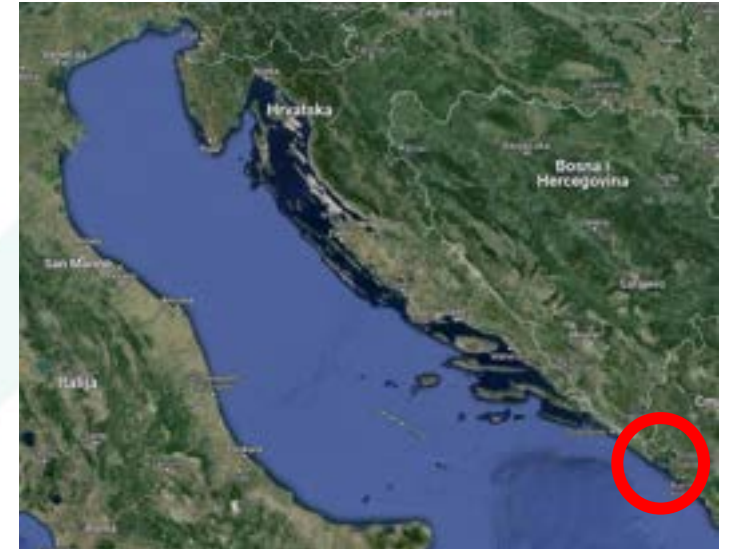
.. Each Party shall further strengthen or formulate a **national strategy for integrated coastal zone management** and **coastal implementation plans and programmes** ...

First Coastal Plan according the ICZM Protocol developed 2015 and **adopted** in 2016.

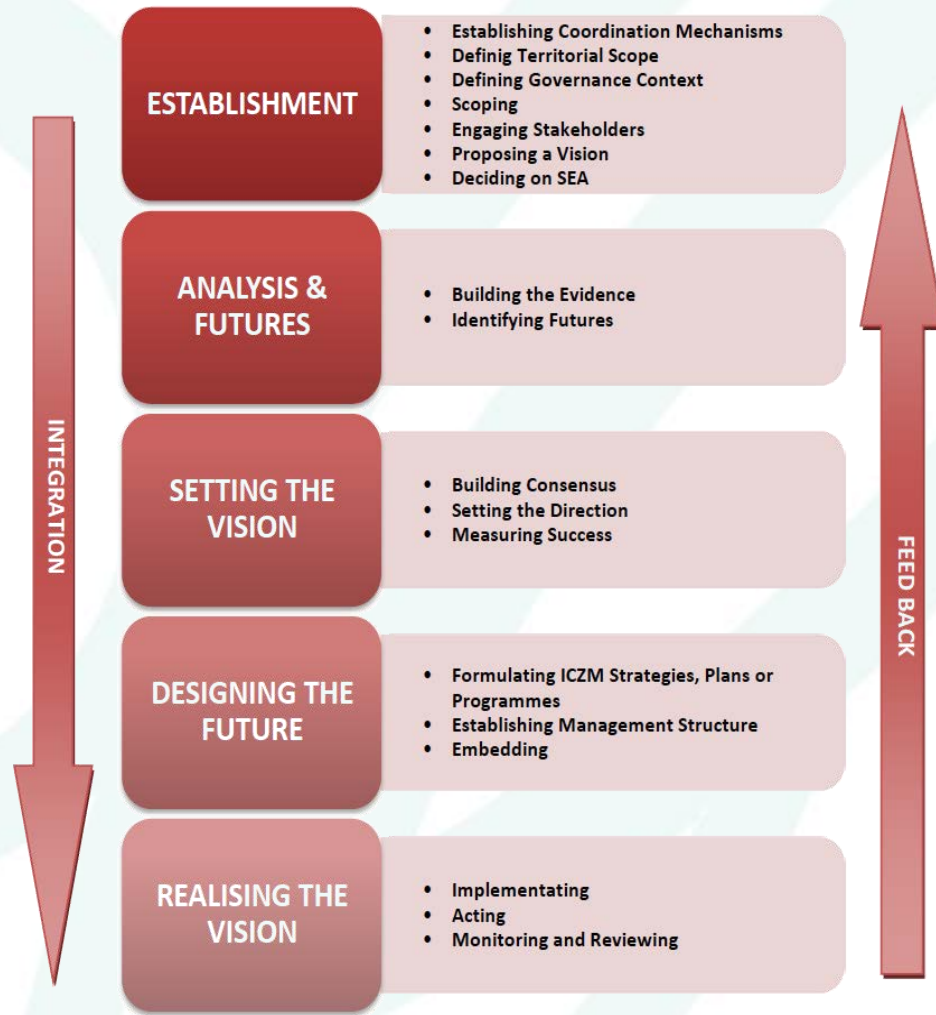


- **Mediterranean Climate Change Adaptation Award**, received at ECCA Lisbon 2019, in competition of 28 projects from 9 countries

COASTAL MANAGEMENT PLAN – BOKA KOTORSKA BAY, MONTENEGRO



ICZM PROCESS



https://www.coastalwiki.org/wiki/PEGASO_participation_methods

PLANNING PROCESS



- ✓ Spatial development and transportation
- ✓ Water supply and wastewater
- ✓ Waste management; ✓ Sustainable tourism
- ✓ Marine environment; ✓ Governance

Highly participatory in nature!



Expert knowledge



Governance mechanisms



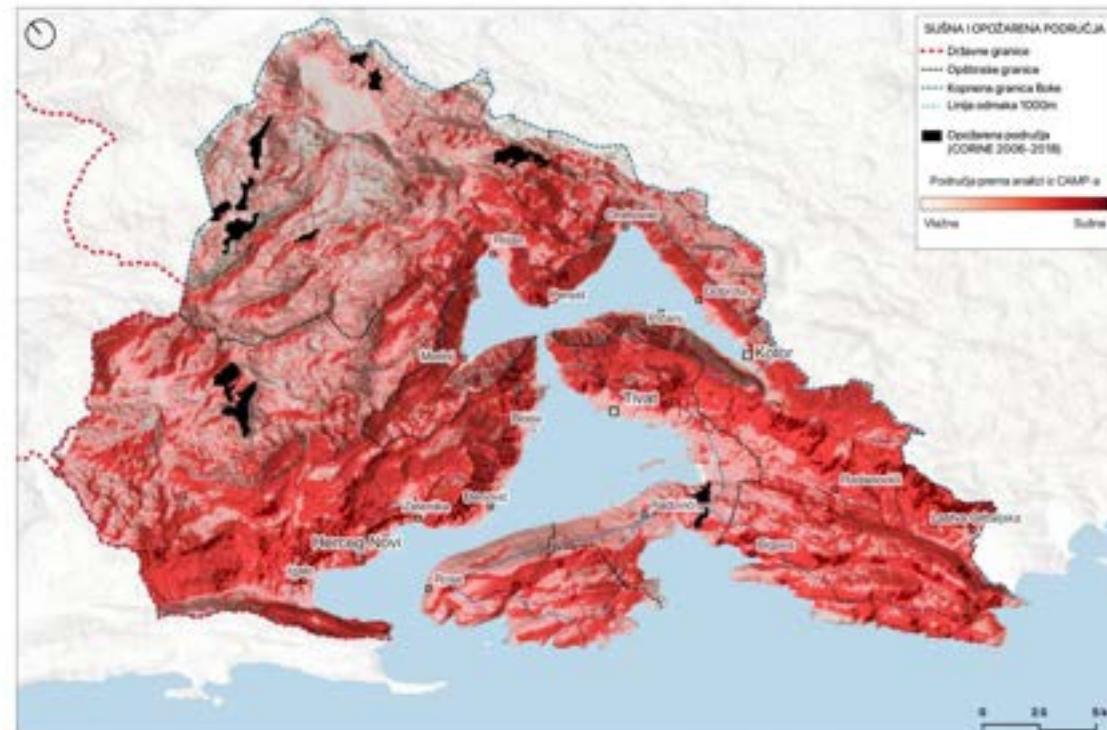
CLIMATE CHANGE

CLIMATE CONDITIONS AND PROJECTIONS IN THE AREA



By 2040, **T will increase** around 2°C during summer, number of heatwaves threefold and their longevity twofold

