

## DIVE AND NOVELTY SEEKING IN EXPERIMENTAL ARTIFICIAL REEFS

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**Abstract:** Scuba diving has opened a way to explore the underwater world. Today, hundreds of different diving areas are in use for tourism purposes. Coral reefs and underwater cultural heritage such as shipwrecks, sunken cities, relics and other remains have been popular tourist destinations for the traveller who seeks novelty and variety, for many years. Over recent decades, artificial reef areas, a wide range of wrecks (ships, aircraft, tanks or cars) and thematic parks (monuments, archeologic parks), have become diving locations and provided tourists with new knowledge about the underwater environment. These can have considerable benefits for both tourists and host communities. Apart from diving destinations, some environmentally friendly experimental methods and setups have also been placed on the seabed, for example, plant cultivation, wineries, regeneration centres for coral reefs and even hotels and restaurants. This paper aims to examine, through content analysis and e-mail interviews, how underwater cultivation of terrestrial plants park (Italy), underwater wineries (Croatia and Spain) and other similar structures or projects around all over the world may create novelty for recreationists in the future. This study also questions which experience that raising to the surface in such a variable environment. This paper indicates that the experience formed through new knowledge about marine environments, awareness, understanding the wildlife and more importantly, the formation of marine surroundings through scientific studies and observations offers novelty and a new implication for recreational scuba diving attractions.

**Keywords:** Diving, Artificial Reefs, Novelty Seeking, Marine Tourism, Experimental

### Introduction

Scuba diving tourism provides a contemporary tourist experience inside a unique underwater environment. Scuba diving attractions are dominated by those in the area of coral reefs, located in tropical latitudes, the most known of which are the Great Barrier Reef in Australia and the Red Sea in the Middle East. Economically these are very important as coral reefs contribute to the global tourism industry an estimated USD 10 Billion in 2012 (Huang & Coelho, 2017, cited from NOAA, 2012). Today, marine-based tourism employs 2.4 Million people with USD 59 Billion in revenue in USD 124 Billion GDP (NOAA, 2019). In the Similan Islands (Thailand) the annual revenue of using the reef as a touristic attraction increased about 20 times from USD 22,000 to USD 460,000 between 1999 and 2003 (Tapsuwan & Asafu-Adjaye, 2008). About 30% of the world's reefs (over 9% of all the world's coral reef countries) are in use in the tourism sector, with a total yearly value estimated at nearly USD 36 Billion. These figures represent the total of within-country expenditure by international and domestic tourists (Spalding et al., 2017). Besides natural coral reefs, other sites, artificial or man-made reefs, replicates certain characteristics of the natural reef, and also attract divers to explore underwater. Economically and in terms of attractiveness, artificial reefs have considerable value for the current and future implications among divers (Oh et al., 2008).

Artificial reefs may offer divers interesting, riveting and various diving experiences (Edney, 2017) in a wide variety of marine-based attractions. Scuba diving tourism reassures divers seeking contemporary tourist experience with an incomparable and unpredictable underwater environment. The artificial reef can be designed for different purposes, such as being created for the new underwater habitat and found as a form of sunk objects like historical shipwrecks

(Lück, 2008) or some environmentally friendly experimental (biotic or abiotic) structures. As Cater and Cater (2007:55) state artificial reefs are “an alternative resource that is seeing increasing intervention and development in order to reduce pressure on natural reefs ...” which providing an alternative area (sacrificial or recreation areas) or touristic product in the marine environment where there is lack of natural coral reefs but a sense of newness, curiosity and novelty.

Novelty seeking is one of the strong emotions in understanding destination choice behaviour (Babu & Bibin 2004) formed by desiring to experience new environments. Among all diving motivations, novelty seeking has been considering as “a key motive” (Lee & Crompton, 1992:733) which develops out of scuba divers’ enthusiasm, excitement and curiosity. From a diving tourism perspective, novelty seekers or thrill-seekers are described as those who are willing to take risks and are interested in having new experiences through exploring pristine underwater surroundings (Cohen 1972; Keng & Chang 1999; Mo et al., 1993, 1994). Currie (1997) states that some tourists are chasing novel experiences different from their daily life while following touristic purposes and motivations.

