Sustainability and the Olympics: The case of the 2016 Rio Summer Games

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Abstract: The Olympic Games are the ultimate mega sporting event with not only hundreds of thousands of athletes, but also hundreds of thousands of spectators, volunteers, media, and security personnel. The Olympics concentrate a large number of people in a confined space (one city or even specific areas within the city) over a relatively small period of time (two weeks), thus introducing inevitable hardship to the natural environment. This case study focuses on the challenges Rio faced in preparation to stage and host the 2016 Summer Olympics Games, and at the same time provide an environment safe to all. More specifically, the case focuses on the water quality in Rio and the associated health risks for athletes competing in the open water events. This case study provides students with knowledge about the history of environmental sustainability in the Olympics and prepares them for a career in a global industry that is increasingly focusing on and implementing environmental initiatives.

Keywords: Olympic Games, Environmental Sustainability and Sport, Mega-Event Planning, Water Pollution, Environmental Management

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Introduction

In October of 2009, the International Olympic Committee (IOC) announced Rio de Janeiro (Rio) as the host city of the Games of the XXXI Olympiad. Rio’s Olympic bid win was a historic moment for the Olympics, and for South America. This was the first time a South American country had ever hosted the Summer Olympic Games (Macur, 2009). The reaction from the Rio Olympic Organizing Committee and from the residents in Rio was positive. Residents of Rio took to the beaches, dancing and celebrating the bid win (Macur, 2009). Officials in Rio even declared a holiday for state and city employees (Downie, 2009).

The Olympics were expected to provide a number of benefits to Rio, one being the chance to clean the waterways, bays, and beachfront water in and around the city (Rio, 2009). Cleaning the waterways would also improve conditions for athletes competing in the open water events (e.g., triathlon, sailing, marathon swimming). Additionally, the Rio Olympic Organizing Committee promoted this project as a legacy of the Games, something that would benefit Rio’s residents for years to come (Rio, 2009). From a historical perspective, Rio has not always struggled with water quality. Some suggest water pollution issues began in the 1950’s as oil refineries operated unchecked (Branch, 2016). Since then, the population in Rio has grown so fast that sanitation and other infrastructure has not been able to keep up. As a result, approximately half of the city’s waste, from its nine million residents, flows into rivers and eventually to the Guanabara Bay, creating a dangerous mix of bacterial and viral contaminants (Branch, 2016). Rio had hoped to utilize the Olympic movement to improve water conditions by capturing and treating 80 percent of the sewage flowing into the Bay (Rio, 2009). This would not only make the outdoor water sport events safer, it would also improve one of the city’s most valuable natural resources.

The feelings of optimism and joy that followed Rio winning the Olympic bid in 2009 decreased as the 2016 Summer Olympics approached. Just as supporters danced in the streets as the Olympics were granted to Rio in 2009, thousands showed their displeasure with the Olympics coming to Rio by protesting just days before the Games were to start (Phillips, 2016). In addition, progress on the water treatment plan stalled and the goal of achieving 80 percent water sanitation went unmet (Branch, 2016). Just 49 days before the opening ceremonies for the Olympics, Francisco Dornelles, the Governor of Rio, was forced to declare a state of emergency and request support from the Brazilian government (Watts, 2016). Dornelles pled for financial assistance, saying that support was needed in order to avoid “total collapse in public security, health, education, transport and environmental management” (Kennedy, 2016, para. 4).

This case focuses on the environmental challenges for Rio, specifically examining water quality and the potential health impact the water had on athletes competing in water sports during the Summer Olympics. Water quality was selected as a focus of this case for three reasons: (1) the Rio Olympic Organizing Committee listed water quality as the top priority for environmental initiatives for the Games, (2) water quality and pollution had direct implications for competitors at the Games, and (3) water quality evaluations received heavy media attention. These three reasons make the quality of water at the Games a useful example from which to examine sustainability issues at mega sport events. The case begins by discussing the initial bid, and outlines the goals and plans Rio had in place for the Games. Next, the case examines Rio’s challenges after winning the bid, specifically the economic, political, and cultural challenges. The case concludes by discussing the reactions from athletes during the Games.
The Rio Olympics and Water Quality: The Bid, Challenges, and Reactions to Sustainability in the Initial Bid

In 2009, Rio submitted its bid to host the Summer 2016 Olympics. The Brazilian Olympic officials explained that being the first host city in South America would be possible for three major reasons: (1) the country maintained that they had been hit less hard by the global financial crisis at the time, and felt comfortable setting aside the estimated $14.4 billion dollars needed to host the Games; (2) facility construction would be less difficult because they could renovate and reuse existing facilities that had been built for the 2007 Pan American Games and (3) Rio had already been awarded the 2014 World Cup, which meant facilities for the World Cup could be altered and again reused for the Olympic games in 2016 (Associated Press, 2009).

