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Ocean Science in the Corona Virus Pandemic: Opportunities and Challenges

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Abstract

The COVID-19 pandemic has obliged Governments all around the world to implement confinement and social distancing measures. Leisure and business activities on beaches and in ports have restricted direct and indirect contamination from, for instance, plastics, hydrocarbon spillage, microbiological loads, and noise levels. This has led to temporarily improved environmental conditions, and therefore the beaches have conditions closer to Marine Protected Areas. Here we report some impacts that are studied using local surveys and qualitative observations in Ecuador at the popular beaches and ports of Salinas, Manta, and Galapagos. Satellite data support this information. Online surveys were meted out at critical moments of the pandemic: May (15th) and just after when measures were relaxed a bit, but within lockdown in July (21st) 2020. Here we recommend that this unique opportunity resulting from the COVID-19 pandemic is employed locally, regionally, and globally to construct baseline data sets that include information on physical, chemical, biological, and microbiological factors in coastal zones. These parameters can then help establish a good Coastal Zone Management Plan supported beach description and quality (water standards, noise pollution), likewise because of the human dimension (tourist load, cultural heritage, and measure indices) [1]. This data and data gathering ideally should be done before the beaches become more heavily used again because the pandemic recedes.

Keywords: Ocean Science; COVID-19; pollution; plastics

Introduction

As the COVID-19 pandemic spreads around the globe, we must re-examine the values that direct our individual and group actions likewise as how we behave publicly. We must lead with humanism and science in the face of the crisis [2]. The exponential rise in the consumption of drinking water after the COVID-19 epidemic could be a significant contributor to plastic contamination. Despite the problems, the COVID-19 pandemic measures of isolation and social isolation are having some positive effects on the environment (at least temporarily), like a discount in atmospheric polluting gases (CO2, SO2, NO2, etc.) [3]. While Le Quéré et al. (2020) have reported 17 per cent less daily CO2 emissions likewise to decreases in other gases, Rosenbloom and Marked (2020) have noted a big decline in pollution and greenhouse emission emissions. cf. Ju et al (2021). Whilst there has been an improvement in environmental conditions, perceptions of individuals who are impacted day by day in places where the economy depends on tourism or fishing activities aren't well-known [4]. Additionally, we want to own a scientific baseline of information and data which will be combined with public perceptions to articulate correct tourism, coastal fishing and pollution management plan post the COVID-19 pandemic. The work reported here seeks to supply information and priorities supported by environmental qualitative information that's supported by satellite quantitative data at three main Ecuadorian beaches in Salinas, Manta, and Galapagos. We expect this can be a novel opportunity globally to form a scientific baseline at a time of reduced environmental impact, as beaches and near-shore waters have taken on temporary features of Protected Marine Areas [5].

Materials and Methods

At the time of full imprisonment and strict restrictions (12th March to 12th September 2020), standard environmental survey techniques weren't attainable because of restricted access, lack of employees, and bottom (if any) laboratory facilities in Ecuador [6, 7]. Therefore, online surveys victimization web-based applications were done out. Recently, Torrentira (2020) has validated the utilization of such online interviews beneath pandemic conditions, and each Abir et al. (2020) and author et al. (2021) have with success used the online methodology for surveys beneath imprisonment restrictions [8].

The data obtained area unit from the visual observation of beaches and nearshore aquatic life. the primary survey was a cross-sectional kind (see Setia, 2016) that according to opinions and sightings throughout might (from 15th) 2020 [9]. Now national imprisonment restrictions duty-bound folks to be received most of the time, beaches were absolutely closed, no travel between cities was allowed, police, and military guarded the streets and COVID-19 cases, and deaths were increasing apace [10, 11]. The surveys were done out over a time window of 76 h, employing a kind change from a Google guide (Google Forms: Free online Surveys for Private Use). The surveys were targeted to own confidence and interval levels of 95 and 5.16% severally, following the approach of Taherdoost (2017) as an example [12].

Both surveys used Instagram, Twitter, Facebook, and WhatsApp to contact a variety of people living within the named cities getting ready to or before the beaches and water's edge, and WHO conjointly had links to coast activities as well as business and educational analysis, also as traditional voters.

To support the qualitative surveys, quantitative information and knowledge from the National Aeronautics and Space Administration satellite instruments Terra (EOS AM-1) and Aqua (EOS PM-1), that area unit payloads for the "Moderate Resolution Imaging Spectroradiometer – MODIS" (NASA, 2019), were accustomed live

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temporal and spatial changes of chlorophyll and the diffuse attenuation coefficient Kd (490 nm), over the timescale of the study [13, 14].

