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Megacities in the Coastal Zone

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Megacities have long been recognised as important drivers for socioeconomic development but also as sources of environmental challenges. A large number of megacities are located in the coastal zone where land, atmosphere and ocean meet, posing additional challenges for our understanding of the interactions. The atmospheric flow is complicated not only by urban heat island effects but also topographic flows and sea breezes which also lead to profound changes in clouds and precipitation. Inflow of oceanic air (rich in sea salt) into the polluted city's atmosphere and outflow of polluted air onto a much cleaner ocean lead to very specific interactions, the net effects of which are not well understood. The addition of contaminants to the coastal waters both by atmospheric deposition and fluvial inputs can affect the coastal ecosystems dramatically, limiting their ability to function and provide ecosystem services, e.g. fisheries and aquaculture. Changes to coastal ecosystems also affect fluxes of gases and particles to the atmosphere and can lead to harmful algal blooms. The scale of influence of megacities in the coastal zone is at least hundreds if not thousands of kilometres in the atmosphere and tens to hundreds of kilometres in the ocean, the latter strongly dependent on the hydrographic setting. Coastal megacities are at risk by sea level rise, floods and storms; they are at the forefront of change and scientifically well informed planning can improve livelihoods and ecosystem health but only if we take a holistic approach to study and monitor these regions.