In addition to feeling confident about the financials and facilities required for the Games, the Brazilian Olympic officials outlined in their bid an ambitious plan that was in accordance with the International Olympic Committee’s expectations for addressing the environment. This section of the bid outlined specific goals, objectives, and tactics for making the Games environmentally sustainable. Despite Rio’s current struggle with environmental challenges (e.g., water supply, air quality, waste management, deforestation) the bid to host the Games proposed an extensive and rigorous plan of environmental protection while promising compliance with a range of sustainable practices (Rio, 2009). Included among the goals were initiatives for environmental awareness, renewable energy use and management, improving air quality, soil protection, utilizing sustainable designs and construction techniques, promoting reforestation, and improving solid waste management (Rio, 2009). To ensure these sustainability efforts would be completed, the Brazilian Olympic Committee was able to create a new environmentally
focused government organization called the Olympic Sustainability Division. The bid outlined that this agency would “provide practical operational delivery capability to underpin the high level of Government policy, financial, and legislative support.” (Rio, 2009, p. 93).

It is important to note that water conservation and treatment was listed as the top sustainability initiative. Water treatment was especially important for the Games, as Rio has struggled to provide clean water and clean waterways for its residents. Cleaning up the water was initially promoted as a project that would become one of the legacies of the Games (Geiling, 2016). The center point of the water conservation goals was to clean the famous Guanabara Bay, which is commonly heralded as one of the seven natural wonders in the world (National Geographic, 2016). With over nine million people living in the Guanabara Bay watershed, and without adequate water filtration or treatment facilities, the water in the rivers leading to the Bay as well as the Bay itself, have become polluted over time. The goal for cleaning this pollution in the Olympic bid was to have 80 percent of the sewage and waste going into the Guanabara watershed to be collected and treated by 2016 (Rio, 2009).

Challenges after winning the bid. In order to reach the goal of capturing, filtering, and ultimately cleaning the water deposited in the Guanabara Bay, the city of Rio had many obstacles to overcome. When the Games began in August of 2016, less than 45 percent of the water going into the Bay was actually being cleaned (Nolen, 2016). Also, of the eight new water treatment facilities planned to be built and operational to clean the water, only one was in operational condition (Brooks & Barchfield, 2015). This section outlines the economic, political, and cultural difficulties that possibly prevented the city of Rio and the Rio Organizing Committee from reaching its goal to achieve 80 percent water cleanliness.

Economic challenges. A discussion of Rio’s economic challenges hinges primarily on its dependence on oil. Both the city of Rio as well as Rio State are highly dependent on oil production for city and state revenues. The government owned and operated the oil company, called Petrobras, which produces, refines, and ships oil both within Brazil and internationally. In the years leading up to the Olympic bid in 2009, Petrobras announced that it had discovered a substantial oil field off the Brazilian coastline, much of which was alongside Rio (Soares, 2016). Prior to this discovery, Petrobras had been generating annual net profits of just under $18 billion dollars (Petrobras, 2008). As a result, Rio City and Rio State had healthy revenue streams coming in through the royalties connected with Petrobras.

With the steady revenue coming into the city and the excitement from winning the Olympic bid, the city experienced a wave of optimism and enthusiasm. Consequently, the state increased its employee base by more than doubling its payroll between 2009 and 2015 (Kiernan & Jelmayer, 2016). In addition, the state took on heavy financial commitments that were connected with the upcoming Games, such as a new subway system that would cost approximately $3 billion (Kiernan & Jelmayer, 2016). However, the expected increase in revenues did not materialize as expected. First, the increase in revenues coming from the new oil reserves off the Brazilian coast proved to be more challenging than initially expected. This was partially due to the difficulty of acquiring oil from deep-water ocean reservoirs, which requires large investments in equipment and technology, both of which slowed the progress of extracting and refining the oil, and increased debt for Petrobras (Soares, 2016). Second, in 2014 the price of oil decreased dramatically on an international scale, thereby reducing the value of oil as a commodity (Soares, 2016). The increase in cost to extract the new oil field, combined with the decrease in revenues as a result of decreasing oil values internationally, left Petrobras with
mounting debt and decreasing revenues. Subsequently, Rio was left with heavy financial commitments and less than expected royalties and tax collections.

As a result of the circumstances described above, Rio state and the city of Rio were in a financial crisis. In June of 2016, the Brazilian federal government temporarily supported Rio’s budget by injecting approximately $900 million dollars (Kiernan & Jelmayer, 2016). However, this money only prevented mass chaos during the Olympic Games. Public employees had already gone weeks and months without pay, basic public services had been neglected, and the city was in risk of defaulting on its debt service (Nolen, 2016). During this economic downturn and fiscal crisis, the focus on environmental sustainability and cleaning the waterways lost support, especially from a financial standpoint.