### **Scuba Diving**

Scuba diving has become a popular touristic activity over the last decades (Garrod & Gössling, 2008) that can offer natural, historical and cultural experiences. These are combined with experimental, entertainment and sportive dimensions in countries all around the world and attracts millions of divers, both certified and amateurs (Musa & Dimmock, 2013). Recreational scuba diving is defined as divers, who dive (maximum depth of about 40 meters for advanced divers) and seek planned scenery, shipwrecks, diverse marine biology structures (Tabata, 1989; Roupheal & Hanafy, 2007), in the marine environments. As Cater (2008) notes, scuba diving is often motivated by the search for difference and an alien environment for humans. The demands of the desire of seeking this novelty constitute the concept of scuba diving tourism. Scuba diving tourists expect to have an unusual experience from pristine natural resources or in well-planned underwater surroundings. According to the Professional Association of Diving Instructors – PADI (2019) over a million new certifications are given to recreationist and novelty seekers, every year. In this activity, the physical and ecological environment of coral reefs and designed diving areas unify behaviour of divers by way of satisfaction level (Medio et al., 1997; Roupheal & Inglis, 1997, 2001, Barker & Roberts, 2004) and unique and exciting experience (Cater & Cater, 2007; Dimmock, 2009) in and around the marine resources.

Through technological developments, increasing social interaction (via social and visual media), education and accessibility have motivated tourists to dive and seek novelty in different atmospheres and environments beneath the water. Today there are commercial and scientific developments in all regions with many planned scenarios, hotels, underwater farms, wineries and restaurants, for example. In the wide variety of marine-based attractions, artificial reefs may represent interesting, challenging, and diverse diving experiences (Edney, 2017) for divers, where otherwise the environment may be limited by the extent of the diversity of surrounding wildlife.

The value of scuba diving, both in coral and artificial reserves, in terms of economic contribution for marine tourism, is therefore significant (Cater, 2008). Today we observe a global multi-billion-dollar industry (Lucrezi et al., 2017) with many benefits (Anderson & Loomis, 2011) while at the same time scaling up the popularity of scuba diving (Dimmock & Musa, 2015). As Albayrak, Caber and Cater (2020) have shown, scuba diving is evolving into a mass tourism activity in many destinations without coral reefs. However, diving into specific diving areas, where there is the natural diversity and biological resources, for instance, well-preserved coral reefs and well-organised varied artificial reef areas like shipwrecks is always a

better option for divers. This preference helps to create an economic market (Spalding et al., 2017; Tynyakov et al., 2017) in marine-based tourism, which aids reef conservation and promotes more diving areas. As Kirkbride-Smith et al. (2013) and Tynyakov et al. (2017) mention divers increasingly prefer to dive in artificial reefs areas due to viewing a planned underwater marine scenario and increased photographic opportunities. Simultaneously these may originate some new businesses for host countries. This is because as Tabata (1992) noted, scuba diving is instrumental in running a lucrative marine tourism business for the local economy (Stolk et al., 2007). In Florida, for example, the economic value of artificial reefs generates USD 3.1 Billion in output with more than 3,330 submerged reef structures placed in state and federal waters. These reef constructions provide over 39,000 jobs, generate \$1.3 Billion direct income and produce USD 250 Million state revenues for Florida (Huth et al., 2015) from tourism, fisheries and other sectors. In the context of these figures, scuba diving specifically creates over 13,000 jobs, in excess of USD 1 Billion output, about USD 417 Million income and approximately USD 80 Million in state revenue.

### **Novelty Seeking**

Novelty stands for the quality of being new and unusual. Novelty seeking is an important interaction between tourists and tourism activities. One of the fundamental motivations for tourists is seeking variety (Chen & Paliwoda, 2004) and novelty (Zbucnea & Radu, 2009; Assaker & Hallak, 2014). Novelty seeking has been examined since the 1970s in the tourism context. For example, in the late 1970s, Crompton (1979) stated that novelty seeking is a way to get a new experience without necessarily new knowledge or as Steenkamp and Baumgartner (1992) indicated, it is a discovering new place in order to have prestige and draw attention. This approach may be categorised into four dimensions which are a thrill, change from routine, alleviating boredom and surprise (Lee & Crompton, 1992) in terms of tourist behaviour. Novelty seeking is also known as a way to make a comparison between experience and the perceived value of the present (Pearson, 1970) which means having unique, unusual and new experiences (Mak, 2015) that differ from someone's comfort zone. Novelty seeking is considered as a typical tourist behaviour referring to their desire to explore or preferences to have new experiences and this is distinguished from a personal characteristic which is steady and viable (Mak, 2015). In terms of scuba diving tourism, novelty refers to a range of diving experiences that ensure divers are able to dive not only coral reefs but also artificial and experimental reefs in the underwater environment with mysterious surrounding and novelty itself.

