

Teenager Involvement in Coral Gardening Efforts

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Accepted for publication: 2023
Published Date: October 2023

Abstract

Global coral reef ecosystems are facing adverse climate change effects. Without urgent action, coral reefs around the world would be at risk of dying at incredibly high rates. This paper proposes a solution to mitigate the threats coral reefs are facing. The research paper is divided into five parts: **1) The danger and threats coral reef ecosystems are facing, 2) An explanation of why coral gardening is the appropriate solution, 3) The importance of teenager involvement in coral gardening, 4) How to get teenagers involved in coral gardening, and 5) Long-term benefits of teenager involvement in coral gardening.** To garner more teenager participation in coral gardening, this paper proposes converting coral gardening sites into eco-tourism destinations, in order to appeal to teenagers' pro-environmental behavior that is influenced by both nature's aesthetic value and social media.

Keywords: sustainability, ocean conservation, term

1. Threats Coral Reefs are Facing

The coral reef ecosystem is one of nature's largest and most diverse ecosystems, and it plays a significant role in the lives of many. It acts as a habitat for 25% of all marine life (*Basic Information about Coral Reefs* | US EPA, n.d.). Aside from this, it provides income for millions of people who live in coastal areas and also acts as a wellspring of food and nutrition. Even in the United States alone, there are 87 million people (29% of the total U.S. population) who live in coastline counties and depend on the ocean for their livelihoods (*Emergency Management Coastal Areas*, n.d.). However, climate change has caused this important ecosystem that is essential for all forms of life to decline severely. Without action to limit and reduce the current state of global warming, by 2050, there will be a 70-90% decrease in coral reefs globally (Reshef et al., 2006; Sully et al., 2022). This would mean detrimental effects on marine life and the life of populations that depend on the ocean.

2. Coral Gardening: The Appropriate Solution

To help mitigate the catastrophic impacts coral reefs are facing, coral restoration projects and efforts are a must. One of the best methods to recover damaged coral reefs and

improve their long-term sustainability is a restoration technique called coral gardening. Because coral garden projects use species of coral that are more resistant to current climate conditions, newly created coral reef communities formed by coral gardens are resilient and vigorous to current climate change, thus creating a more robust reef ecosystem (Schmidt-Roach et al., 2020). Furthermore, corals grown in coral garden nurseries can become a source of coral saplings for other gardening or restoration projects, reducing the unsustainable cutting of wild corals (Lirman & Schopmeyer, 2016). This also implies that since they are resilient to current climate conditions, they will multiply the amount of resilient coral reef ecosystems around the world when replanted in other nurseries.

Aside from their advantages in vigor, corals grown in coral gardening projects have a highly successful survival rate because these nurseries enhance coral survival and population growth as they "allow reduced competition for resources (substrate, light), better protection against predation pressures, provide improved conditions for reduced sedimentation, and continuously increased water flow conditions for improved nutrition" (Rinkevich, 2019). Other than multiplying the populations of healthy and strong corals, various coral garden projects were developed to help recover threatened or vulnerable coral species. For example, Lirman

et. al. conducted a study on the effectiveness of coral gardening on the propagation of a threatened coral species called the Caribbean staghorn coral *Acropora cervicornis*. Through coral gardening, the growth rates of the staghorn coral grown in the nursery exceeded the growth rates of wild staghorn corals in the area, proving that coral gardening is a successful method of recovering species and improving their long-term sustainability (Lirman et al., 2010). To ensure that coral gardening projects create a maximum positive impact, this paper will examine the significance of teenage involvement in coral gardening.

3. The Importance of Teenage Involvement in Coral Gardening

To create significant impacts and progress, it is essential to gather the participation of teenagers. According to statistics from UNICEF, there are 1.3 billion adolescents, which account for 16% of the world's population (*Adolescents Statistics - UNICEF DATA*, n.d.). Furthermore, 95% of U.S. teenagers report that they own or have access to a smartphone, with 45% of them stating that they frequently use social media (Anderson & Jiang, n.d.). This suggests that since the majority of teenagers are social media users, they have a significant influence in promoting online environmental awareness. So-In et al. (2023) explain that social media is now the primary form of communication and also acts as a platform for the spreading of news, causes, and advocacy. Aside from this, Generation Z is the generation that will suffer the adverse effects of climate change, which encourages the need for youth-led environmental movements and actions (Hurrelmann & Albrecht, 2021).