Number of consecutive dry day will increase 5 to 10%

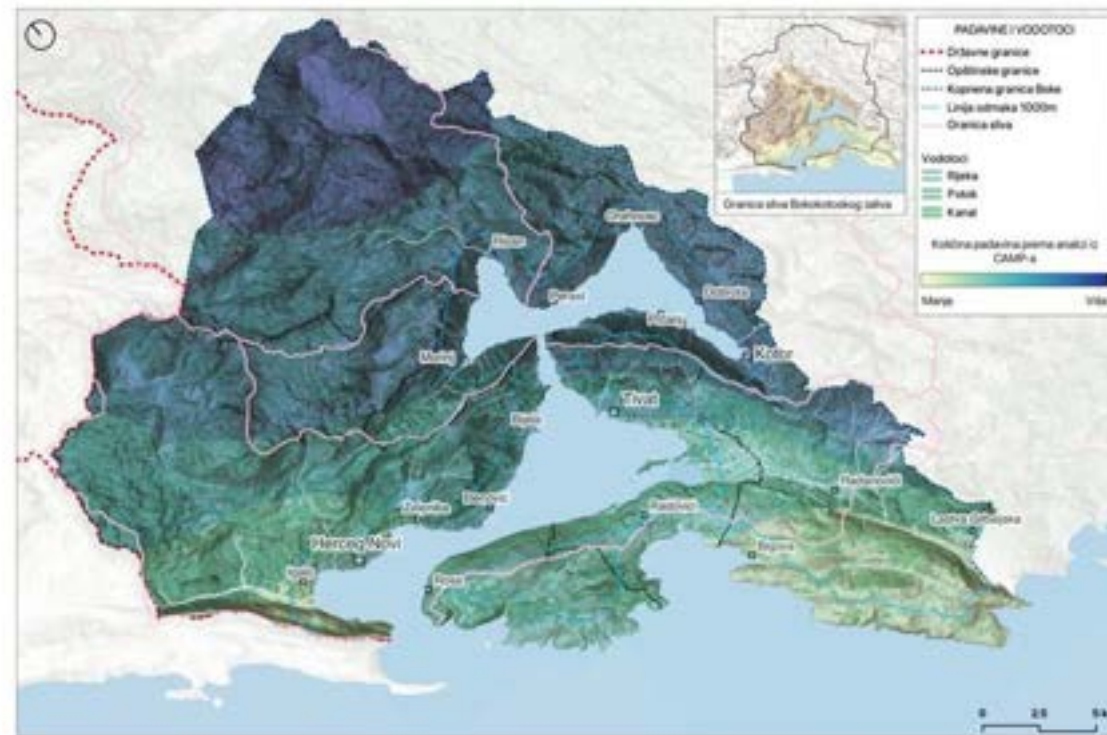


CLIMATE CONDITIONS AND PROJECTIONS IN THE AREA



By 2040, total **precipitation** could decrease for about 5%.

However, an increase in autumn and winter flash floods is expected



CLIMATE CONDITIONS AND PROJECTIONS IN THE AREA



Sea level rise and storm surges will impact the urbanized areas at the coastline.



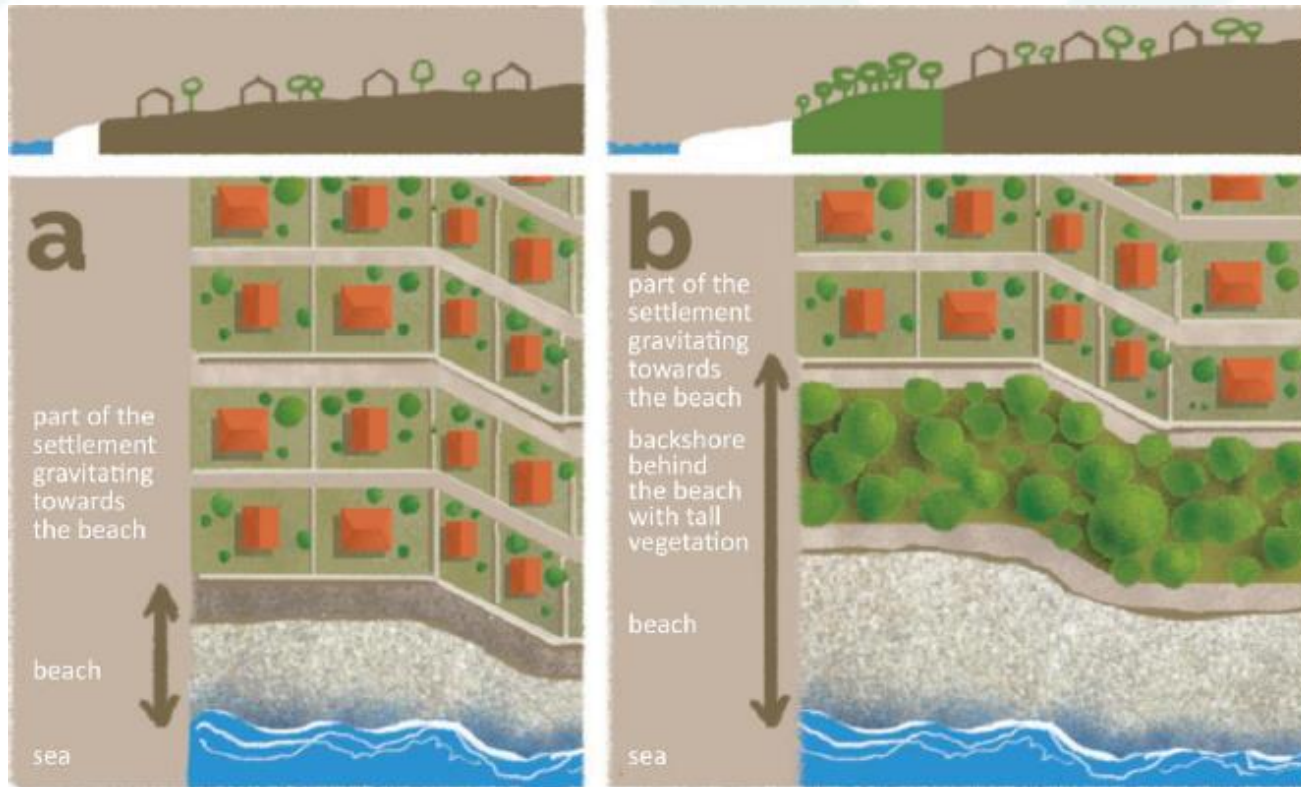
CLIMATE CHANGE IMPACTS IN THE AREA



Bokanews.me

RECOMMENDATIONS FOR THE ADAPTATION MEASURES

Implementation of the coastal setback zone



L. Duplančić



RECOMMENDATIONS FOR THE ADAPTATION MEASURES

Coastal afforestation and protection of coastal forests



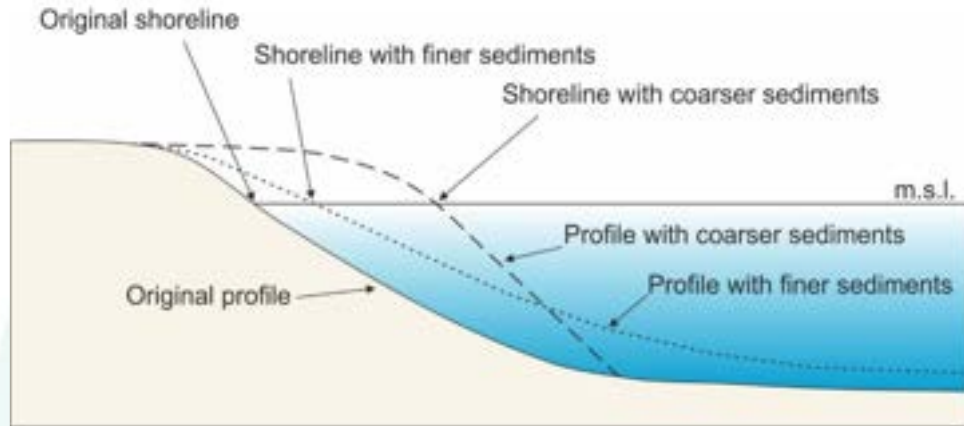
I. Belamarić



[Get Wild](#)

RECOMMENDATIONS FOR THE ADAPTATION MEASURES

Adaptation of beach areas with minimal environmental impact



<https://www.wwfadria.org>

RECOMMENDATIONS FOR THE ADAPTATION MEASURES

Measures for flood protection

- ✓ Regulation, cleaning and maintenance of flood channels
- ✓ Maintenance and construction of flood and erosion protection facilities
- ✓ Afforestation of degraded areas in the hinterland

