

Extended SSPs for Coastal Impact Assessment

Spatial Coastal Population Scenarios

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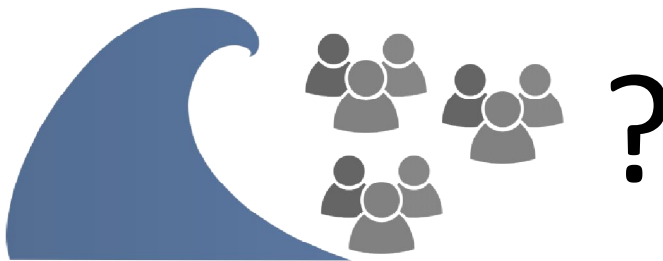
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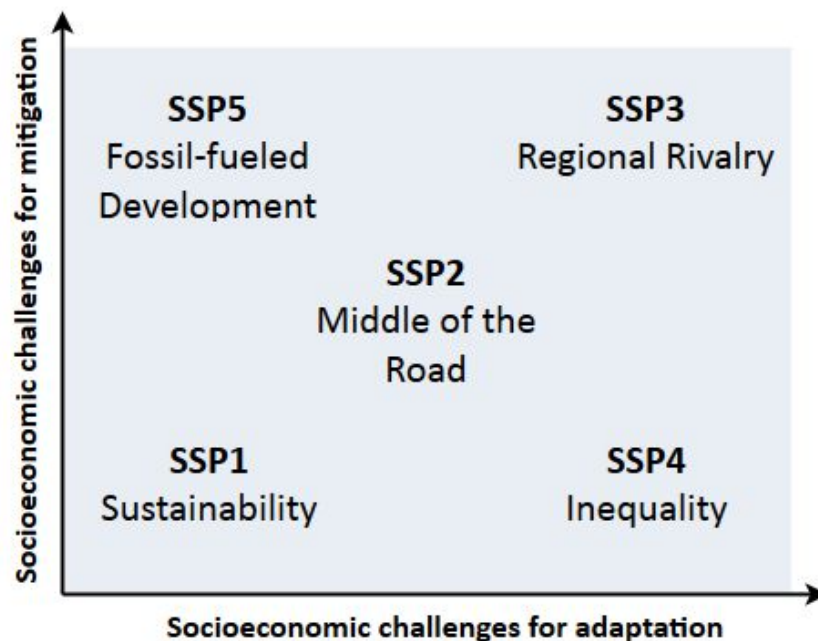
Coastal impact, adaptation and vulnerability (IAV) assessments:

| How many people will be exposed to coastal hazards in the future?



| Shared Socioeconomic Pathways (SSPs)

*“[...] plausible **alternative trends** in the evolution of **society** and natural systems over the **21st century** at the level of the **world** [...].”*
(O’Neill et al. 2014)

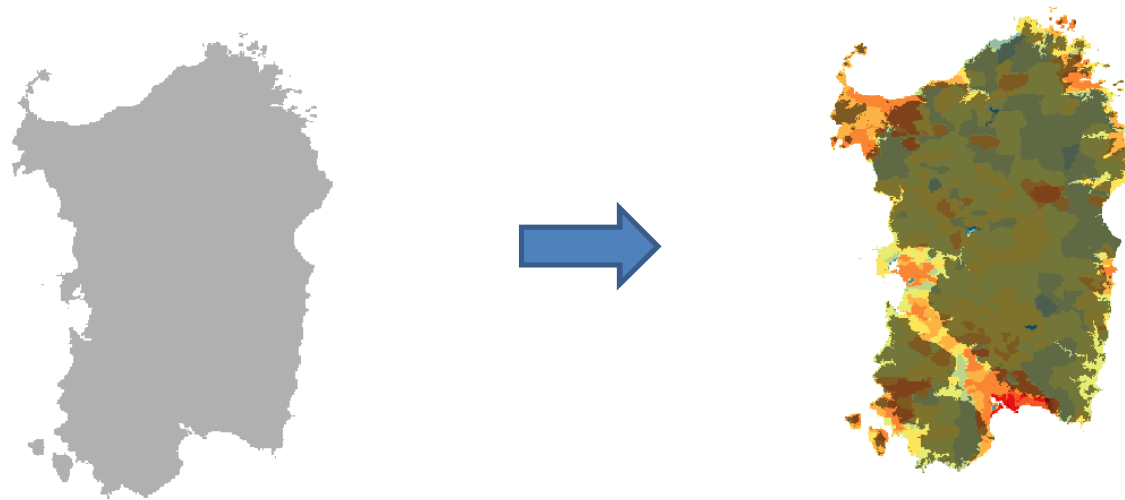


Adapted from O’Neill et al. (2015)

