Autonomous Archaeological Authority: The Future of Drone Use and Privacy Laws in Cultural Heritage Preservation

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AUTONOMOUS ARCHAEOLOGICAL AUTHORITY:
THE FUTURE OF DRONE USE AND PRIVACY LAWS IN
CULTURAL HERITAGE PRESERVATION

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ABSTRACT

Since ancient times, humanity has placed high value on natural and cultural phenomena, with Philo of Byzantium recording the first list of the “Seven Wonders of the Ancient World” as early as 225 B.C.E.1 Similarly, modern world leaders continue to recognize the value of these and more sites through preserving them as United Nations Educational, Scientific, and Cultural Organization (UNESCO) World Heritage sites. With the advancement of drone technology, researchers now employ drones to aid preservation efforts since drones can enter dangerous and humanly-inaccessible spaces, provide detailed images of sites the human eye cannot see, and assist governments in identifying illegal looting. However, while many countries have developed drone use regulations, the challenging ethical questions drones pose regarding privacy rights have resulted in a lack of drone-specific privacy regulations. As countries create new legislation to fill the policy gaps, the tension between protecting privacy rights and preserving cultural heritage results in an unclear future for the use of drones for site preservation.

Section II of this Comment analyzes the history of World Heritage sites, drone development, and their intersection to under-

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stand the vital role drones play in site preservation. Subsequently, Section III conducts a comparative analysis of drone-use and privacy regulations in four countries with the greatest amount of UNESCO sites to identify the current status of global drone laws. Finally, Section IV addresses the lack of drone-specific privacy regulation and asserts potential implications new drone legislation could have on preservation efforts while postulating methods to protect preservation drone use.

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I. INTRODUCTION

FROM THE GRAND CANYON TO THE COLOSSEUM, the world boasts both natural wonders and treasured cultural monuments known as UNESCO World Heritage Sites. As humanity becomes increasingly interconnected, preserving these sites is critical to remembering the unique pasts each country holds that shape our collective identity. As global conflicts, climate change, and deterioration threaten natural and cultural
sites, archaeologists have begun employing the latest technology, known as unmanned aerial vehicles (UAVs) or drones, to survey World Heritage sites. In response to this new technology, nations have each created their own regulations. However, the lack of uniform policy raises equality issues as UNESCO sites across the world may not be preserved consistently. Additionally, there is a significant lack of national and international regulation involving drone-specific privacy rights. Through a comparative evaluation of four countries with the highest number of UNESCO World Heritage Sites, this Comment both explores how drone use could revolutionize cultural heritage preservation and analyzes how the effects of drone-specific privacy laws could impact the consistent preservation of World Heritage sites.

Specifically, Section II examines the nuanced history behind UNESCOs founding, drone development, and the complex nexus where UNESCO and drones meet. Next, Section III analyzes four countries—the United States, Italy, China, and India—to compare drone policy and identify gaps in drone privacy laws across the world. Finally, Section III evaluates the challenges in the interplay between privacy rights and drone usage. Within Section IV, the purpose is to analyze potential implications of new drone privacy legislation on cultural heritage preservation while postulating methods to protect preservation drone use.

II. A HISTORY OF CULTURAL HERITAGE PRESERVATION AND DRONES

A. UNESCO AND CULTURAL HERITAGE PRESERVATION

In response to global concern for safeguarding the world’s treasured environmental and cultural sites, world leaders developed multiple organizations devoted to preservation—for example, the World Monuments Fund (WMF) and the United Nations Educational, Scientific, and Cultural Organization (UNESCO). WMF is “the leading independent organization de-

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4 See id.
5 See id.
voted to safeguarding the world’s most treasured places,” whose goal is to increase mutual understanding between cultures. Though the two work together, the more widely known contributor to cultural preservation is UNESCO, whose purpose is to “promote knowledge sharing and the free flow of ideas to accelerate mutual understanding and a more perfect knowledge of each other’s lives.” UNESCO was developed in response to World War II to seek global peace, and its mission has several purposes. A few include: encouraging countries to register sites to protect their natural and cultural heritage; encouraging countries to set up management plans and reporting systems on the state of the sites; helping countries to safeguard their sites through providing training and technology; raising public awareness for conservation; and providing emergency services for sites in immediate danger.