**Political forces.** In addition to economic challenges facing the Rio Games, political forces also stymied the progression of generating clean water. It is important to note that the sewage flowing into Guanabara Bay originates from 16 different municipalities in and around Rio with each district having its own standards and utility practices in place (Nolen, 2016). Therefore, any attempt to unite the different utilities and standards for clean water would need to first be a result of concerted effort from these various branches in the area. A federal policy was proposed, but has been waiting in the government system for years, and as of the writing of this paper continues to be stalled in the approval process (Nolen, 2016). Rio has the authority on its own to build and manage the infrastructure needed to clean up the waterways as well. However, because of the financial struggles discussed above, a lack of resources decreased Rio’s ability to take on the project on its own.

The slow government legislation and a lack of local resources to contribute to the clean water project are minor factors when compared to the scandals and corruption that plagued the Brazilian government at all levels during the build-up to the Rio Games (Nolen, 2016). Some reports indicated that nearly $2 billion dollars were lost due to corruption that involved members of the federal government, local and state officials, as well as nearly 200 members of the Brazilian senate and congress (Soares, 2016). The corruption conditions even led to the impeachment of the president of Brazil, Dilma Rousseff (Romero, 2016b), as well as the investigation into former president of Brazil, Luiz da Silva (Romero, 2016a).

Even without the corruption and bureaucracy that slowed the progress toward clean water for Rio, the idea of clean water is simply politically less popular. The process of creating the infrastructure to make clean water a reality would require laying the pipework throughout the city. Such an undertaking may require moving homes in less wealthy parts of the city, removing or altering city roads, as well as taking on a difficult process of installing plumbing into homes that are semi-permanent (Nolen, 2016). As a result, many local politicians prefer to allocate resources to business, education, public parks, or other items that create more political capital than a sewage sanitation project.

**Cultural expectations.** Along with political and economic challenges that inhibit the progress toward clean water, there are also cultural norms in Rio that prevent support for clean water projects. Many residents in Rio consider the presence of a working toilet as classifying for sanitary living conditions (Nolen, 2016). In these instances, there is less of a worry about where the toilet is flushing out to, and more of a concern that it is flushing at all. As a result, many bathrooms have plumbing that flush waste into local ditches and waterways, thereby polluting the waterways (Nolen, 2016). Some residents do not have expectations for more sanitation than the current level (Nolen, 2016). This cultural expectation for sanitation does not only apply to residents living in the favelas (impoverished areas of town historically occupied by emancipated
Some reports indicate that even wealthy areas of town in which new construction has taken place often do not connect to sanitation lines (Nolen, 2016). One reason why residents do not worry about sanitation is that they do not trust the state sanitation department to complete the work (Nolen, 2016). In addition, it is expensive to pay for sewage treatment and the monthly utilities, while piping the waste in local waterways remains penalty free. As a result, cultural barriers exist which prevent water sanitation from becoming an issue that citizens demand or even expect.

Figure 2: Eco-barriers being used to stop trash from entering Guanabara Bay. From “Rio de Janeiro Eco-Barriers Installed in the River Meriti,” by Tomaz Silva, 2016 (https://commons.wikimedia.org/wiki/File:Ecobarreira_no_Rio_Meriti_01.jpg). In the public domain.

**Athlete Reactions to the Conditions at the Games**

The challenges described above illustrate some of the reasons why Rio was unable to clean the waterways as they had promised. Just weeks away from the start of the Olympics, athletes were still worried about how polluted and untreated water might create undesirable health outcomes that in turn might affect their performance (Barnes, 2015). Reports indicated that the waterways in Rio, such as Guanabara Bay, contained high levels of human adenovirus as well as other bacteria and viruses that come from untreated human waste in the water system (Azzoni & Wade, 2015). The Associated Press reported that individuals entering the water system had a 99 percent chance of contracting a viral infection if they swallowed even as little as three teaspoons of the water (Brooks & Barchfield, 2015). Even with this knowledge, athletes who competed in water events (e.g., triathlon, swimming, and sailing) pledged that they would compete in the Games, regardless of the conditions. For example, one triathlete shared, “We know we are exposed to viruses, maybe to health problems later, but in my case, I have invested so much to prepare myself for this and I want this to happen” (Azzoni & Wade, 2015, para. 22).
The Rio Olympic Organizing Committee was unable to meet its promise of capturing, treating, and cleaning 80 percent of the water entering Guanabara Bay. Thus, last minute efforts were necessary to prepare the sites for competition. The first method for capturing trash and debris from entering Guanabara Bay was to place eco-barriers across the 17 rivers flowing into the Bay (Niiler, 2016). Each eco-barrier was a wide net meant to stop any large pieces of trash, appliances, or other debris from floating further into the bay. Then city garbage teams would pick trash from the net and place it in large dumpsters wheeled to the side of the river (“Brazil fails to treat pollution,” 2016). In addition to the eco-barriers, 12 specialized boats were put in place in the Bay itself to find and remove trash (Niiler, 2016). These specialized boats, named eco-barcos, patrolled the waterways each day collecting trash and removing it from the water. To help guide the eco-barcos and ensure the largest and most detrimental pieces of trash had been removed from the Bay, helicopters patrolled the air, searching the water for large pieces of trash and debris (e.g., furniture and appliances). If a large piece of trash was found, then the eco-barcos were directed to the location and would scoop out the trash. This process was repeated during the weeks leading up to the Games (“Brazil fails to treat pollution,” 2016). Although these efforts reduced the chances of collisions between watercraft and large trash items, it did little to reduce bacterial or viral counts in the water.