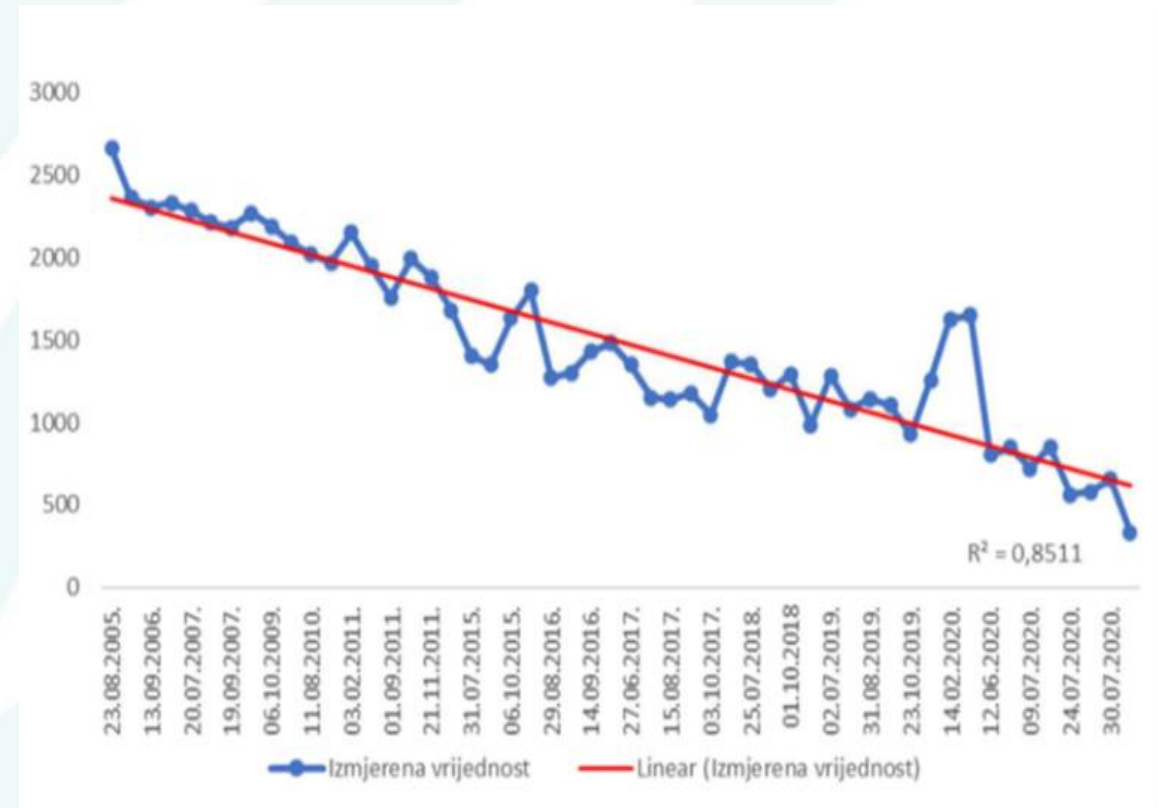


I. Sekovski

RECOMMENDATIONS FOR THE ADAPTATION MEASURES

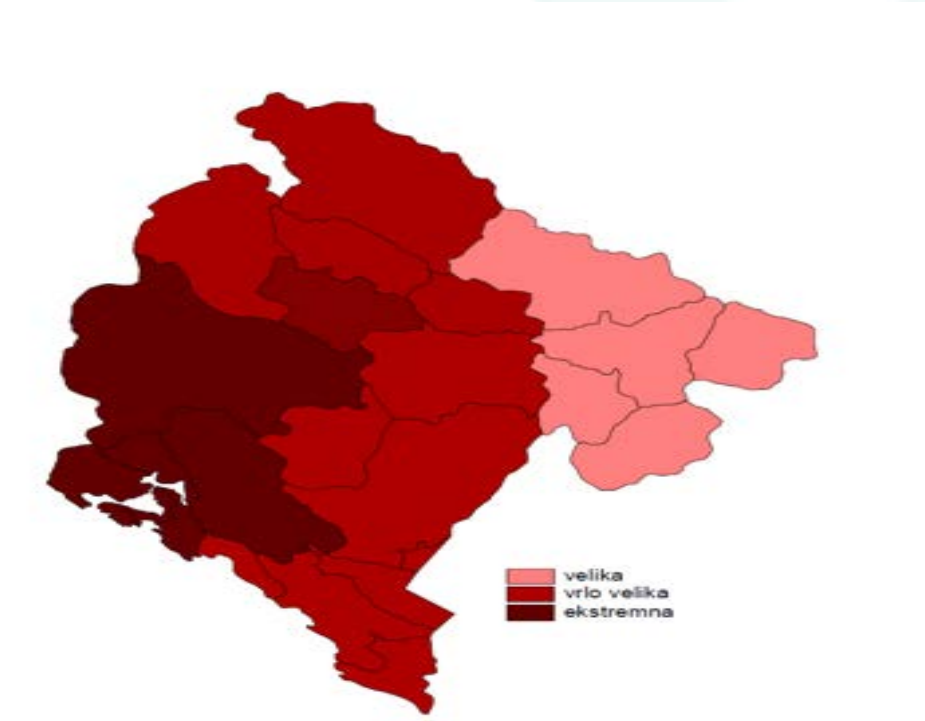
Measures for water supply, sewage water and drainage of storm water

- ✓ Analysis of the potential of existing and potential water springs
- ✓ Reduction of losses in water supply systems
- ✓ Provision of water for drinking and watering in public areas



RECOMMENDATIONS FOR THE ADAPTATION MEASURES

Measures for fire prevention and rehabilitation



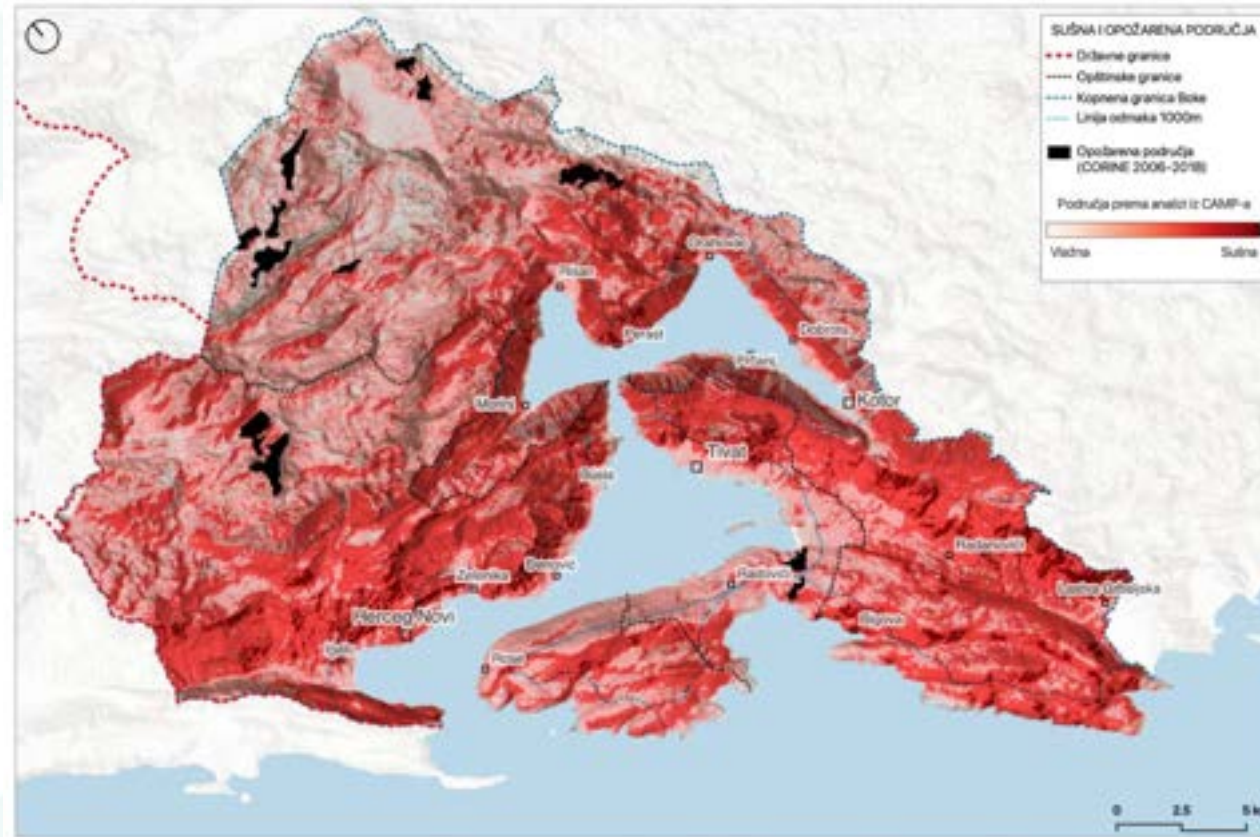
Bokanews.me

AFFORESTATION IN HINTERLAND


HAZARD: Loss of life & assets due to intense wildfires
SOLUTION: Forest management to reduce risk of super-fires


HAZARD: Landslides, soil loss, and siltation due to intense rainfall
SOLUTION: Protect and restore forests to stabilize soils and slow water runoff