- | Two dimensions:
 1. Qualitative narrative
 2. Quantification
- | National-level projections of key variables until 2100: population, urbanization, GDP

- No differentiation between coastal and inland areas

- No spatial explicitness





DEVELOPMENT OF COASTAL SSPS

Narratives & Projections

| Assumptions:

1. Coastal areas **do not necessarily** experience higher population growth than inland areas
2. Coastal population growth follows **recent development trends**

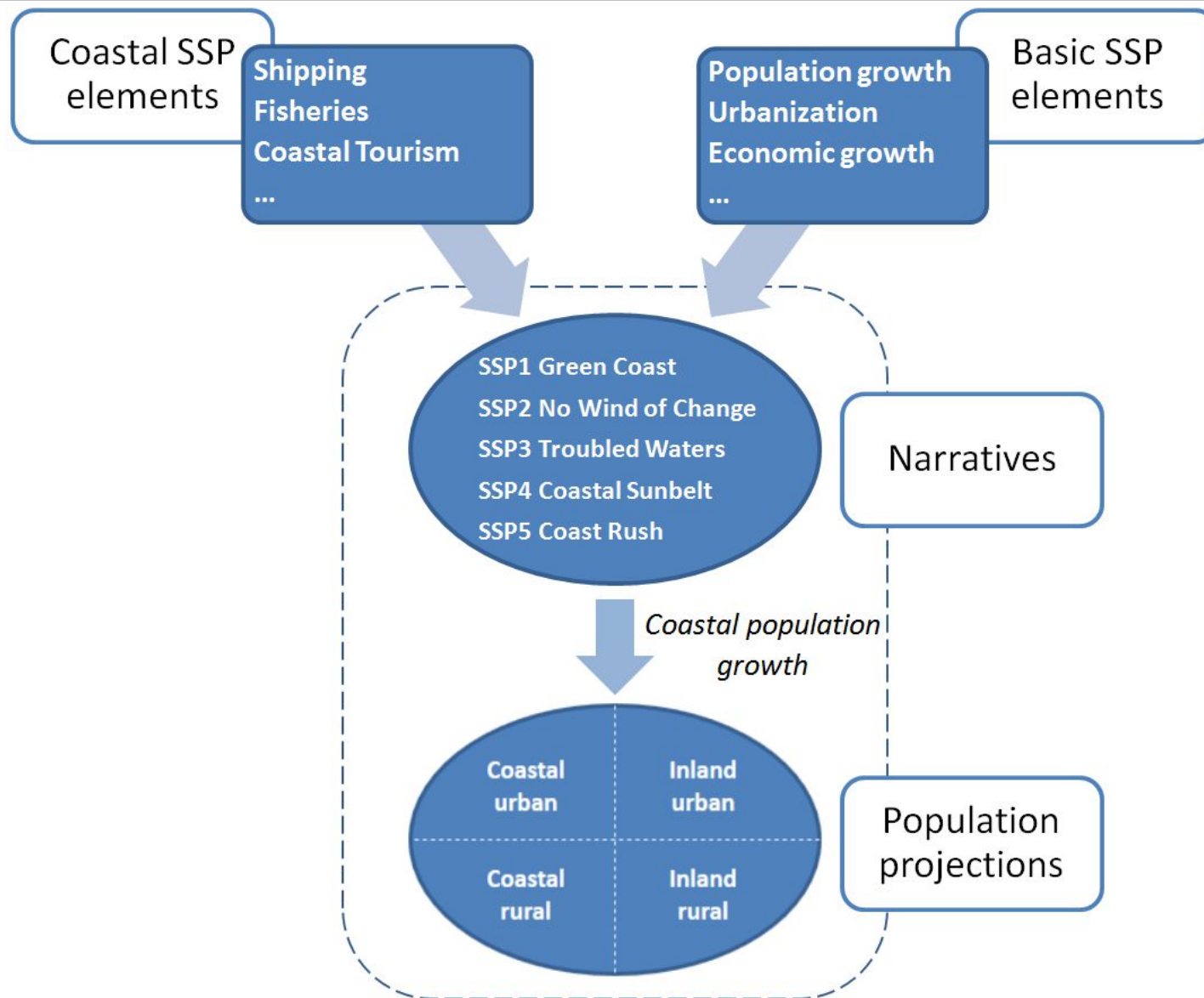
| Which factors motivate people to move to the coast?