As cultural diversity is still threatened, UNESCO’s purpose remains to “reaffirm the humanist missions of education, science, and culture.” A critical part of UNESCO is its commitment to “encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity.” Thus, UNESCO adopted an international treaty in 1972 called the Convention Concerning the Protection of the World Cultural and Natural Heritage (the Convention), which creates a World Heritage List ensuring protection of the world’s most valuable cultural sites. Notably, the decision to prepare a draft of the Convention and prioritize protecting cultural heritage came from Egypt’s plan to build the Aswan High Dam, which would have flooded a region containing ancient Egypt’s Abu Simbel Temples. In response, UNESCO began a safeguarding campaign, accelerated the

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7 See id.
8 See UNESCO in Brief, supra note 2.
9 See id. (explaining UNESCO was formed by European governments coming together to confront Nazi Germany and grew to incorporate over forty-four representatives worldwide).
10 See id.
11 Id.
13 See id. (explaining one unique aspect of World Heritage is that it has universal application, and the sites belong to everyone in the world regardless of the land they are located on).
archaeological research, and moved the temples to higher ground. Moreover, the campaign sparked other safeguarding campaigns in Italy, Pakistan, and Indonesia, initiating international recognition to prioritize protecting cultural heritage.

Beyond encouraging general cultural heritage preservation, the Convention specifies the types of sites that are considered for the World Heritage List. Specifically, there are five strategic criteria the Convention seeks in admitting new sites—credibility, conservation, capacity-building, communication, and communities—which help countries identify their responsibilities in preservation efforts to gain recognition on the World Heritage List. Part of the responsibility is not only preserving World Heritage sites but also protecting their national heritage through regional programs that provide staff at sites, conduct research, and make the site a functional part of their community. Additionally, the parties are required to report to the World Heritage Committee on the state of conservation, which assists the Committee in identifying specific needs for each site. In less affluent countries, the benefit of ratifying the World Heritage Convention is the World Heritage Fund, which annually makes nearly $4 million available to parties who identify and preserve their World Heritage sites.

As of 2023, the World Heritage List consists of 1157 sites, with 900 being cultural and 218 being natural. Notably, the sites are spread across 167 countries. Italy and China are tied for the highest number of UNESCO World Heritage Sites, followed by several European countries such as Spain, Germany, and France, and finally India, Mexico, the United Kingdom, Russia,
and the United States to complete the top ten. Out of these ten, this Comment will analyze the laws surrounding drone use and privacy in four countries—the United States, Italy, China, and India—to determine how the laws or gaps in legislation affect cultural preservation for UNESCO sites.

B. Drone Development

With the rise of technology, the use of geo-spatial technology is changing the future of protecting cultural heritage sites. As of 2015, UNESCO and the United Nations Institute for Training and Research (UNITAR) agreed to use the most advanced geo-spatial technology to protect cultural heritage sites. With advanced technology, the organizations are able to collaborate during times of conflict and natural disasters to protect the sites. There are a variety of geo-spatial technologies that can be used for cultural preservation ranging from a crowd-sourcing mobile application called UN-ASIGN to unmanned aerial vehicles (UAVs), both of which are used to record damage assessments of sites. This Comment focuses on UAVs, commonly referred to as drones, to analyze various legal frameworks surrounding their use, their effect on privacy rights, and their impact on cultural heritage preservation.

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23 See Katharina Buchholz, These are the Countries with the Most UNESCO World Heritage Sites, WORLD ECON. F. (Dec. 3, 2020), https://www.weforum.org/agenda/2020/12/unesco-world-heritage-countries-history-archaeology-landmarks-italy-china [https://perma.cc/3K46-DZYG] (explaining as of 2020, Italy and China have fifty-five sites, while the US has twenty-four).

24 This Comment specifically chose these countries to obtain a geographical cross-section which would provide a more accurate analysis of current drone regulations globally.


26 See id.

27 See id.; The Ancient City of Aleppo, UNESCO (Apr. 20, 2023), https://www.unesco.org/en/articles/using-new-technology-document-endangered-world-heritage [https://perma.cc/3CQ-G48V] (explaining satellite technology allowed UNESCO and UNITAR to document the destruction to Aleppo due to the Syrian conflict, demonstrating how more than ten percent of the ancient city had been destroyed and showing detailed damage to one of the famous minarets of the ancient city).