MOUNTAINS, FORESTS & WATERSHEDS

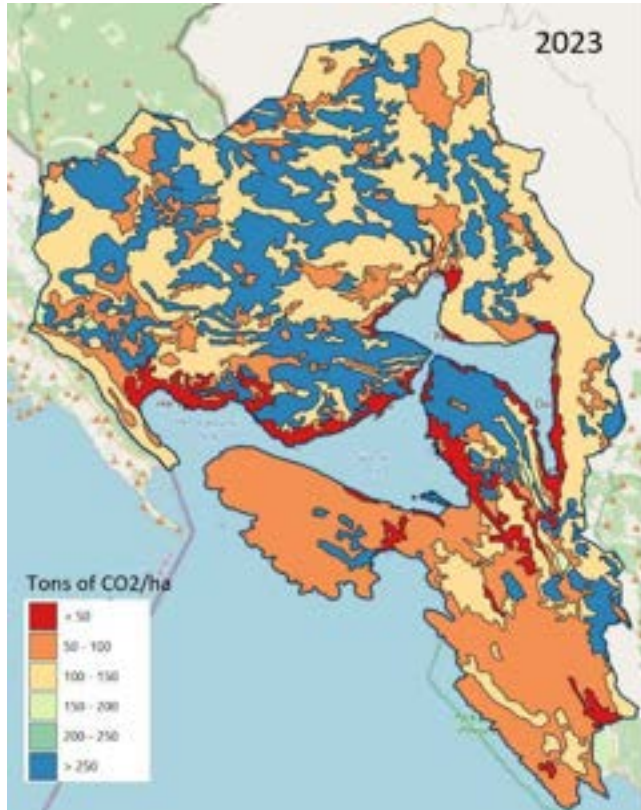


Đ. Kalezić. MonteCEP

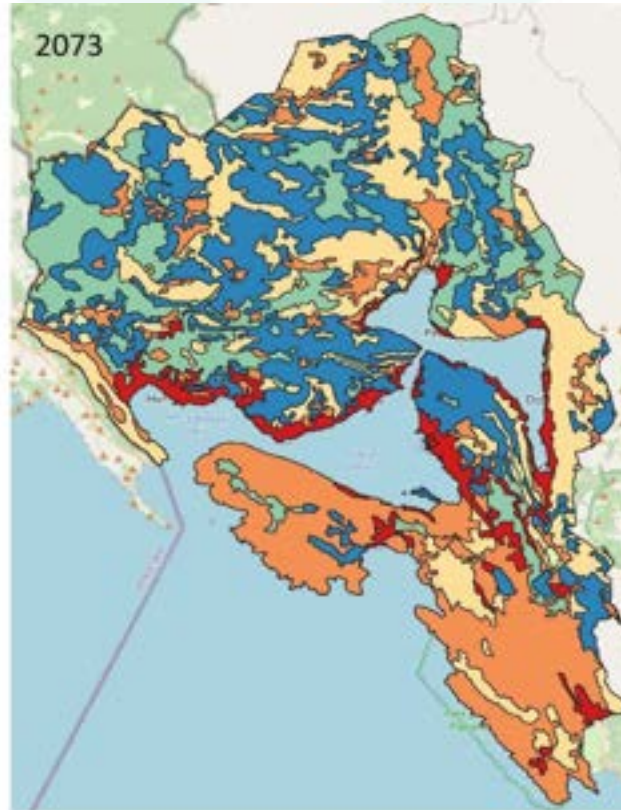
- ✓ Afforestation of burnt areas
- ✓ Measure to combat soil erosion and reduce flooding
- ✓ Strengthening biodiversity

COST-BENEFIT ANALYSIS FOR AFFORESTATION/REFORESTATION

Carbon Storage Model



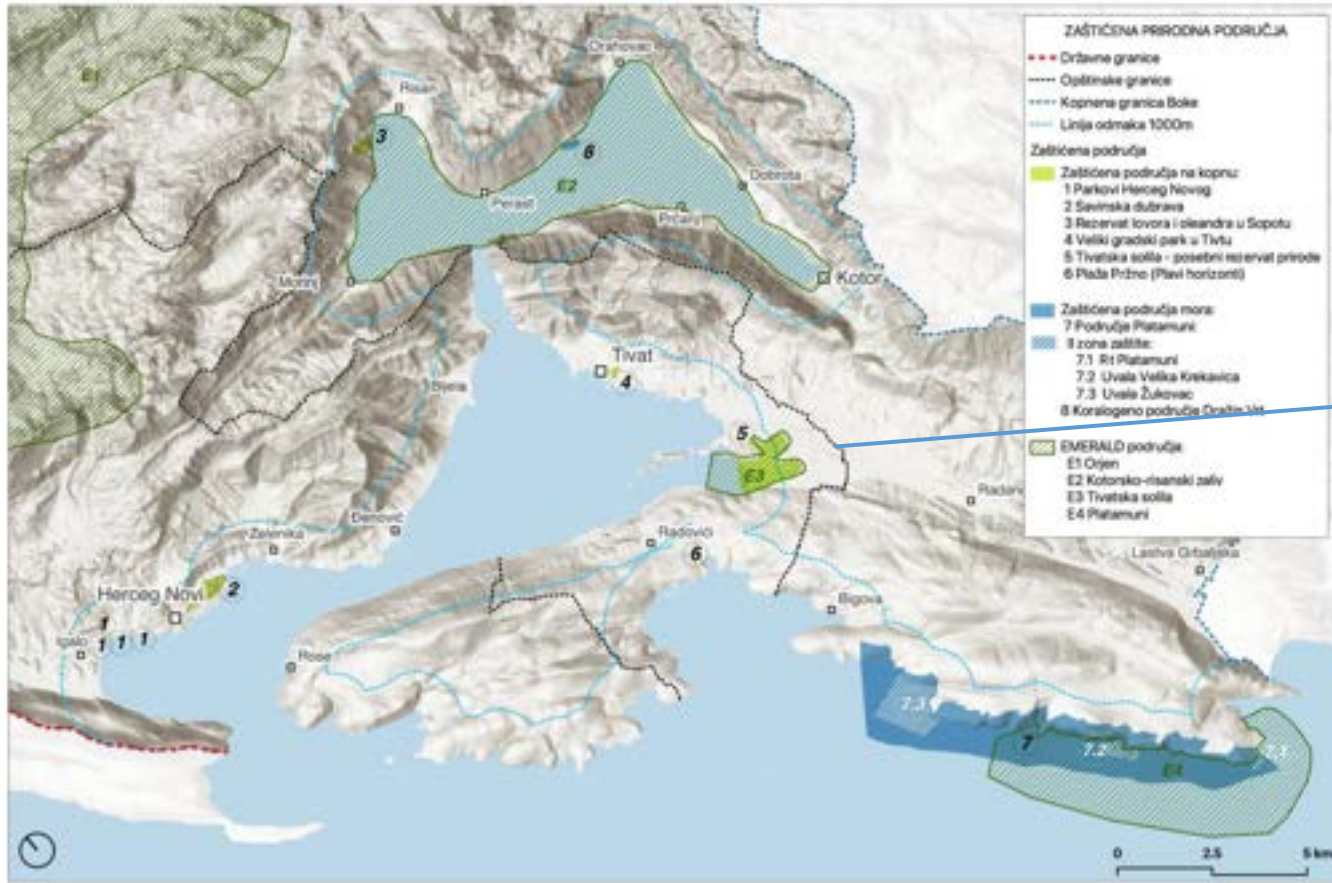
IN-VEST Model



Proposed measures

Current Use	Future Use
Agriculture with natural vegetation	Mixed forest (+2500 ha)
Mixed forest	Broad-leaved forest (+1500 ha)
Grasslands	Mixed forest (+500 ha)
Transitional	Mixed forest (+8000 ha)