- Shipping
- Fisheries
- Coastal tourism
- Lifestyle
- Coastal management



Coastal SSP
elements

Coastal SSPs





RESULTS

SSP 1 – Green Coast

*“[...] **shipping** is moderately important. **Tourism** is practiced in a sustainable way. **Lifestyle migration** to the coast is limited. Reduced inequality, low-meat diets and improvements in farming productivity lead to decreasing importance of **fisheries**. [...] **Policies** are oriented towards conservation and expansion of coastal ecosystems prevents settlement in the coastal zone. [...]”*

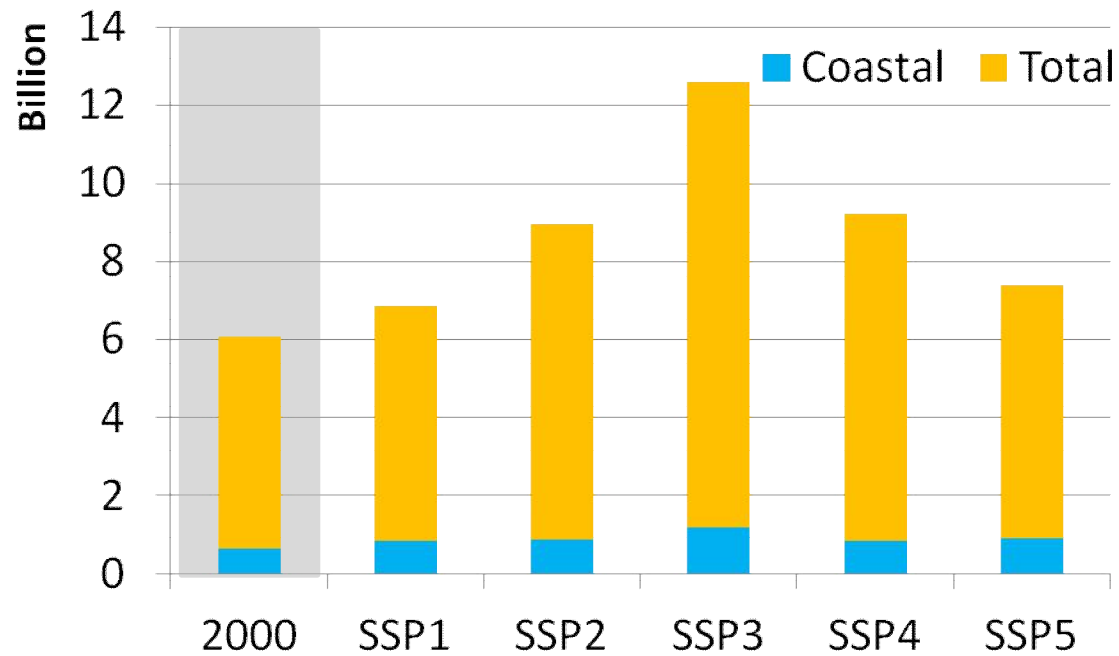
Merken et al. (submitted)

Coastal population growth (compared to inland areas)