### **Artificial Reefs**

Artificial reefs are widely acclaimed attractions for diving tourism. Submerged recreational areas in the marine environment may offer different experiences with economic benefits to businesses, organizations, communities and destinations. They are accessible in different forms of structure, relics, concepts and themes. The European Artificial Reef Research Network (EARRN) defines an artificial reef as 'a submerged structure placed on the substratum (seabed) deliberately, to mimic some characteristics of a natural reef' (OSPAR Commission, 2013:3). Artificial reefs are used for both consumptive and non-consumptive purposes, often providing a resource in sandy coasts or close to the severely threatened coastline of coral reef habitats that were previously relatively unproductive or had poor natural resource development. They have a significant potential to increase the biodiversity of habitats around them (Pickering, Whitmarsh & Jensenà, 1999) over a relatively short period. It can be seen that the changes over time and natural effects on these objects offer some good opportunities for picturesque diving (Edney, 2006), as well as a habitat for marine life and submerged areas. As Kirkbride-Smith et al. (2013) address, divers would often prefer to dive in artificial reefs areas because of the

concentrated and planned opportunity to view underwater marine life and increased photographic opportunities.

These created sub-aqua environments may enhance destinations` values, knowledge and experiences that result in a unique atmosphere. Besides natural, commercial, cultural and historical values, artificial reefs can help to create awareness among people towards the conservation of the world and climate change; providing a fundamental form of the protected marine environment; and encourage tourists to make an effort through connection with values. In addition to these attributes, artificial underwater scenery may improve the sustainable principles of recreational scuba diving (Stolk et al., 2007). Managing artificial reefs and their remains is often a less risky experimental design and practice for promoting sustainable management in the marine zone or marine protected areas (MPAs). They may have a direct and indirect benefit for individuals, communities and societies (Torland et al., 2015; Moyle et al., 2017). By means of experimental and observational learning, it may be possible to form reasonable, effective and manageable integrative sustainable standards for the future of marine-based tourism. The benefits derived from marine environments depends on reliable conditions of diversified beautiful natural areas, wildlife reserve and nature and authentic or enriched cultures (IUCN, 2018). This unity-in-diversity within one destination helps to create and sustain not only a protected marine environment but also socio-economic and sustainable development in the long-term at both global and local scales.

## Methodology

This paper aims to examine how tourists satisfy their novelty seeking through diving on artificial reefs and how experimental structures are created as a new way of having these experiences. As many of these artificial reefs feature environmental messages, the study examines how this is communicated to guests as an important element of creating a novelty in underwater experience. Using case studies from Italy, Spain, Croatia, Norway, Sweden, USA, Dubai, Tanzania and Maldives, we illustrate different techniques to inform divers about the facets of these attractions prior to, the dive itself, and after diving periods which create a unique sub-aquatic experience. This paper also questions the degree to which atmosphere can be novel in such a variable natural environment, and in addition to this, which experiences can be had by diving in these new structures. When an artificial structure is located on the bottom of the sea it is not definite how the surroundings will growth and how marine creatures and organisms may occupy this new submerged home (Bideci & Cater, 2020). Therefore, each artificial diving area presents a different experience, which helps to create a unique novelty.

**Figure. 1.** *List of E-Mail Interviews*

Nemo`s Garden (Italy)	E-Mail	Project Coordinator
Crouse Treasure (Spain)	E-Mail	General Manager
Edino (Croatia)	E-Mail	General Manager
Utter Inn (Sweden)	E-Mail	Marketing Manager
wUNDERful (Norway – Visit Norway)	E-Mail	Marketing Manager
Niyama (Maldives)	E-Mail	General Manager
The Conrad (Maldives)	E-Mail	General Manager
The Manta (Tanzania)	E-Mail	General Manager
Jules Undersea Lodge (USA)	E-Mail	Project Manager
Atlantis The Palm (Dubai – on-shore)	E-Mail	Marketing Manager

In this study, it is examined how the new types of artificial reefs function as experimental reefs in the sense of their effectiveness in tourism concepts. In recent years, the underwater realm

has witnessed many experimental research and businesses development in its environment, termed the 'blue economy'. From all around the world, adventurers, entrepreneurs and scientist have set up new businesses and scientific research models in different forms. This paper has also identified hotels and restaurants in this niche market those together form case studies for the examination of these concepts. For these purposes, this study used content analysis of websites and e-mail interviews (Fig. 1.) with organisations and businesses. This paper also shows that experimental kinds of reefs can be classified into four categories according to Lee and Crompton (1992) framework, which are thrill, change from routine, alleviating boredom and surprise.