28 See UNITAR, supra note 25.

29 Since UAV encompasses all varieties of drones, this Comment will use the term drone exclusively. See Shawn Herrick, What’s the Difference Between a Drone,
In particular, a drone is an unmanned aircraft that is able to fly without human control; instead, the drone has a computer control operated by a ground-based pilot.\(^{30}\) Drones are used for both surveillance and photography, and are employed by a range of private, commercial, and military users.\(^{31}\) Specifically, surveyors are able to take photographs of land from thousands of miles away and then use those images to conduct up-close analysis of the land.\(^{32}\) Additionally, the cameras allow professionals to take videos that create high-quality aerial footage, enabling historians to survey previously inaccessible sites in war-torn countries and to evaluate the status of World Heritage sites.\(^{33}\)

As archaeologists attempt to preserve these cultural heritage sites, drones have become an essential tool for archaeological surveys.\(^{34}\) Drones allow historians and archaeologists to gather images in all angles with accurate and comprehensive data.\(^{35}\) Before drones, any projects to survey archaeological sites were time and resource intensive since traditional aerial photography required ground operation.\(^{36}\) With the help of drones, archaeologists now analyze and collect data at a much faster rate, lowering surveying times from two or three weeks to between one and four days.\(^{37}\) Additionally, drones have assisted archaeologists ranging from documenting and recording new discoveries to helping plan future dig operations, assessing damage to sites from natural disasters or human activity, monitoring illegal excavation and looting, and helping digitally reconstruct ancient sites.\(^{38}\)

\(^{30}\) See id.; FLYING Staff, What is a Drone, FLYING (May 17, 2022), https://www.flyingmag.com/guides/what-is-a-drone/.

\(^{31}\) See What is a Drone, supra note 30.

\(^{32}\) See id.

\(^{33}\) See id.


\(^{35}\) See id. (explaining that Scotland employed drones to document a remote set of islands, with the drone flying over 250 miles capturing 420 million data points in just five days—a record speed.).

\(^{36}\) See id. (explaining how before the ease of drones, archaeologists were paying up to thousands of dollars per hour to hire a helicopter; comparatively, drones are significantly cheaper and have more accessibility while producing more accurate models.).

\(^{37}\) See id.

\(^{38}\) See id.
C. THE INTERSECTION OF PRESERVATION AND DRONES

With the recent addition of drones to preservation efforts, archaeologists have employed multiple techniques for mapping ancient sites: photogrammetry and LiDAR technology. Between the two methods, the most common is using photogrammetry to produce virtual models to digitize previously only tangible cultural heritage.\textsuperscript{39} Because preservation requires such accurate information for effective restoration, drones become invaluable both due to the digital models and because of their ability to enter dangerous areas to collect vital site data.\textsuperscript{40} Another way drones benefit preservation is through artifact authentication.\textsuperscript{41} Specifically, when there is a risk of destroying an artifact by physically removing or examining it, photogrammetry creates an alternative by producing accurate and efficient 3D models for examination.\textsuperscript{42} However, the model accuracy is about 2.9 centimeters to the original object, and archaeologists sometimes prefer LiDAR technology’s greater precision.\textsuperscript{43}

In comparison, LiDAR technology uses lasers to measure distances and then employs those measurements to build industrial-level maps and models with greater accuracy.\textsuperscript{44} Some of the benefits of LiDAR technology include its ability to enable a high level of detail, create 3D models, be unaffected by inclement weather or poor lighting, and map minute characteristics.\textsuperscript{45} However, LiDAR’s expense can be a drawback, as one LiDAR camera can cost nearly $35,000.\textsuperscript{46} While expensive, LiDAR’s ability to accurately evaluate structural conditions of cultural heritage sites nonetheless makes it a popular choice. Importantly, this technology allows the World Heritage Committee to assess damage or deterioration to sites and determine the best course of action for those on the World Heritage List.\textsuperscript{47} Additionally, LiDAR technology is even helpful for sites not on the list, as it allows nations to visualize their own steps in protecting their cul-

\textsuperscript{40} See id. at 7.
\textsuperscript{41} See id.
\textsuperscript{42} See id.
\textsuperscript{43} See Leslie, \textit{supra} note 34.
\textsuperscript{44} See id.
\textsuperscript{45} See id.
\textsuperscript{46} See id.
\textsuperscript{47} See id.
tural sites. As professionals have recognized how critical drone use is, they recently founded a conference in Italy for researchers and professors to collaborate over how drones are used in cultural heritage preservation. Thus, the rise of drone technology and its ability to capture more detailed images is assisting UNESCO and WMF in identifying at-risk sites and developing site-specific preservation strategies.