NATURE PROTECTION OF VALUABLE AREAS



Đ. Kalezić. MonteCEP



Tivatska solila

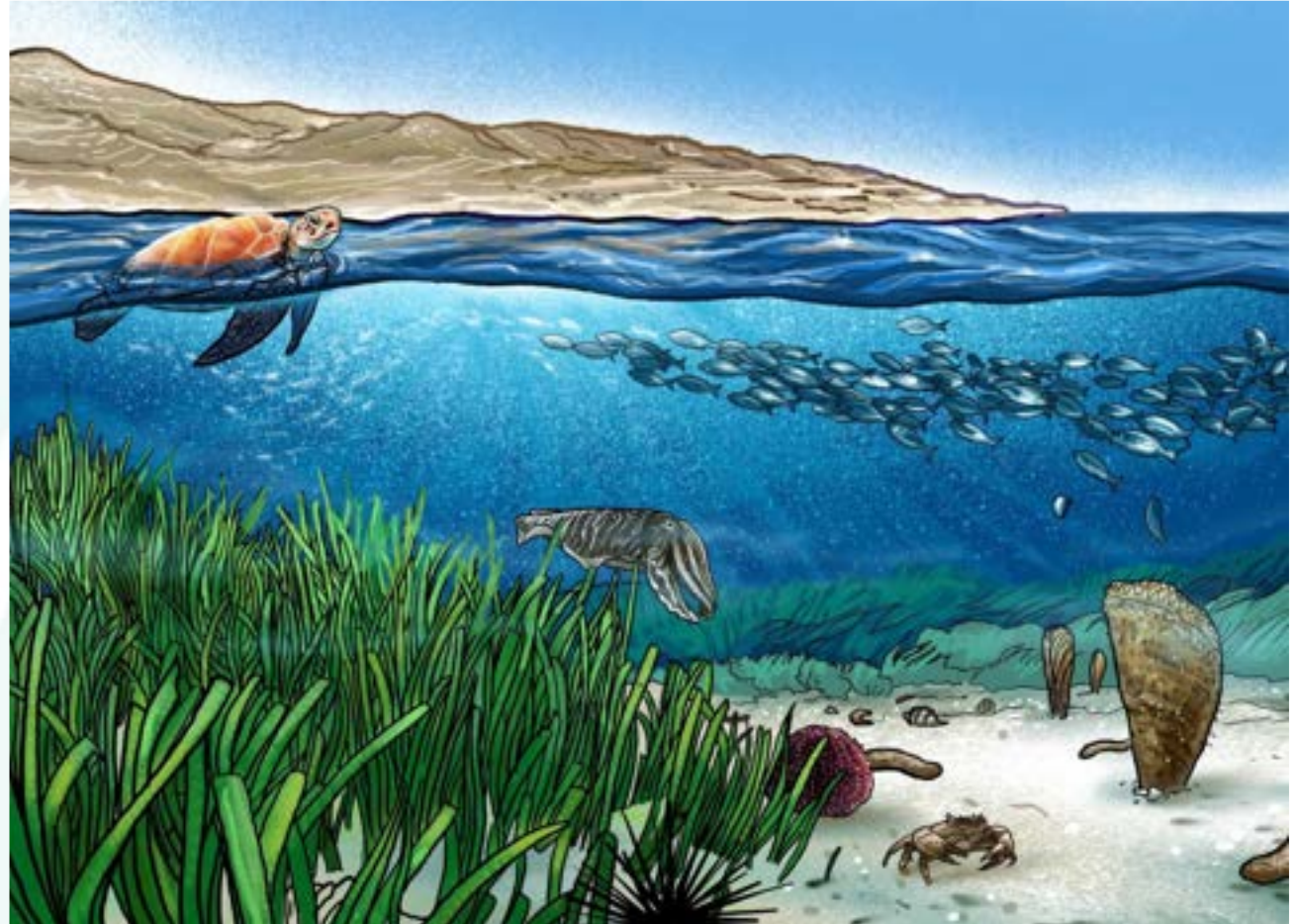
RECOMMENDATIONS FOR THE ADAPTATION MEASURES

NbS at sea – seagrass protection



Eco-buoys - Interreg SASPAS project

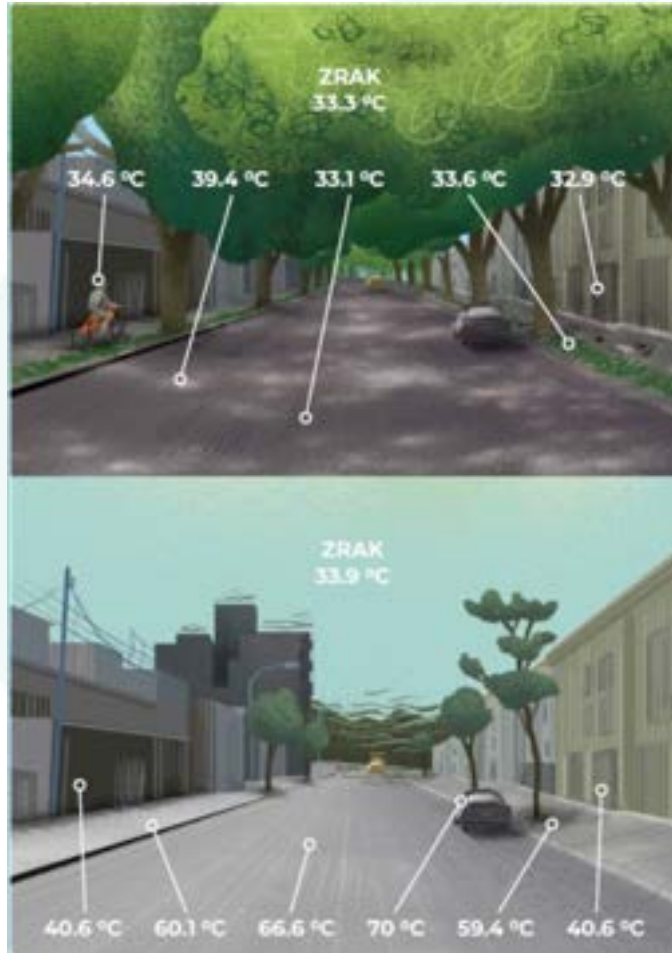
- ✓ Carbon sequestration – CC mitigation
- ✓ Erosion protection
- ✓ Important for breeding and nursery of marine species



L. Duplančić

RECOMMENDATIONS FOR THE ADAPTATION MEASURES

Measures for urban greening



- ✓ Preserve existing and create new green areas
- ✓ Greening of grey infrastructure
- ✓ Green roofs and walls
- ✓ Reduction of impermeable surfaces
- ✓ Better management of green areas