However, once the Games began, relatively few athletes reported being ill. One of the main contributions to reduced illness was that athletes took numerous proactive steps to avoid illness, such as bathing immediately after being in the water, using hand sanitizer frequently, keeping water bottles inside zip-lock containers to avoid contact with polluted water sources, and in general avoiding direct contact with the water when possible (Axon, 2016). Despite these efforts, some athletes competing in Guanabara Bay did become ill. For example, Evi Van Acker, a Belgian sailor in the Laser Radial class who medaled in London, was reported to have contracted a severe gastrointestinal illness as a result of competing and training in the Bay (“Rio's dirty water,” 2016). Because few athletes reported illnesses that inhibited competition, and perhaps as a result of fatigue from addressing the issue frequently, many athletes at the Games reported that the conditions had been exaggerated (Baxter, 2016; Blount, 2016). Nonetheless, now that the Olympics have concluded, Rio must deal with the challenges of facing a struggling economy, a large fiscal deficit, lingering issues of water quality, and a lack of sanitation (Romero, 2016b).

**Teaching Note**

This case is intended for use with undergraduate or graduate students enrolled in a sport and sustainability, event management, facility management, or other general sport management course. The case study will likely be most effective when paired with a course module or section examining the Olympic movement, sustainability in event management, or course sections pairing sustainability with management practices. The case study purposefully focuses on water quality in Rio for three main reasons: (1) the Rio Organizing Committee officially listed it as the top environmental initiative, (2) the direct potential for health consequences for competitors, and (3) the heavy media attention on this topic. However, it is clear that water quality is not the only environmental initiative for sport and event managers to consider. Issues of air pollution, long-term plans for venues, energy conservation, waste management, and using sustainable raw materials are also important issues in relation to environmental sustainability and sport. This case is meant to provide insight into the background and context of a single environmental issue, which may then be leveraged to discuss other important environmental issues more broadly. To
this end, the teaching note outlines broad learning objectives of the case, foundational background literature on sustainability and the Olympic movement, as well as potential classroom use and discussion questions. Naturally, instructors should tailor the case to fit their needs in the classroom.

Learning Objectives
Upon completion of this case, students will be able to:
1. Identify and understand environmental issues facing the Olympic Games
2. Understand the complex relationship between sport stakeholders and the natural environment
3. Examine and evaluate strategies sport organizations can utilize to address environmental sustainability
4. Plan an event that implements various sustainability strategies
5. Explore the relationships between environmental sustainability, facility construction, and game day operations

Background: Sustainability, Sport, and the Olympics
This section is intended to provide a brief background of sport domains in which sustainability has raised some concerns as well as the history of environmental sustainability in the Olympics. In addition, it discusses the steps the IOC has taken to emphasize the importance of addressing the environment when planning for and staging the Games. The background note also discusses the implications of the governing structure of the Olympics, and briefly evaluates the consequences of having no enforcement protocols in place to ensure sustainability efforts are completed.

Environmental sustainability in sport. The notion of sustainability is defined as the condition of meeting the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). In other words, it refers to meeting the needs of people while taking into consideration available resources. Sustainability is a concept that has become ubiquitous in sport and recreation policy and practice. Over the last couple of decades, the interest in examining the impact of sport on the physical environment has remained strong. Lenskyj’s (1998) work is one of the first to examine “the complex relationship between sport and the environment, specifically the detrimental impact of sporting activities on the environment and the negative impacts of a degraded environment on sport participants” (p.341). This interest crosses multiple domains, including recreational, amateur, and professional sport (Falt, 2006; Lindsey, 2008; Smith & Westerbeek, 2007; Trendafilova, 2011; Trendafilova & Chalip, 2007; Trendafilova & Waller, 2011).

