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Geomorphological changes in Puerto Madryn coast (Chubut, Argentina) as a consequence of urban growth during the last decades

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The study area is located in the western coast of Nuevo gulf, Chubut province, Argentina. Puerto Madryn city (42°46' 20" S; 65° 0'48"W) has grown very quickly during the last decades, both in number of inhabitants and urbanized area. This urban development has changed intensely the natural landscape of the coast, modifying and destroying the original geomorphology. The evolution of the coast has been analyzed through the analysis of aerial photographs (1940, 1957, 1971, 1988, 1998, 2011), current satellite images and field observations.

Puerto Madryn population has grown from 6,110 to near 82,000 between 1970 and 2010, estimating that it is near 100,000 by now. This number doubles every year during the tourism period. The urban area (from north to south and from east to west) has increased 25% only between 2002 and 2014, while the length of coast occupied grew from 0.8 km to 11.2 km since 1940. The coastal dunes originally developed over a marine terrace (beach ridges) has been almost completely destroyed. The coastal dunes (partially active and stabilized by vegetation) reached a width of about 700 m by 1942 and a length of 3,150 m from north to south. Currently, that extension has been reduced by 30% in length and 90% in width, reaching 60 m in the sites where it is conserved.

It has been observed that the recharge of the beaches depends on the conservation of coastal morphologies due to there is no external sediment source or coastal drift inside the gulf. The destruction of the dunes field altered the sediment balance with the coast and beach erosion could be seen in a near future. Despite this and the importance of coastal resources conservation, urbanization continues (coastal roads, hotels, spas, restaurants, drains to the beaches) and it is urgently necessary to develop an integrated coastal management plan.

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