I. Belmarić

RECOMMENDATIONS FOR THE ADAPTATION MEASURES



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Measures for urban greening

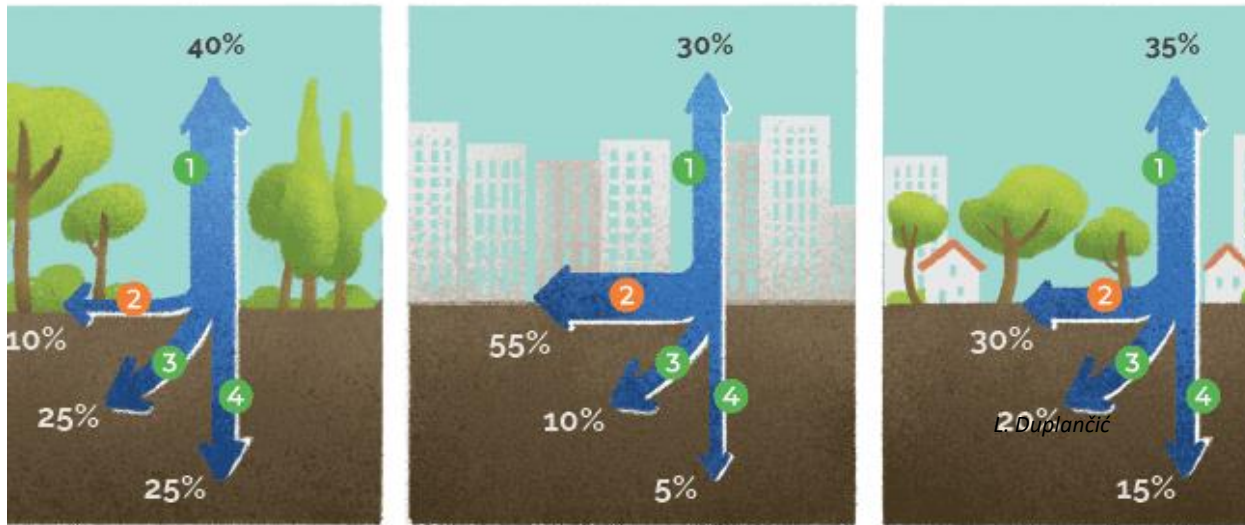


I. Belamarić

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RECOMMENDATIONS FOR THE ADAPTATION MEASURES

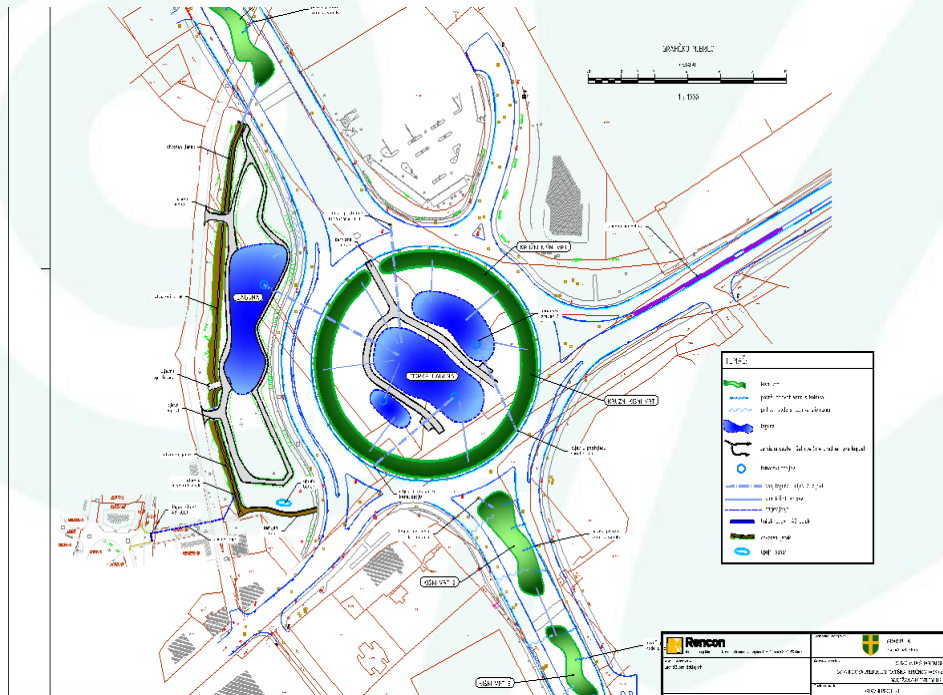
Water-sensitive urban designs



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RECOMMENDATIONS FOR THE ADAPTATION MEASURES

Water-sensitive urban designs – City of Pula rain gardens (Croatia)



URBAN GREENING – GREEN ROOFS AND WALLS



www.brighton-hove.gov.uk



[Ekovjesnik](#)

- ✓ Pollinator-friendly bus stops
- ✓ Absorb excess rainwater
- ✓ Create additional shade

RECOMMENDATIONS FOR THE ADAPTATION MEASURES



Other adaptation-related measures

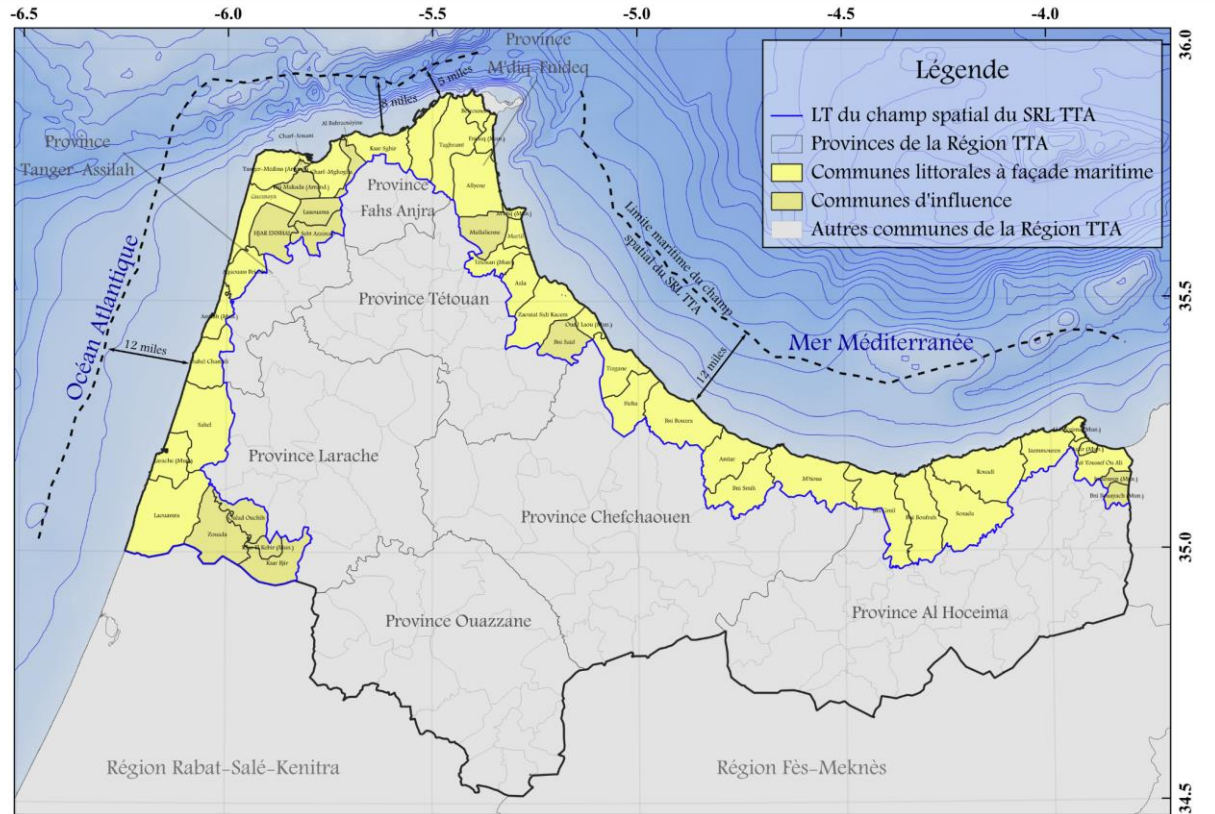
- ✓ Early warning systems
- ✓ Awareness-raising and climate literacy
- ✓ Adaptation-related measures related to tourism sector – focus on rural agro-tourism
- ✓ Adaptation-related measures related to transportation sector

COASTAL MANAGEMENT PLAN (SRL TTA) – TANGIER-TETOUAN-AL HOCEIMA, MOROCCO

Milieu naturel, Région Tanger-Tétouan-Al Hoceima



Source : Direction Régionale du HCP



وزارة الانتقال الطاقوي والتنمية المستدامة - قطاع التنمية المستدامة
 MINISTÈRE DE LA TRANSITION ÉNERGÉTIQUE ET DU DÉVELOPPEMENT DURABLE
 DÉPARTEMENT DU DÉVELOPPEMENT DURABLE

Delimitation du littoral de la région Tanger-Tétouan-Al Hociema
 Schéma régional du littoral - Région de Tanger-Tétouan-Al Hociema