There are many sports that have the potential for negatively impacting the environment. For example, golf is one of the most criticized outdoor sports, in relation to its negative impact on the environment (Wheeler & Nauright, 2006). The relationship between golf and the environment is natural since the sport often takes place in scenic natural settings. However, there have been concerns associated with deforestation, erosion, large-scale applications of chemicals (e.g., fertilizers) as well as wildlife habitat loss (Wheeler & Nauright, 2006). Similarly, disc golf, has been linked with a significant increase in soil compaction, which in turn yields greater soil erosion and a decrease in vegetation cover (Trendafilova & Waller, 2011). Other scholars have indicated negative effects on the environment due to rock climbing, specifically related to cliff-
face lichen community (Adams & Zaniewski, 2012). A study conducted in Finland has focused on three more outdoor recreational activities (hiking, skiing and horse riding) and their potential for negative impact on the environment, illustrating how trampling affects soil and subsequently vegetation (Törn, Tolvanen, Norokorpi, Tervo, & Siikamäki, 2009). The above examples emphasize the need to carefully consider the type of outdoor activities undertaken and the sensitivity of habitats in which those activities take place.

Issues related to environmental sustainability have also been expressed in other sport settings. For example, Kellison and Kim (2014) have looked at professional sports, focusing on the design of green facilities. Currently, a large number of sport teams in all four major North American Leagues (NFL, MLB, NHL, NBA) compete in green-certified facilities. A carefully planned facility design has the potential to minimize short- and long-term environmental impacts (Kellison & Kim, 2014). The regular efforts of maintaining and managing a sport facility and team are resource intense and require substantial use of energy in particular related to the power needs of a venue and field maintenance (Covello, 2008). Scholars have offered insights into the adoption of environmentally oriented actions among NCAA athletic departments, illustrating the diversity of relationships, the communicative and decision-making processes, and the involvement of stakeholders in environmental efforts (Pfahl, Casper, Trendafilova, McCullough, & Nguyen, 2015).

Environmental sustainability in the context of mega-events and the Olympics has also attracted the attention of scholars (Chernushenko, 1994). For example, Cantelon and Letters (2000) outlined the creation of an environmental policy as the third pillar of the Olympic movement. Furthermore, authors have emphasized the short- and long-term negative impact of mega-sport events on the environment (Cantelon & Letters, 2000). Others have studied the role of stakeholders in greening the 2000 Olympic Games in Sydney, Australia (Kearins & Pavlovich, 2002). They concluded that through the engagement of stakeholders and implementing effective stakeholder management strategies, organizations can better understand and clarify the different dimensions of the environmental challenges they face.

Sport facilities built for the purpose of hosting the Olympics are large facilities accommodating hundreds of thousands of spectators and athletes. Dozens of new venues are usually built specifically as Olympic venues, costing hundreds of millions of dollars (Long, 2016). In the case of the Rio Games, ten permanent new sites and seven temporary sites were built (IOC, 2016a). Furthermore, mega-events require additional accommodations such as parking areas, auxiliary commercial and recreational activities, and well developed transportation infrastructure to move spectators, athletes, and officials. This in turn raises concerns about a significant increase in traffic, water consumption, and waste production along with air quality and energy conservation. Scholars have argued that unless the rights holders of mega-events change their candidacy and selection processes, these events will inevitably be detrimental to the host city (Gaffney, 2013).

Although the Olympics have been associated with many negative aspects when it comes to preserving the environment, the Games have the potential to bring environmental benefits to the host communities. These may include new and better standards in the building industry, use of renewable energy sources (e.g., solar, wind) (Frey, Iraldo, & Melis, 2007), use of biomass for heating and cooling, innovative water conservation technologies (capturing rain water), and new waste and environmental management systems. For example, the 2006 Winter Olympics in Torino, Italy achieved several notable environmental successes by minimizing waste, conserving fresh water, incorporating eco-friendly building designs, utilizing pollution-free materials in
venue construction, exploiting passive solar heating, and preserving the natural landscape (IOC, 2014). Similarly, the 2012 Games in London managed to provide 40 percent of their water supply through recycled rain water (IOC, 2013). Another example is Greenpeace’s high profile campaign against Coca-Cola, which caused the company to phase out the use of hydrocarbon refrigerators during the 2008 Beijing Olympics (Greenpeace, 2007). The aforementioned examples illustrate a variety of environmental initiatives, but to better understand the forces shaping sustainability specifically in relation to the Olympics, it is important to know the history of the IOC’s efforts in this area.