For this study, e-mails sent in February 2019. Responses received by February and March 2019. Because of short responses and lack of up-to-date statistics, results have been interpreted in the manner of services provided and received experience. Businesses have not been willing to share data about economic profit and activities. In the other hand, scuba diving is not seemed as business model hotels. The chosen organisations are business have been determined according to the feature of the artificial reef and scuba diving attractions around structures. All organisations and businesses provide scuba diving services around the formation and claim as an artificial reef (excluding onshore structure, which is located in the aquarium). The plant park and the restaurant are also part of a scientific research project. This paper aims to address a wide and different range of contemporary artificial reef formations from all over the world.

## Results

Technological developments, social awareness, media and education have motivated tourists to go diving in different surroundings. Today, many coastal regions promoting their coral reef assets and seaboard in different planned scenarios, with hundreds of wildlife marine reserves, wrecks, marine protected areas, caves and artificial settings, for instance. Therefore, there are thousands of areas for different diving purposes that draw the attention of people who seek unusual experiences from countries all around the world. Among new setting areas, artificial reefs are one of the leading diving attractions and experimental reefs have aroused divers` curiosity. For example, a new farming method has been established on the seabed and named Nemo`s Garden Project, on the coast of Noli, Italy. In another example, grapes have been fermenting at Underwater Wineries in Spain and Croatia, since the 2010s, named Crusoe Treasure and Navis Mysterium, respectively.

In *surprise* category, an example, which has submerged in Italy, a project to grow crops in underwater biodomes called Nemo`s Garden Project, may be an example of future developments in diving environments. Here the Ocean Reef Group launched an underwater gardening and cultivation project in 2012. Acrylic structures, resembling large balloons, hold approximately 2,000 litres of air and float at different depths, between 15 and 36 (4.5 to 11 meters) feet below the surface of the water. This project aims to create a method used as an alternative to conventional agriculture, especially where plants are hard to grow. The microclimate and thermal conditions within the biospheres are optimal for plant growth and crop yields, similar to a conventional greenhouse, yet they require no additional energy sources. The use of renewable energy harnessed from the sun and fresh water obtained by desalination of seawater, make this a self-sustainable system. The operator calls researchers to these biodomes with their self-sustaining atmosphere "Agrinauts". The project coordinator says, "every year, we are discovering new possible applications for the biospheres" (Nemo`s Garden, 2019). These include eco-tourism, fish farming, seaweed farming, or as scientific research labs and underwater stations for monitoring wildlife.

Recreational scuba diving is not a primary business model for Nemo`s Garden however, this activity helps to raise reasonable funding for future research projects. The project operator does not have a diving centre as a business department. Alternatively, the centre collaborates with

some of the diving centres in the area. There are a few diving schools around the underwater cultivation of terrestrial plants centre. The closest dive centre has reported between 250 or more divers have been taken out to the Nemo's Garden habitat, each season from June to September. The project site attracts divers, swimmers, free divers and snorkelers throughout the year with constant increment. The centre is also open to the public and can visit the habitat with or without the support of a diving centre; therefore, it is hard to estimate the exact number of visitors.

The project draws attention from different sectors and people from media, universities, private companies and tourists all over the world. As identified, Nemo's Garden is a new touristic attraction with biosphere and installation of the artificial reef which provides popularity through the instrument of mass and social media exposure and touristic demand. Something new and novelty to offer to tourists (underwater communication, guided tour through the different biospheres, explaining the project, scientific experience); and repopulation and protection awareness of the surrounding marine area. In addition to this, it is providing a live stream channel on YouTube and provides information about the project.

In Spain and Croatia, winemakers are exploring possibilities to use underwater reefs to develop the ageing process in viticulture and *change the routine*. In northern Spain, a winery places bottles of wine to age on the seabed for up to six months (Underwaterwine, 2019). Whilst popular with consumers these also offer scuba divers a unique underwater and above water experience. In Croatia, in a small village called Drače, in the middle of the Pelješac Peninsula, Winemakers put the glass bottle in the sea to a depth of 18-25 meters for more than 700 days (Edinovina, 2019). Apart from production, subaquatic vineyards provide scuba diving experiences within their business models. These attractions run by vineyards' organisations as a part of the wine tourism experience.