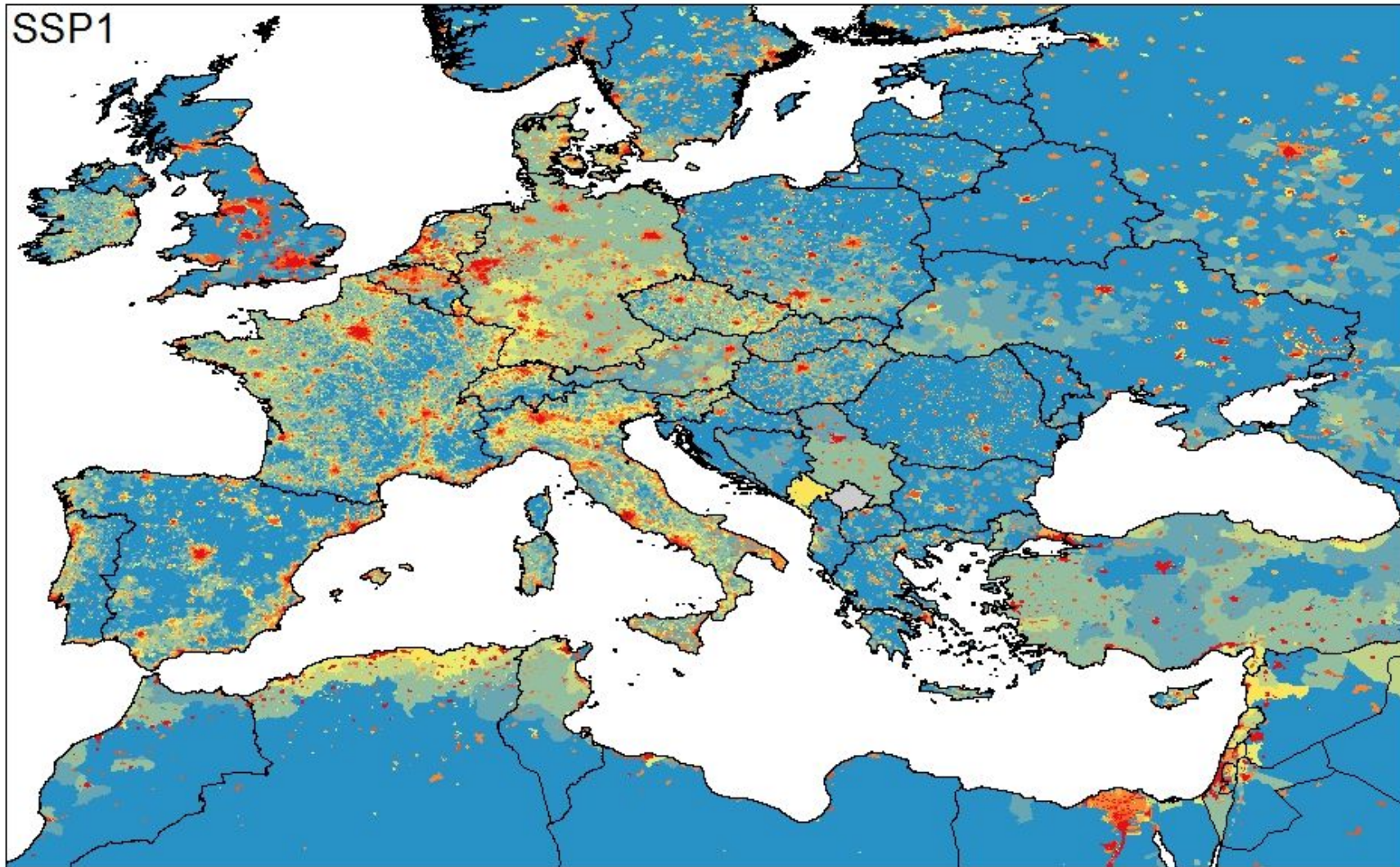
	SSP1 Green Coast	SSP2 No Wind of Change	SSP3 Troubled Waters	SSP4 Coastal Sunbelt	SSP5 Coast Rush
Urban	Equal	Historical patterns	Converging	High	Very high
Rural	Low	Historical patterns	Converging	High	High