The IOC efforts for environmentally sustainable Olympics. Environmental sustainability in the context of the Olympics originally began to be discussed as early as the 1930’s (Chappelet, 2010). However, sustainability did not become a clear focus of the IOC until after protests stemming from environmental damage at the Winter Games located in Albertville, France in 1992 (Chappelet, 2008, 2010). Only two years later, the Lillehammer Winter Games in Norway were the turning point in sustainability legacy by successfully demonstrating how the Olympics can be staged with reduced environmental damage (Chappelet, 2008). The Lillehammer Organizing Committee made the Games a showcase for sustainable and environmental policies by working with local and national authorities to minimize the negative impact on the environment (Chappelet, 2008). Over 20 sustainability projects were initiated mainly focused on recycling and energy efficiency efforts. For example, the ice hockey venue was built underground in order to preserve energy. The Lillehammer Winter Games set the stage for sustainability at future Games (Chappelet, 2008).

Following the Centennial Olympic Congress in Paris in 1994, environmental protection was introduced as the third pillar of Olympism alongside the already existing two pillars of sport and culture (Cantelon & Letters, 2000). This was a crucial step in recognizing the importance of sustainable development in sport. In the following year, 1995, the IOC established the Sport and Environment Commission (now renamed Sustainability and Legacy Commission). The purpose of the commission is to advise the IOC executive board on policy related to environmental protection. The commission has also formed a partnership with the United Nations Environment Programme (UNEP) to organize the World Conference on Sport and the Environment held every two years starting in 1995. At these conferences, environmentalists, scholars, government figures and sport experts meet to discuss sustainable development of previous Olympic Games, future Olympic Games, and the role of the United Nations in this process.

In 1996, the IOC amended the Olympic Charter, calling for the Olympic Games to be organized in a manner that demonstrates responsible concern for the environment and promotes a positive legacy for the host cities and host countries. The Charter is a set of rules and guidelines for organizing the Games, and serves three main purposes, including:

1) Establishes principles and values of Olympism
2) Serves as IOC law
3) Defines the rights and obligations of the IOC, International Federations (IF), National Olympic Committees (NOC), and Organizing Committees for the Olympic Games (OCOG) (IOC, 2014)

In the summer of 1999, the IOC approved and adopted the Olympic Agenda 21 (Sport for Sustainable Development), calling upon every member of the Olympic Movement to play an active role in promoting sustainable development (Chappelet, 2008). Agenda 21 represents a significant policy effort by the IOC to address the environment and to encourage commitment and actions from governments and major sporting bodies. The document is a non-binding action
plan based on the United Nations’ Agenda 21 for sustainable development and provides policy guidelines for the delivery of the Olympic movement (IOC, 1999). Three main objectives are at the core of the Olympic Agenda 21:

1) Improve social and economic conditions in host communities
2) Improve Games-based practices in environmental conservation
3) Strengthen the inclusions of women, youth and indigenous peoples in the Games (IOC, 1999)

In 2005, the IOC published the Sport, Environment and Sustainable Development guide, created in collaboration with 35 International Federations (IFs) (IOC, 2007). The guide builds on Agenda 21 and suggests practical initiatives to participants and spectators alike, and is recommended for use by all members of the Olympic Movement. The document provides understanding of global environmental protection in diverse cultural and sports contexts.

Cities bidding to host the Olympic Games are required to submit an extensive document covering various areas that need to be considered during the planning and staging of the Games (IOC, 2017d). This document is known as the Olympic bid book. The 2000 Sydney Olympics were the first to address the environment in their bidding documents. The main focus was on waste reduction, water re-utilization, and use of recyclable materials (IOC, 2016b). Similarly, the 2012 Olympics in London focused on climate change, waste reduction, biodiversity, inclusion, and healthy lifestyles (SOPA, 2014).

To further environmental sustainability efforts, the IOC launched the Olympic Games Global Impact (OGGI) study (IOC, 2006). The study spans over 12 years, beginning 2 years prior to host city selection, 7 years during planning and staging phase, and then 3 years after the Games (IOC, 2008). The OCOGs are obligated to partner with an independent local entity to conduct the data collection and analysis, according to a Technical Manual. The Manual is a binding document detailing legal, commercial and financial rights and obligations of hosting the Games (Pentifallo & Van Wynsberghe, 2012). The objective of the study is to gather data on the overall effects (economic, socio-cultural, and environmental) of the Games, to create a comparable benchmark across all future Olympics, and to help bidding cities identify potential legacies to maximize the benefits from the Games. In the environmental area the study includes a total of 34 factors, with 20 of them mandatory and the other 14 optional. Beginning with the 2008 Beijing Olympics, all host cities have been required to complete the study (IOC, 2008).