Discussion

The COVID-19 pandemic has placed populations beneath emotional, economic, and health stresses, and so to conduct face-to-face or online surveys under these circumstances is tough (Labatt et al., 2013; Arnsten, 2020; Steele et al., 2021), and recently Lardone et al [15]. (2021) have reportable however these circumstances may influence psychological feature processes. Each face-to-face and focus cluster approach was tried within the second survey, however, folks weren't ready to retort, and therefore it absolutely was dead within the same manner because the first [16]. The surveys were designed to be the best potential, to make sure responses, because, beneath the trying and distinctive pandemic conditions, concentration, reasoning, empathy, patient, and management of emotions like thoughts and actions may well be compromised (Arnsten, 2020; Lardone et al., 2021) [17]. Studies exploitation of social media (Google forms) square measure more and more accepted and web-based surveys became one of the foremost common strategies to gather information for analysis (e.g., Vasantha and Harinarayana, 2016) [18]. Steele et al. (2021) reportable a full study on cross-sectional surveys on folks' activity directly affected by the lockdowns, one among the characteristics square measure the short and unambiguous queries and replies to them; affirmative, or not for example, just like the surveys given here. although the results of the second interview confirmed the primary one, it should be clear that interview information relies on the perception of the interviewee. Biases throughout online questionaries throughout COVID-19 pandemic restrictions are studied by Schaurer and Weiß (2020) and will be thought of in survey interpretations [19].

There is nearly a unanimous read that beach zones (sand and coastal water) have notably improved throughout confinement, a minimum of from a visible purpose of reading (see Supplementary Material Photos and Video) [20]. The beaches have less garbage normally and plastic especially, although there has been a rise in plastic and mask production and disposal around the world (Calma, 2020; Elkarra, 2020) [21]. Tourists tend to litter beaches, as they appear to lose smart behaviour concerning the management of their garbage (Oigman-Pszczol and Creed, 2007), Williams et al. (2016) and Mestanza-Ramón et al. (2019b) have reported cases of littering of popular beaches at Rio de Janeiro, the north Caribbean coast, and Ecuador (including Galápagos) [22]. A lot of recently, Gaibor et al., 2020 has found that phylogenesis junk (plastic, paper, cigarette butts, metal, glass, others; plastics, 60%) is especially of native origin [23]. The variety of plastics found is given in the results. Beach business has additionally been reportable to extend microbiological load (Natural Resources Défense Council, 2014), though it absolutely was unfeasible to follow this within the current study [24]. The determined reduction in litter and contamination reportable here appears to directly correspond to less use of beaches throughout the internment.

There is a direct relationship between fish demand and business (Budzich-Tabor et al., 2014), and as business activities stopped, the work markets of each city were partly closed, leading to less artisanal fishing impact. Different species within the three locations, together with tiny water fish and marine mammals (dolphins, orcas, whales, ocean lions) like sharks and turtles are reportable within the survey, like on social networks (Zambrano-Alvarado, 2020). A marine scientist from the island reportable seeing turtles on the point of the bay (I. San Cristobal) between 10 and 15 times a day; before the confinement, turtles were seen seldom there in space. during a recent release by the naturalist Foundation (CDF, 2020), island penguins (Spheniscus mendacious) and wingless Phalacrocorax carbo (Phalacrocorax Harris) that are caterpillar-tracked for the last thirty years square measure showing enhanced numbers of people, 1,940 and 2,290 severally, that could be a record for these species [25].

The absence of business has greatly reduced the pressure on the few already full waste treatment plants in Salinas, Manta, and the island, and so eutrophication, plastic and soiled contamination have dramatically decreased; Castro-Rodas (2016) found a right of way relationship between flora growth and dissolved P gift in residual untreated waters in Salinas. However, as most surveyed folks don't understand the dearth of waste treatment plants, they're unlikely to remember the issues related to untreated wastewater. The reduced business, while economically damaging, has created less waste pollution, and paired with background renewal of the coastal waters because oceanic currents have crystal rectifier to cleaner sandy beaches similarly to nearshore waters.

The ICZM approach needs baseline information and data against those changes caused by the reactivation of business, tourism, fishing, and different activities away on marine nearshore systems, which will be measured. The setting of this baseline before changes to this improved environmental quality occur is Associate in a Nursing imperative recommendation. Parameters should a minimum of embodying, coastal hydraulics (surface, littoral, periodic event currents), beach and inshore flora and fauna multifariousness, phylogenesis microbiological load (intestinal and soiled bacterium load), chemical characterization of water bodies (Patil et al., 2012) and beaches, quality indices (Anfuso et al., 2014; prosecuting attorney Costa Cristiano et al., 2020), and noise.

Conclusion

All three sites examined are underneath an aggressive and customarily poorly organized tourism-driven economy and, as Stumpf et al. (2013) warned, this has created cluttered beaches and impure waters underneath traditional conditions. The COVID-19 pandemic has semiconductor diode to dynamic conditions and the public looks to understand an improved environmental quality as they price and depend upon the natural resources of their surroundings. The come of marine species and reduction in levels of noise and environmental pollution are the highlights of the survey results and they corroborate the final perceptions found in social media. These survey observations are per quantitative satellite knowledge on Chl and the diffuse attenuation constant for the areas studied. The environmental improvement throughout the pandemic provides an unequalled chance to construct a baseline dataset for these nearly pristine beaches and coastal waters, and to contemplate future viable management choices supported by such datasets, as mentioned here.

The COVID-19 pandemic is inflicting monumental and unpredictable changes in society that may influence lives for generations to return (Nat Ecol Evol, 2020) (No Author, 2020b). Adoption of the recommendations higher than are required to limit coastal impacts on these future generations.

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Conflict of Interest

None

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