Population in 2100

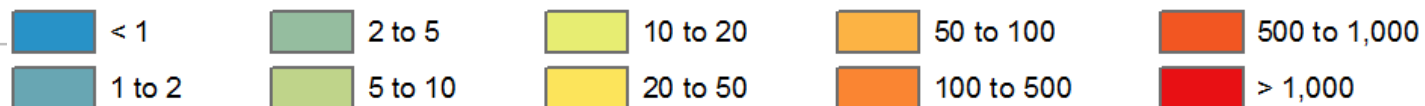


Coastal (million)	637	845	870	1184	830	907
Share (%)	10.5	12.3	9.7	9.4	9.0	12.3

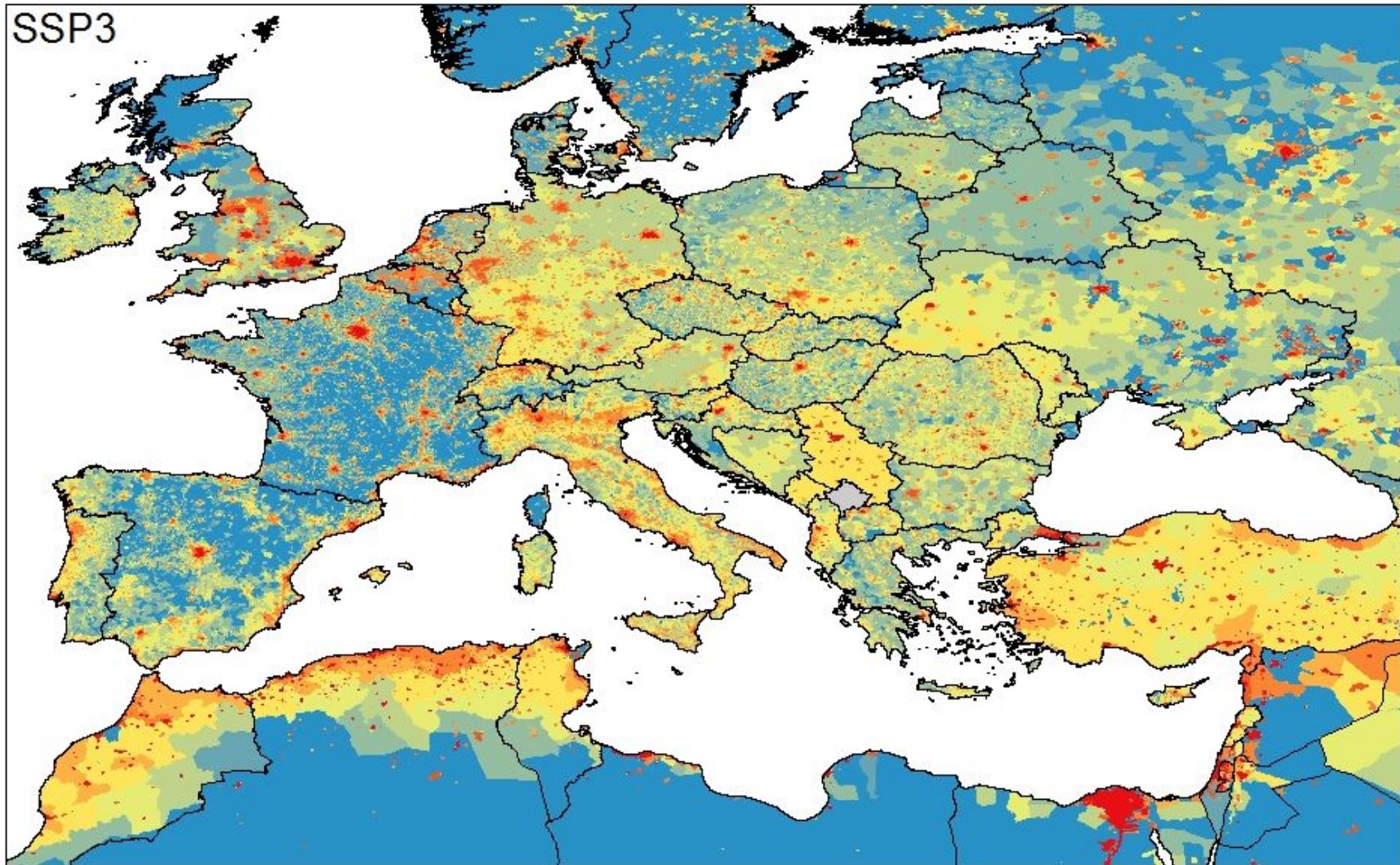
Population in 2100



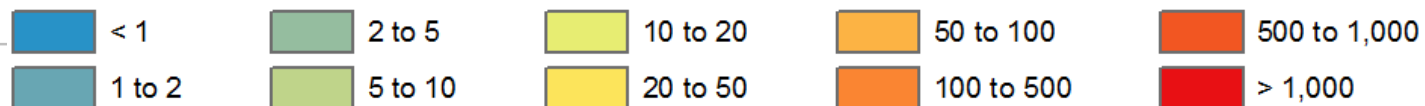
Population count (people per pixel)