Although the OGGI study initially sounded like a promising step moving forward to a more systematical way of evaluating the impact of the Games, it has already raised some questions regarding lack of specific sustainability standards against which to measure the impacts. For example, experts fear that “without a sustainable standard, evaluation is impossible because the objects of interest cannot be compared against a standard of acceptability” (Van Wynsberghe, 2015, p. 7). Another concern is the reliability of data due to the fact that much of the gathered information is based on OCOGs self-reports and screened by Olympic authorities, thereby creating potential biases in the report. In addition to challenges with post event measurement, the governing structure of the Olympics movement is not strongly positioned to enforce environmental initiatives originally outlined in Olympic bids.

**Governing bodies of the Olympics.** The IOC is the supreme authority presiding over the organizational field of the Olympic Movement (IOC, 2017d). The Olympic Movement’s three main constituents include the IOC, International Federations (IF), and the National Olympic Committees (NOCs) (IOC, 2017e). The IOC is a non-profit, international, multisport organization based in Lausanne, Switzerland. Its mission is enshrined in the Olympic Charter: to
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support the development of competitive sport by ethical and environmentally sustainable means (IOC, 2017d). Each IF is a governing body for a given sport and administers its sport at a world level, developing rules and promoting the sport, developing prospective athletes, and organizing championships (IOC, 2017a). Each Olympic sport is represented by its respective IF, which in turn then helps to administer the sport during the Games. For a sport to become recognized as an Olympic sport, its respective IF must be recognized by the IOC (Robinson, 2016). Although the IFs have a relationship with the IOC, they are not formally a part of the IOC.

NOCs are responsible for organizing their respective nations’ participation in the Olympic Games (IOC, 2017b). They may nominate cities within their respective areas as candidates to host future Olympic Games. NOCs also promote the development of athletes and training of coaches and officials at a national level (IOC, 2017b). The organization of the Olympic Games is entrusted by the IOC to the NOC of the country of the host city as well as to the host city itself. The NOC forms an Organizing Committee for the Olympic Games (OCOG), which, from the time it is constituted, communicates directly with and receives instructions from the IOC. The OCOG executive body includes: the IOC member or members in the country; the President and Secretary General of the NOC; and at least one member representing the host city (IOC, 2017c). In addition, it generally includes representatives of the public authorities and other leading figures. Once a city is selected for hosting, its organizing committee has autonomous control over the rest of the planning and staging processes.

Understanding the relationships between the IOC, IFs, NOCs, and OCOGs gives insight into the challenge of enforcing sustainability initiatives put forth in an Olympic bid document. As it is clear from the Games in Rio, host cities often have promising environmentally sustainable goals. Yet, without enforcement, many of those goals went unmet. As a result, many wonder how environmental initiatives can achieve greater success. Although the IOC holds the power at the Olympic level, the NOCs and OCOGs have more direct influence at the local level. In addition, certain sports may have more direct environmental impacts than others. In those cases, should the IFs take a more active role in encouraging and demanding environmental sustainability standards? Answers to questions such as these are necessary as environmental sustainability takes on an even more prominent role.
Conclusion

Moving forward, the solution to sustainable Olympics will not come easy. Different cities and countries have different environmental needs and priorities, and different systems of collaboration among governing authorities and environmental organizations. Under the current IOC structure for bidding and planning of the Olympics, it is challenging to achieve truly sustainable Olympic Games. The IOC’s environmental mandate and the extent to which environmental strategies are incorporated by the OCOGs are not well understood (Paquette, Stevens, & Mallen, 2011). Each OCOG must find the optimal way of engaging a variety of stakeholders and to do their best to improve the environment in which the Games take place. The IOC works closely with the OCOGs providing guidance and assistance based on knowledge from past Games, but also encourages the OCOGs to form partnerships with government authorities, environmental agencies, the United Nations Environmental Programme (UNEP), Olympic sponsors and local community residents. Sustainability requires a collective effort and strong public-private partnerships are essential. Mutual cooperation is a prerequisite for successful environmental protection. Additionally, the Olympics offer a great opportunity to develop new partnerships, to enhance cooperation among public authorities and to support networking between various socio-economic actors involved in the Games.
Sustainability and the Olympics: The case of the 2016 Rio Summer Games

Another issue that needs to be considered moving forward is the use of Olympic facilities post-Games. The main challenge comes because the facilities are rather large with a seating capacity of tens of thousands, mostly suitable for international and national competitions. Therefore, these facilities are not frequently used at all. This in turn leads to the venues degradation and/or to high costs associated with their maintenance. This is the case with the Olympic facilities in Athens, where some venues such as the aquatic center, softball and beach volleyball arenas are yet to find tenants, thus in a desperate need for private investors (Manfred, 2012). On the positive side, some host cities have made a cognizant effort to address the issue of post-event usage. For example, the Atlanta Olympic stadium was designed on the principal that it would be converted to other uses once the event was over. One year after the 1996 Atlanta Games, the venue was sized down from 85,000 seats to 50,000 seats to be the home to a professional baseball team (Newman, 2016). Similarly, the Sydney stadium was designed with temporary seats with some seats being movable. After the 2000 Sydney Games, the venue sits about 80,000 spectators and is reconfigured to host soccer and rugby competitions (IOC, 2012). These examples of legacy planning show effective ways facilities can be utilized post-Games.

