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Editorial Open Access

Large Natural Disturbances and Interactions with Artificial Coastal Landscape

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Editorial

The frequency of large natural disturbances has increased over the last 20 years [1-3], affecting physical infrastructure, shattering local, regional and national economies [4] and reshaping natural ecosystems [5,6]. Notwithstanding the last fact, there is no much knowledge on the immediate effects (i.e. weeks, months) on natural ecosystems of large natural disturbances such as earthquakes, tsunamis, volcanic eruptions, fires and floods, among others. Indeed, it has been strongly argued that fast responses to study the effects of such disturbances, are the best way to foster proper knowledge on their mid and long lasting effects, studies which may well result in surprising findings, the so call ecological surprises [7,8]. For example, studies initiated circa 1.5 years after the severe 1988 fires in Yellowstone National Park (Wyoming, USA), showed that the vegetation of the affected area was quite resilient, a fact that surprised scientists, a similar situation found by researchers who studied the effects of the 1980 Mount St Helen´s volcanic eruption on the surrounding environment [5,9].

Exposed sandy beaches represent nearly 80% of the ice-free coasts of the world [10]. These coastal habitats are squeezed between sea level increases [11] and urban coastal development such as armouring (e.g., seawalls, rocky revetments) which covers beach habitat, reflects waves and constrains landward migration of the shoreline, leading to decreases in beach width and intertidal habitat. Surprisingly enough, there are just some studies devoted to evaluate the effects of coastal armouring on the sand beach macrofauna, organisms which have relevant ecological functions [12,13].

Exposed sandy beaches located on seismically active areas on Earth (e.g. the coast in an around the Pacific Ocean), are periodically affected by co-seismic coastal deformation and tsunamis, due to large earthquakes (M_w>8.5). On February 27, 2010, the tectonic plate boundary between the Nazca and South American plates ruptured along a fracture zone close extended for about 500 Km along the Chilean coast (circa 34-38°S). The resulting earthquake (M_w=8.8) produced significant coastal damages and triggered a devastating tsunami that killed nearly 500 people [14], destroyed coastal infrastructure, and further reshaped coastal landscapes through land-level changes (coastal uplift and subsidence) [15]. Results published recently [16] and based on samplings carried shortly before and after this massive earthquake, showed unexpected interactions between the co-seismically uplifted southern rupture coastal zone and artificial coastal defences, such as seawalls and revetments. Uplifted sandy beaches in front of armouring structures widened and flattened, restoring habitat which had been lost due to the placement of seawalls and rocky revetments on the upper and mid shore levels of those beaches. That was followed by rapid colonization of mobile crustaceans typical of that levels which before the earthquake were occupied by these man-made structures. Thus, interactions of extreme events with human-altered coasts-such as armored sandy beaches-can produce surprising ecological results, and suggest that complex responses to human landscape alteration can leave lasting footprints in coastal ecosystems. Thus, we are confident that these novel insights will be useful for planners and stake holders of coastal zones located along tectonic areas, especially along that coasts where sandy beach erosion is a common problem. Indeed, location and placement of armoring structures could be properly planned, ensuring a sustainable urban development of coastal zones. I am also confident that open access journals, such as Journal of Geography & Natural Disasters, are relevant to a worldwide spread of these sort of studies, which are urgently needed in a world already affected by a significant increases in the occurrence of large natural disturbances and consequently in its effects: natural disasters. Therefore, I do hope that we will see an increase in fast response studies to natural disturbances, hoping that it will enhance our understanding of how nature works and how natural disturbances interact with human infrastructure. As written in a former Editorial of the Journal of Geography & Natural Disasters "The field of disasters is unusual, in that the test of theory is its ability to help solve pressing, practical problems right away, not in 50 years´ time" [17]. I fully agree with that statement.

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