For example, one way UNESCO and WMF use drones to protect and preserve World Heritage sites is through identifying illegal looting at sites. Archaeologists have found that "[s]ites are routinely mined for objects, for private or institutional consumption, as part of the commodity chain involving looters, intermediaries, dealers, and eventually consumers." This underground market leads to looters digging holes throughout ancient sites and destroying contextual information, limiting archaeologists’ ability to assess how a looted object or destroyed site was used in the past. One example of recent drone use fighting illegal looting is the ancient sites of the Dead Sea Plain in Jordan that hold Early Bronze Age biblical cities covered in "cist tombs."

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48 See id.
50See Alyssa Buffenstein, A Monumental Loss: Here are the Most Significant Cultural Heritage Sites that ISIS has Destroyed to Date, ARTNET (May 30, 2017), https://news.artnet.com/art-world/isis-cultural-heritage-sites-destroyed-950060 [https://perma.cc/X7QF-KKVR] (demonstrating that one area of continued research may be the potential for time-stamped data collected from drones being used in war crime tribunals; specifically, as terrorist organizations destroy cultural heritage sites in the midst of wars, later when they stand trial drones could help prove damage they caused to sites to hold them responsible.).
52 Id. at 306.
53 See id. (explaining demand for artifacts is a large driver of illegal looting, though other motivations can be nationalism, quests for buried treasure, and conflicting preservation and management plans).
54 See id. at 307–15.
55 See id. at 309; Bronze Age Cist Burial, Tipperary Museum of Hidden Hist., https://www.hiddenhistory.ie/collection-items/bronze-age-cist-burial [https://perma.cc/89G2-4VSX] (explaining cist tombs are small, stone-like coffins that unburnt bodies are buried in, typically tied into a position with their knees drawn up to their chins).
Despite the Jordanian government’s efforts and local site initiatives, looters have continued excavating deep holes throughout the ancient site.\footnote{See Kersel, supra note 51, at 309 (explaining how archaeologists recall "where there were once graves, there are now holes, 3,723 of them.").} In response to the looting, the Jordanian government noted that one issue with their attempts at mapping to prevent looting was the failure of Google Earth satellite imagery to distinguish holes that were actually ancient tombs.\footnote{See id. at 312.} This deficiency led to the government using drones to obtain data that had more spatial resolution and accurate identification.\footnote{See id.} Now, the site uses drones to “build a [w]hole picture of the mortuary landscape, including looting activity and holes,” through low elevation aerial photography and spatial data for digital mapping.\footnote{See id. at 313.} Through identifying which holes were ancient tombs, the government was then able to more effectively protect their cultural sites by either blocking them off to protect them or placing guards to prevent looters.\footnote{See id. at 324.}

However, as global privacy concerns increase, cultural heritage sites like the Dead Sea Plain in Jordan bear the effects. While pedestrian ground surveys are vital to avoid misinterpreting small details, the Jordan community pushes back out of privacy concerns, arguing the “eye[ ] from the sky” nature of drones is dehumanizing.\footnote{See id. at 313.} Yet, there are great incentives for using drones, such as providing more comprehensive maps for local communities and heritage organizations like UNESCO that enable greater awareness of cultural site destruction.\footnote{See id. at 316 (explaining drone models help track the movement of looted material which is then used to “evaluate site protection strategies and to develop local community outreach programs, resulting in a comprehensive model that might be applied to other at-risk sites and regions.”).} Thus, this example in Jordan of how critical drone use can be for effective cultural preservation highlights the tension felt worldwide between preservation and privacy.