The movement towards environmental awareness will continue to grow in the future. The media coverage from the Rio Games indicates that public awareness and demand for greater focus on environmental issues may be gaining strength. Additional work on sustainability initiatives concerning water quality, energy conservation, waste production, ecosystem protection, and air pollution reduction are needed. However, the current momentum may expand the importance of sustainability in all areas of sport, not just at the Olympic level.

Sample Classroom Use and Discussion

The following are meant to be potential projects, assignments, or other examples of evaluation possibilities that may work in conjunction with the use of this case. The instructor should modify these as needed to fit the course goals and objectives.

1. Student groups take on various stakeholder roles (e.g., IOC, OCOG, IF, policy experts group, local environmentalists group). Students then prepare information from their stakeholder’s perspective and discuss sustainability initiatives and the Olympics. Ask all groups to come up with a solution all parties will agree on regarding how to plan, implement, and enforce sustainability practices in the Olympics or at other sporting events.

2. After reading the case, students act as a potential host for an upcoming Olympic Games. Have students craft their own bid for a potential Olympic Games location, focusing primarily on the area of environmental sustainability.

3. Students conduct research to find the current state of Rio Olympic sites. How have stadia, arenas, and outdoor sites been maintained, converted, or neglected? Discuss potential legacy concerns from the Games. Students then prepare a sustainability document outlining a post-Games action plan.

4. Students attend a local athletic event for the purpose of observing and analyzing the environmental sustainability efforts related to game day operations, marketing, sponsorship, and fan behavior.

Sample Discussion Questions
1. Could the water quality issues at the Rio Games been more effectively planned, managed, and executed considering the economic, political, and cultural factors present in Rio? If so, how?

2. What kind of challenges are to be expected in evaluating the global impact of the Olympics in general and in Rio in particular? How can monitoring, management, and reporting translate into better environmental performance?

3. What solution(s) would you recommend for enforcing environmental efforts and ensure that the Olympics are sustainable? What type of a system should be implemented to penalize those who do not comply with environmental standards? Who would be responsible for enforcing and monitoring how well the penalty system works?

4. How might venues built for the Olympics be utilized post-Games?

5. You have been selected to be a member of the OCOG. As a member of the OCOG, what types of programs and strategies would you recommend that the host city focuses on to address environmental sustainability (e.g., water cycle, energy conservation, waste production, ecosystems, landscape, urban environment, air pollution) and minimize the environmental impact during the Games? What about post-Games? Provide a rationale for your suggestions.

6. What type of organizations and stakeholders would you seek to form partnerships with (at the international, federal, state, and local level) to ensure the Olympics are planned and staged in a sustainable way?

7. The Olympic Games are hosted in a two-week time period, are situated in a specific area, and accumulate operating and infrastructure costs in the billions of dollars. With that in mind, do you feel the Olympic Movement contradicts the fundamental premises of sustainability (meeting the needs of the present without compromising the needs of the future)?

A note about the authors and this piece:

In order to provide some insight as to why we decided to write this teaching case study, we thought it would be appropriate to discuss our connection to environmental sustainability in sport. All three authors are very passionate about sport and the environment. The first author has multiple graduate studies degrees, with one of them being in the field of Environmental Science, and is a pioneer scholar connecting the fields of sport management and environmental sustainability. The second author has done work in this area as well and has presented at national and international conferences. Both hold a doctoral degree in Sport Management and have published multiple articles in peer-reviewed journals focusing on the intersection between sport and the environment, by addressing a variety of sport settings (e.g., recreational activities, collegiate sports, professional sports). The third author has an extensive practical experience with a variety of organizations responsible for the government of sport at the national and international level. For example, he coached an Olympian who won a gold medal at the 2004 Olympic Games in Athens, Greece.

The sport industry has increasingly placed emphasis on and recognized the importance of environmental stewardship. We strongly believe that higher education coursework should reflect the industry needs, and develop students’ problem-solving skills, ability to assess environmental impacts, manage environmental change, and provide knowledge regarding sustainable development. By incorporating discussions of environmental sustainability into the classroom, students will be challenged to innovate, create, and develop non-traditional ways of delivering
sport while caring for the environment. We feel that it is our professional duty to educate students about sustainable sport development to ensure they better serve an industry that is determined to become a champion in environmental sustainability.
References


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