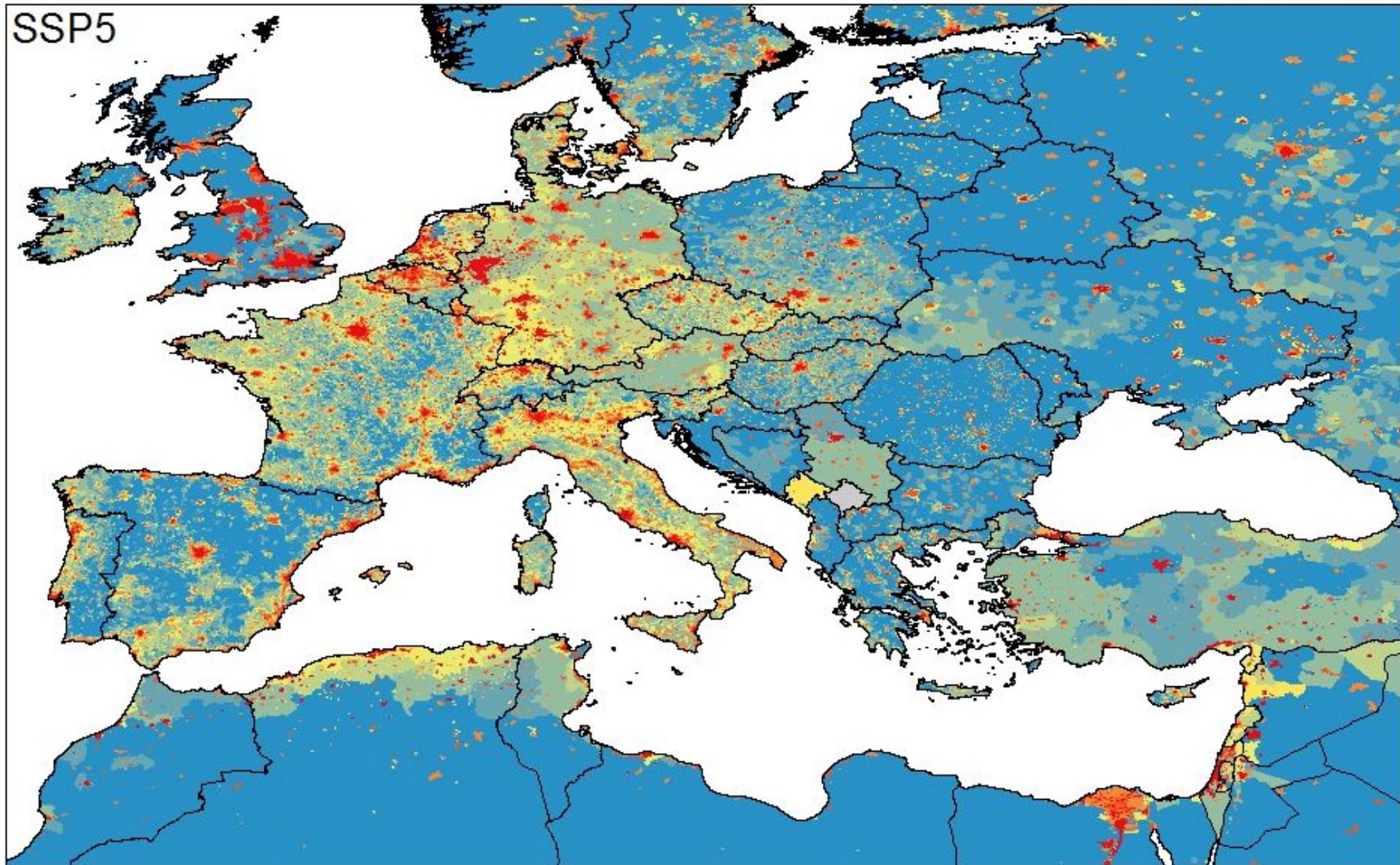
Population in 2100



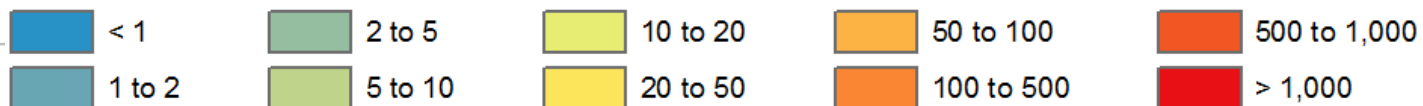
Population count (people per pixel)



Population in 2100



Population count (people per pixel)





SUMMARY & CONCLUSION

- | Development of coastal SSPs on a global scale until 2100
 - Narratives
 - Population projections
- | Coastal population increases by 30 - 85 % in all SSPs
- | Share decreases in SSP2, SSP3 & SSP4
- | For coastal IAV assessments on global to regional scale
- | Can be refined for local-scale applications

- | Merkens et al. (submitted): “Gridded population projections for the coastal zone under the Shared Socioeconomic Pathways”
- | Coastal population projection data (grids, tables) available upon publication

Thank you for your attention!



ADDITIONAL SLIDES

Coastal SSP elements



Coastal SSP element	SSP1 Green Coast	SSP2 No Wind of Change	SSP3 Troubled Waters	SSP4 Coastal Sunbelt	SSP5 Coast Rush
Shipping	Moderate	Moderate	Low	Moderate-high	High
Fisheries	Low	Moderate	High	Very high	Low
Coastal tourism	Sustainable; low-impact, no mass tourism	Moderate; uneven	Very low; no international tourism	High for elites; low for majority of population	Very high; mass tourism
Lifestyle	Low	Moderate	Low	High for elites; low for majority of population	Very high
Coastal management	High; towards sustainability	Moderate	Weak	Towards elite's benefit; little interest in sustainability	High; towards economic growth