Longer periods in the marine environment providing by current and planned underwater facilities (Cater & Cater, 2007) for accommodation. These facilities may provide tourist who *alleviating boredom* for novelty. For example, Jules Undersea Lodge, which uses the shell of an ex-research laboratory, operates in Key Largo, Florida, USA. Whilst accommodating only two couples, the facility provides for a unique experience. Qualified scuba divers enter the hotel through a pressurized wet room in the base of the structure and can take meals prepared by a 'mer-chef' who dives down to serve them (Jules Undersea Lodge, 2019). There are also opportunities in Tanzania at Manta Resort, Pemba Island; in Sweden at Utter Inn, Västerås; in the Maldives there is a hotel, with has the world's first all-glass underwater hotel suite, run by one of the hotel chain, The Conrad Maldives Rangali Island; and in Dubai people engage with underwater in Aquarium rooms at Atlantis The Palm with 65.000 marine animals seen through panoramic windows.

Compared to pressurized wet rooms, the first largest and research-friendly underwater restaurant (wUNDERful) easily accessed by walking in Southern Norway with seating capacity for 100 guests, has opened in March 2019, which *thrills* people. Several research environments that are focused on the development of knowledge within marine biology are involved so as to provide guests with an enhanced experience. Like a sunken periscope, the restaurant's window, like a panoramic screen, offers a view of the seabed as it changes throughout the seasons and varying weather conditions (Visit Norway, 2019). Half-sunken into the sea, the building's 34-meter long monolithic form breaks the surface of the water to rest directly on the seabed five meters below. The structure designed by full integration into its marine environment over time; as the roughness of the concrete shell will function as an artificial reef, by welcoming wildlife inhabit it.

## **Discussion and Limitations**

In the modern era, the underwater environment allows people to gain knowledge and explore new things about our world through experience. Technology provides people with a new realm by discovering depths both from surface and underwater. In these days and age, novelty seekers and travellers can dive and break new ground in different regions and diversified structures. According to mass and social media, some scuba diving activities can be found around experimental reef areas and businesses try to promote this attraction in surrounding of these formations. These structures quickly become part of the marine environment over the years. The development of marine life around the artificial reefs attracts both wildlife and recreational scuba divers. Artificial reefs created in many different forms. Each of them presents and offer unique and unusual experiences for tourists. As for that, the experience formed by new knowledge about marine environments, awareness, understanding the wildlife and more importantly formation of marine surroundings through scientific studies and observations offer novelty and a new implication for recreational scuba diving attraction.

In this paper, the new, experimental artificial reefs which biotic or abiotic artificial structures are questioned. Hotels, restaurants, wineries and underwater biosphere farming areas provide tourists experiences that are surprising, thrilling, differ from daily routine and a new way for who try to alleviate their boredom. Currently, the total number of market share is unknown. This is because scuba diving is not the primary purpose or business model for these organizations and diving activities around these structures are a relatively new and niche market. However, even if not their core purpose of a branch of activity, tourists who are willing to have novelty experience tend to visit and see the marine surroundings.

One of the important limitations of this study is the lack of descriptive information. New structures, in question, hotels, scientific areas and food & beverage facilities, are in their early period for having statistics by the way of scuba diving. This paper has interviewed the businesses and organizations` managers through e-mail however, operators and organizations do not have the necessary information and statistics to assist in their records. Even though scuba diving is a popular activity, statistics about the number of divers are limited and not accurate, especially for artificial and experimental reefs. Especially hotels, they do not pay attention to diving facilities apart from their main business model, accommodation. From the viewpoint of diving schools, experimental reefs are a new market for their operations and mostly depend on individual requests.

Consequently, recreational scuba diving around these new structures remains in early niche development. In future studies, examining the knowledge of novelty experiences through experimental artificial reefs will be helpful for researchers and businesses to establish a model. This study was carried out in order to discover the niche recreational scuba diving trends that provide more unique and unusual experiences for novelty seekers. By reason of the fact that experimental reefs are new phenomenon and scarcity of studies in the current literature, this study may help to fill this gap in the tourism context.

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