Tétouan



Chefchaouen Province,
November 2018 © A. Ivcevic



Larache

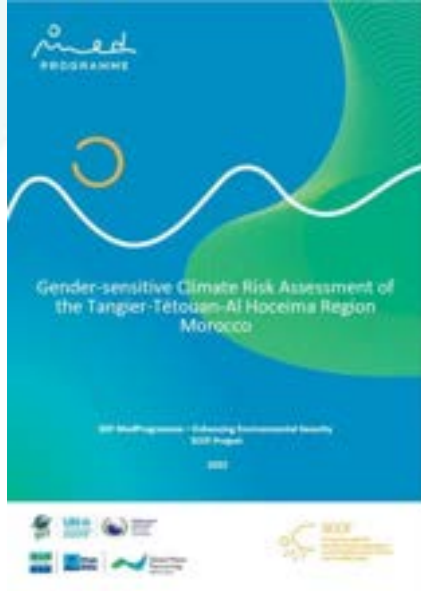
Tétouan, April 2018

©A. Ivcevic



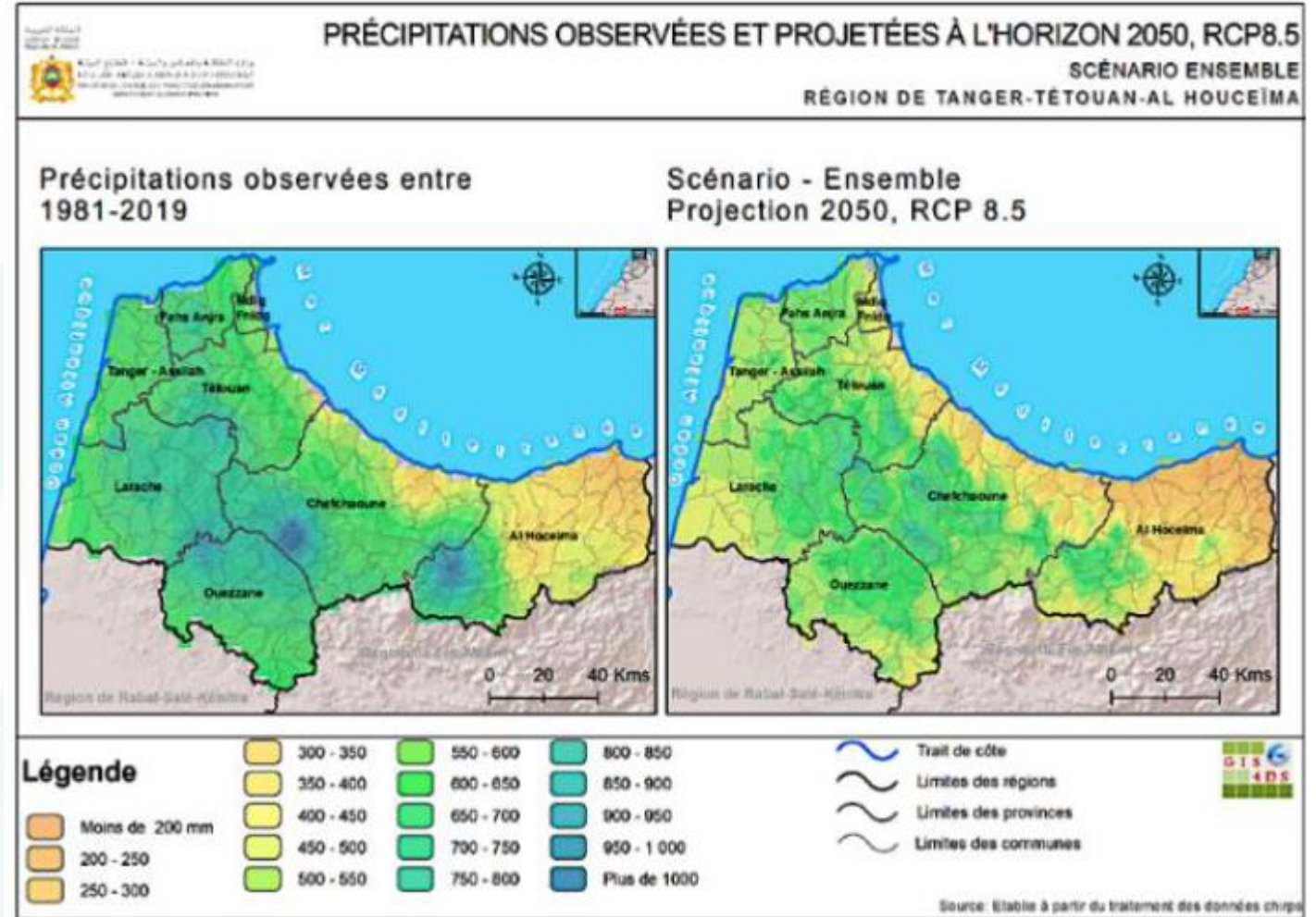
L'Economiste,
2016

CLIMATE CONDITIONS AND PROJECTIONS IN THE AREA (TTA, MOROCCO)

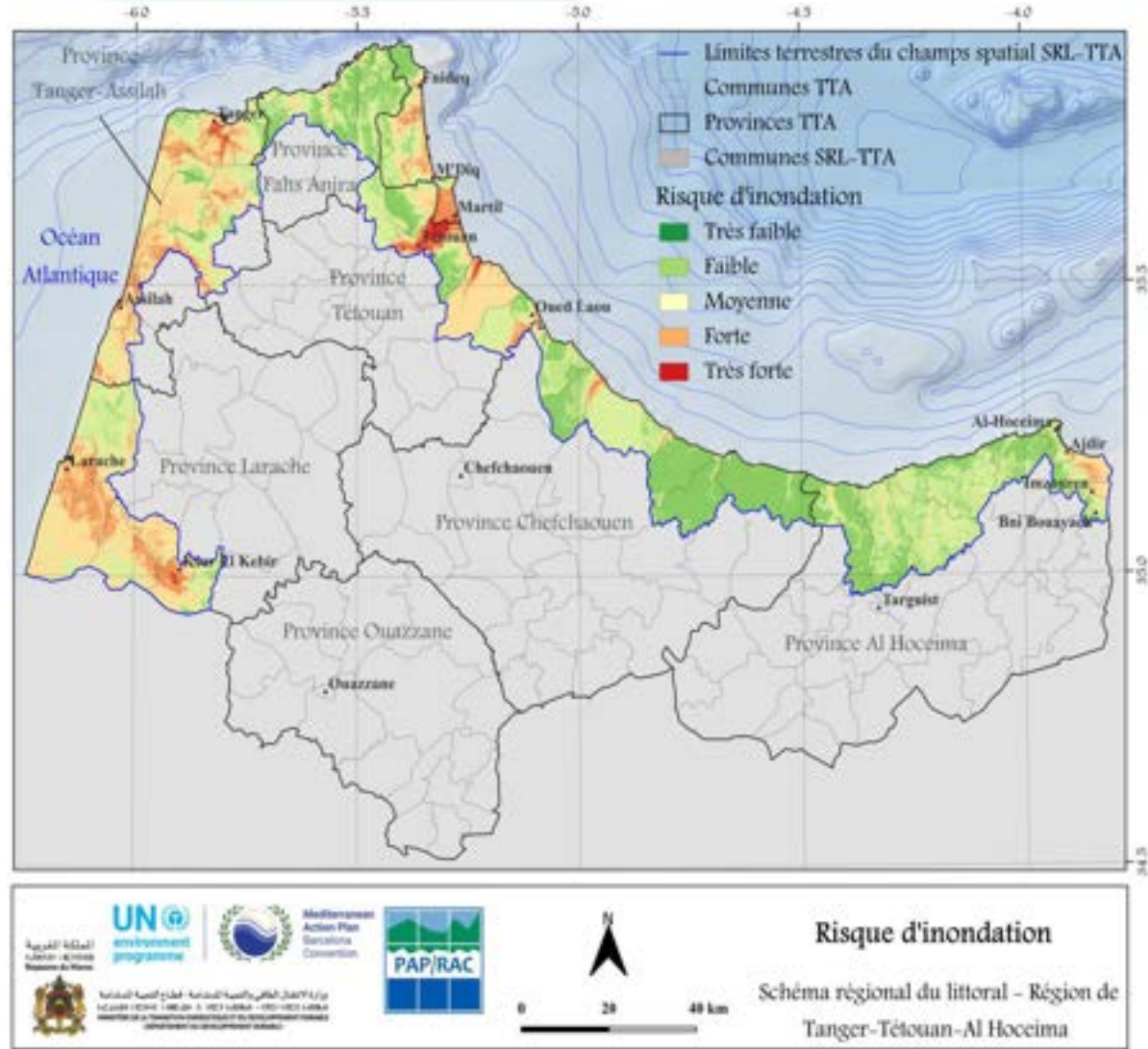


Climate projections established by the National Meteorological Directorate forecast an increase in average summer temperatures of around 2°C-6°C.

In terms of precipitation, for all time horizons set by the IPCC in its 5th report, there is a downward trend in annual rainfall totals which varies between 10-20%, reaching 30% in the Saharan provinces by 2100.



CLIMATE CONDITIONS AND PROJECTIONS IN THE AREA (TTA, MOROCCO)



Flooding is exacerbated by the sometimes uncontrolled urbanization of towns and their outskirts.

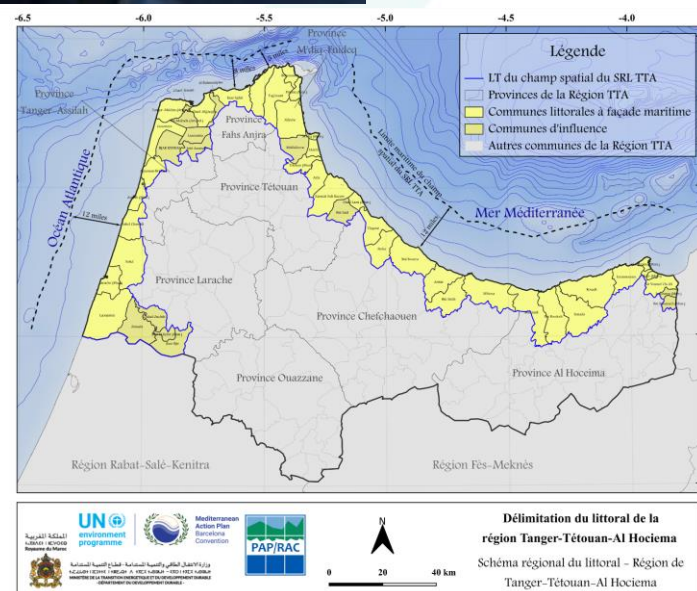
The last decade has seen an increase in the frequency of flooding in the TTA region, often due to the extension of urbanization close to watercourses because of the favorable topography in adjacent areas, which are often floodable, easier to access and less costly to build on.