Basic SSP elements



Basic SSP element	SSP1	SSP2	SSP3	SSP4	SSP5
Population growth	Relatively low	Medium	High; low in OECD	Relatively high; low in OECD	Relatively low
International migration	Medium	Medium	Low	Medium	High
Urbanization	High, well managed	Medium, historical patterns	Low, poorly managed	Med-high, mixed across & within countries	High, some urban sprawl
Economic growth	Medium-high	Medium, uneven	Slow	Low-med	High
International trade	Moderate	Moderate	Strongly constrained	Moderate	High, regional specialization
Policy orientation	Toward sustainable development	Weak focus on sustainability	Oriented toward security	Toward the benefit of the political and business elite	Toward development, free markets, human capital

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- O'Neill, B.C.; Kriegler, E.; Riahi, K.; Ebi, K.L.; Hallegatte, S.; Carter, T.R.; Mathur, R. and D.P. van Vuuren (2014): A new scenario framework for climate change research. The concept of shared socioeconomic pathways. In *Climatic Change* 122 (3), pp. 387–400. DOI: 10.1007/s10584-013-0905-2.
- O'Neill, B.C.; Kriegler, E.; Ebi, K.L.; Kemp-Benedict, E.; Riahi, K.; Rothman, D.S.; van Ruijven; van Vuuren, D.P.; Birkmann, J.; Kok, K.; Levy, M. and W. Solecki (2015): The roads ahead. Narratives for shared socioeconomic pathways describing world futures in the 21st century. In *Global Environmental Change*. DOI: 10.1016/j.gloenvcha.2015.01.004.