There is a lack of involvement from teenagers and youth in the field of environmental conservation (Corner et al., 2015). A study that sampled 160 students from a high school in Assam, India, showed that the students had an above-average rating of environmental knowledge (Sahidullah, 2022). However, Castro et al. (2014) proved through a study done in Chile that surveyed 1,951 students from 21 high schools in the Valparaiso region that environmental literacy does not correlate with eco-friendly behavior. Pro-environmental behavior can be altered by direct experiences with nature, not merely through an increase in environmental knowledge alone (Zsóka et al., 2013). Due to these reasons, it is urgent to get teenagers directly involved in the practice of coral gardening.

4. Proposed Solution for Teenager Involvement in Coral Gardening

One effective solution to get teenagers involved in coral gardening is by converting coral gardening projects into ecotourism sites. Ecotourism sites have a high aesthetic value (Kusumoarto et al., 2019), and studies show that high environmental aesthetic value causes people to have higher scores of moral behavior. A study done on 25 college students ages 18-30 showed that moral behavior intention was higher in an environment with a high aesthetic value compared to one with a low aesthetic value (Wu & He, 2021). This means that the higher the aesthetic value a coral garden has, the more people, specifically teenagers, will be aboard to get involved in coral restoration work. In a parallel and complementary study, Wang and Yu (2018) conducted an experiment on students from National Chiayi University in Southern Taiwan where the students had to answer a questionnaire. The study showed that the aesthetic experience of nature has both direct and indirect influences on environmental behavioral intention. The findings of these two studies suggest that the conversion of coral garden restoration projects into ecotourism sites will encourage teenagers to willingly participate in coral restoration, as the aesthetic value of these coral gardens will encourage teenagers to act on eco-friendly behavior and habits.

Aside from its effect on behavior and habits, aesthetic value, in general, impacts social media and online engagement, which becomes essential when gathering the participation of teenagers in coral gardening since the majority of the teenage population has access to the internet and social media. For instance, Lazard et al. (2020) found that adolescents and young adults had more engagement with tobacco education on websites that were aesthetically pleasing, meaning websites with minimal information on the homepage, a consistent style and font, bold and well-contrasting colors, and pictures. This trend of causation also applies to the pleasing aesthetics of nature, the environment, and its ecosystems. A study conducted by Kim et al. (2022) using data that consisted of posts on National Geographic's Instagram account (@natgeo) from January 1st, 2015, until November 25, 2018 – with the aesthetic value of these posts rated by 800 individuals – showed that “the role of image aesthetics in social media engagement is robust” because “image aesthetics significantly increased social media engagement”.

An increase in online engagement is important because social media has a huge impact on decision-making in teenagers. In a study that used data from the 2017 Maternal Health Survey, Ahinkorah et al. (2020) found that adolescent girls in Ghana who had higher exposure to mass media had higher odds of self-efficacy in abortion decision-making. By converting coral gardening efforts into ecotourism sites and posting them on social media, there will be a high number of online engagements and interactions (likes, comments, shares) due to their high aesthetic value.

This will help multiply the exposure and the online audience/followers of environmental initiatives or organizations that have coral garden ecotourism sites. A heightened exposure would mean more people, primarily teenagers, viewing posts about coral garden restoration projects which would then cause an increase in active participation in coral restoration through coral gardening, due to the impact of social media on teenage decision-making.

Active participation in coral gardening efforts is various, which includes donations to coral gardening initiatives or scuba diving and contributing directly (cleaning shelves, measuring coral growth, etc.) to the sustainability of corals in coral gardening projects. This means that if marine conservation organizations post their coral garden ecotourism sites on social media and the internet, their aesthetic value would garner attention online which would then significantly increase the participation of teenagers in coral gardening work. Teenager participation in coral gardening will have long-term benefits which will be explored further in this paper.

5. Long-term Benefits

The involvement of teenagers in coral gardening has positive long-term impacts. Students who have extracurricular activities revolving around environmental conservation tend to have higher levels of pro-environmental behavior than other students who are not as involved (Hidayah & Augustin, 2017). Aside from this, those who perform ecological restoration work are more associated with more positive environmental attitudes and behavior (Bowler, Kaiser, & Hartig, 1999). Gathering the participation of teenagers in coral gardening will not only improve the conditions of coral reef ecosystems; it will also create a new generation of youth who are actively working towards restoring and conserving coral reefs. The involvement of teenagers is essential when working towards the betterment of the earth's coral reefs and our planet as a whole.

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