DEVELOPMENT OF THE COASTAL PLAN IN THE TTA REGION



VISION 2045

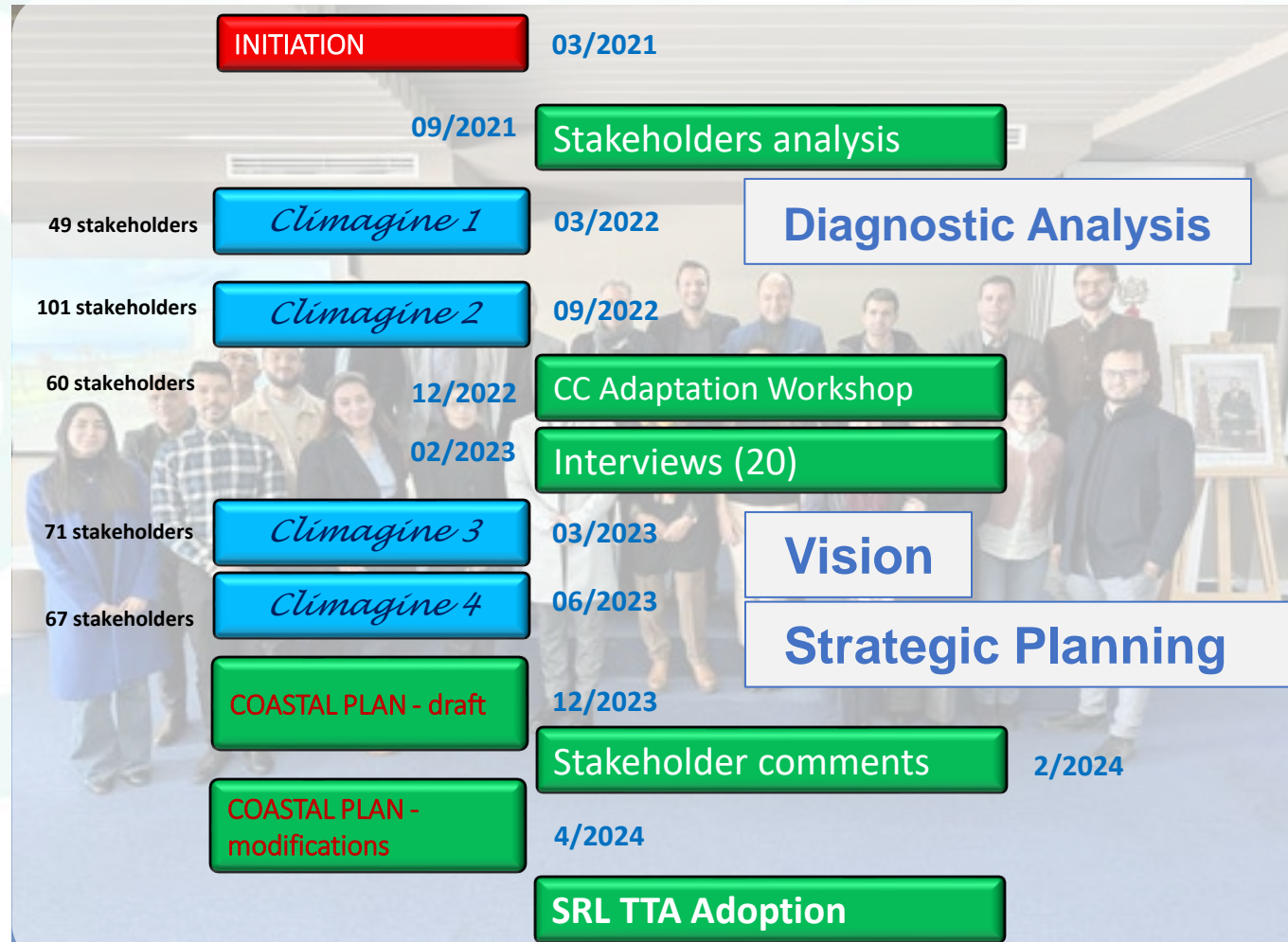
« The TTA region's coastline is ecologically productive, economically valued, legally protected, socially equitable and resilient to climate change. »



DEVELOPMENT OF THE COASTAL PLAN IN THE TTA REGION

ACHIEVEMENTS AND RESULTS

Participatory Approach



- Inception report
- Stakeholder analysis
- Scoping report
- Diagnostic analysis
- Climate risk assessment
- Clímagine report
- Advice for enhancing coastal governance
- Reports on Adaptation
- Recommendations
- Atlas
- SRL TTA Coastal Plan
- Action Plan
- ICZM Policy Paper

RESULTS



1st

Good governance - coherence between all decisions by the public authorities, at the national, regional and local levels



2nd

Reduce the effects of natural hazards and of climate change



3rd

Achieve coherence between public and private initiatives



4th

Sustainable use of natural resources, particularly water use



5th

Preservation of the integrity of coastal ecosystems



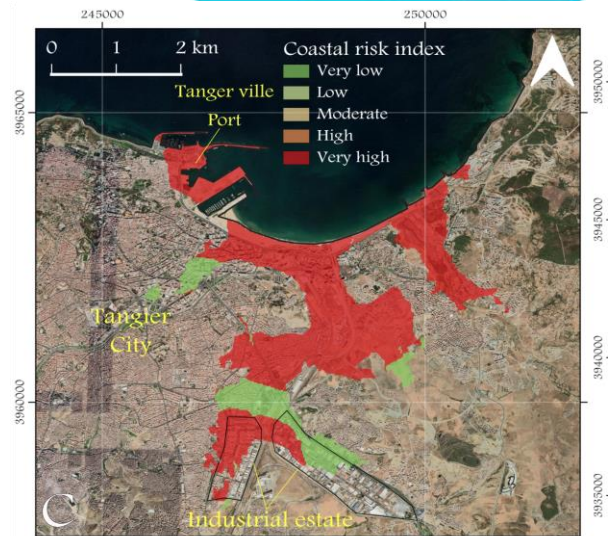
6th

Preserve the coastal zones



7th

Facilitate the sustainable development of coastal zones



RESULTS – ADAPTATION MEASURES

- Establishment of a coastal setback zone: Coastal Law, coastal plans SRL



- River rehabilitation and restoration: Martil river

- Restoration of coastal wetlands: Lagoon Smir



- Dikes and quays: Fnideq, Azla, ...

GREEN ADAPTATION MEASURES



- ✓ **Building and restoring dunes**
- ✓ Passive sand trapping systems, such as wind curtains- Relatively low cost- Easy to construct - Efficient sand deposition.

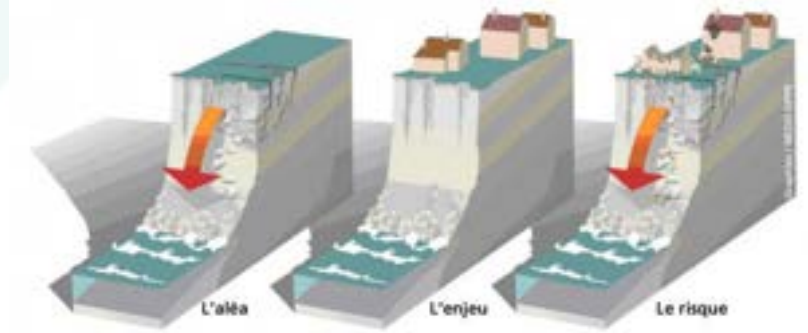
- ✓ **Protection and restoration of seagrass beds**
- ✓ Blue coastal ecosystems - Combat erosion – TTA Coasts include phanerogam seagrass meadows (*Zostera marina* and *Cymodocea nodosa*) at Jbel Moussa (Belyounech and El Marsa bays), which must be preserved.



GRAY ADAPTATION MEASURES



- ✓ **Cliff stabilization and reinforcement**
- ✓ Rainwater infiltration, aided by plant roots, facilitates the formation of cracks that weaken the rock. Waves impacting the bottom of the cliff, carving away at the rock and causing entire sections to collapse.



Cliffs south of Larache

SOCIETAL ADAPTATION MEASURES



✓ Societal – political measures

1. Establish a governance model for a resilient coastline and strengthen institutional and sectoral;
2. Inform and raise awareness;
3. Promoting Research & Innovation (R&D);
4. Install early warning systems for floods and tsunamis
5. Adopting ICZM as a proactive and adaptive approach to climate change-related coastal risks.

✓ Additional measures

1. Measures to combat heat waves and urban heat islands
2. Measures to limit the effects of drought and water shortages
3. Measures to combat forest fires

USEFUL REFERENCES

<https://climate-adapt.eea.europa.eu/en>



<https://adriadapt.eu>



<https://programming14-20.italy-croatia.eu/web/create>



<https://oppla.eu>





THANK YOU!

<https://pandoteira.cy>

ΤΜΗΜΑ ΠΕΡΙΒΑΛΛΟΝΤΟΣ. ΥΠΟΥΡΓΕΙΟ ΓΕΩΡΓΙΑΣ, ΑΓΡΟΤΙΚΗΣ ΑΝΑΠΤΥΞΗΣ ΚΑΙ ΠΕΡΙΒΑΛΛΟΝΤΟΣ



Με τη συγχρηματοδότηση του προγράμματος
LIFE της Ευρωπαϊκής Ένωσης



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