Climate change and economic development on Europe's coast

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The contribution is based on five basic statements concerning the coastal regions:

1) the coastal areas are in intensive use all around the world;
2) a sea-level rise is observed and also expected to continue in the future;
3) there are multiple pressures affecting the coastal regions in addition to sea-level rise;
4) the prediction of the amount / intensity of changes is very uncertain while there is a consensus concerning the tendency (sea-level rise);
5) a reduction of the predicted sea level rise seems to be possible (reduction of CO_2 emissions) but cannot be avoided.

ad 1) A significant portion of the global population lives in the **coastal regions**, esp. mega-cities are situated at the coasts all around the world. The coastal system consists of natural (mangroves, salt marshes, coral reefs, …) and socio-economic areas, whereas a significant sea level rise would endanger many socio-economic infrastructures.

ad 2) A **mean global sea level rise of 1-2 mm/a** has been observed during the last decades which is regionally differentiated; reasons for this differentiation is e.g. rising (and sinking) tectonic plates due to glacial isostatic adjustments after the last ice age. The predictions for the future based in scenario calculations (SRES) are diverging depending on the assumptions made, but all scenarios predict rising sea levels for the future. Main causes for this tendency are the melting of land ice (glaciers, inland ice) and thermal expansion of sea water. Other causes may be the variability in earth rotation, geological events as well as regional changes in circulation mechanisms (e.g. Gulf stream). The coastal interpretation of the SRES scenarios implies wetland losses as a consequence of a sea level rise, a differing priority to hazard coastal management (depending on the story line) and despite of the potential risks high migration rates to coastal areas. All SRES scenarios (= a range of possible / probable futures) of the IPCC concerning sea level rise are consistent until 2040, a divergence can be observed thereafter. Potential (expected) effects of the future sea level rise would be: coastal erosion, ecosystem displacement, salinisation of ground- and surface waters as well as an increased storm frequency and intensity (and increased damage).

ad 3) In addition to the expected sea level rise there is (and has been) a **multiple pressure** on coastal ecosystems: destruction of intertidal systems, land claim, construction of ports and harbours, aquaculture, increasing population, etc.

ad 4) The **prediction** of future scenarios of coarse is very **uncertain** as up to now not all contributing processes are understood an can be integrated into the models. The mean predicted sea level rise of the IPCC is about 1-2 mm/a which needs to be differentiated regionally. In addition to this mean behaviour some events are discussed which would have a high consequence but only a low probability (e.g. the collapse of the West Antarctic ice shelf). This event would rise the global sea level by about 5m but is very unlikely. Nevertheless it is necessary to be aware that these kinds of events are possible.

ad 5) A reduction of the of the predicted sea level rise seems to be possible (e.g. by a reduction of CO_2 emissions) but cannot be avoided. Strategies how to respond to this process (with regard to buildings) could be retreating activities from the coast line, constructing buildings on artificial platforms or building protection measures (e.g. dikes). The last possibility would protect human societies but reduce the accomodation space for ecosystems. So the responding to sea level rise in detail and climate change in general required by the society requires both, **mitigation** and **adaption**.

Finally it has to be mentioned that ecosystems are mainly dependent on the rate of rising sea level (adaptative capacity…) while for humans the absolute amount of rising is more decisive.

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