While identifying and preventing illegal looting is a high-stakes and nuanced area of drone use, another more common use in cultural heritage preservation is general historical mapping even for sites that are not denoted as UNESCO sites.\footnote{See generally Bryce E. Berrett, Cory A. Vernon, Haley Beckstrand, Madi Pollei, Kaleb Markert, Kevin W. Franke & John D. Hedengren, Large-Scale Reality Model-}
cifically, colleges across the country have recognized that the memory of their campus is preserved only through “rudimentary written form, drawings, and/or simple photos,” inspiring schools to employ new ways of “preserving campus and university cultural and infrastructural heritage.” In particular, one case study from Brigham Young University (BYU) used both photogrammetry and LiDAR technology, finding that for “large and complex sites,” photogrammetry poses a more cost-efficient method. Applying these findings to actual UNESCO sites could be beneficial for archaeologists deciding between photogrammetry and LiDAR, as they could compare the size and complexity of their site to those demonstrated in the BYU study to determine which technology would be most efficient. From preventing illegal looting of world monuments to preserving local memories, drone use for cultural preservation is only becoming more common, placing UNESCO and cultural heritage organizations in the center of the tension between drone use and privacy regulations.

III. REGULATING DRONE USE AND PRIVACY

With increased accessibility to drones and the potential threat to privacy, many countries have implemented regulations over drone use. However, there currently are no global, uniform drone regulations, which jeopardizes the consistent preservation of world heritage sites in different countries. While some countries have rules that really only monitor for safety, others have strict regulations no matter the purpose. Though drone laws are constantly changing, there are certain laws that appear worldwide in some variation. For example, nearly every country has a law distinguishing recreational and commercial drone flights, with recreational having less restrictions than commer-
cial in most places of the world. Additionally, another common regulation is the allowed height to fly a drone, with the most common height ranging from the United States to China between 300 and 400 feet, respectively.  

Not only are there regulatory concerns, but drones pose large privacy concerns as they have the ability to “capture and record people or objects often without being seen, and . . . to easily cross terrestrial boundaries between private and public spheres.” Specifically, drones raise ethical questions about “monitor[ing] people from the air without their knowledge” and the potential that this may infringe upon civilians’ privacy or their freedom to associate. Additionally, when researchers use data from drones, if people or their practices are identifiable, other questions arise as to whether the researchers must obtain consent. Beyond drone users, there are also concerns about the potential for hacking or “corrupt officials sell[ing] the data or us[ing] them for personal gain,” which could facilitate illegal activity like looting through officials providing information on the status of sites to criminals. While there are a myriad of privacy concerns, there is a lack of national and international regulation to address them. The purpose of this Comment is to identify current drone regulations and to examine gaps in existing privacy laws to determine the effect future regulations could have on the preservation of cultural heritage sites across the world.

A. The United States

While some countries in North America such as Cuba and Nicaragua have very strict drone regulations, the United States is less restrictive, with the U.S. Federal Aviation Authority (FAA)

70 See id. (explaining that this maximum height was chosen as the safest height where a drone could fly and not interfere with airplanes; additionally, other common and expected rules are not to fly over people or crowds and not to fly drones while under the influence of drugs or alcohol.).
71 See Lee, supra note 3, at 2.
73 See id.
74 Id. at 642.
75 See id.
76 See Buchholz, supra note 23. This Comment will analyze the United States, the European Union and specifically Italy, China, and India as these represent a range of continents and different political jurisdictions from the top ten countries with the most UNESCO sites.
only requiring registration and paperwork to fly.77 However, while the FAA dictates drone laws nationally, each state has their own regulations.78 Thus, when historians or archaeologists use drones, they must ensure they are not only registered with the FAA, but also that they are in compliance with the site’s local state laws.79 While drones are allowed for both recreational and commercial use, drone use for cultural heritage preservation is often in the specific commercial category of Certificated Remote Pilots and Commercial Operators.80 The Commercial Operators category is for those using drones for work, and users must obtain a Remote Pilot Certificate from the FAA, which requires the applicant to read and speak English, be mentally and physically able to operate the drone, be at least sixteen years old, and be able to pass an Aeronautical Knowledge Test.81 The laws surrounding commercial drones are contained in “Part 107,” which provides the requirements for issuing a commercial certificate and sets regulations for different potential issues ranging from in-flight emergencies to night-time and day-time operations.82

Although the FAA governs drone regulations on a broad scale, it is the states’ right to pass laws surrounding land use, zoning, and privacy.83 In relation to cultural heritage preservation, since UNESCO sites in America reside in a variety of states, differing state laws could result in inconsistent preservation de-

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79 See id.

80 See FAA Drone Regulations for Commercial Drone Use, Dart Drones, https://www.dartdrones.com/faa-drone-regulations-commercial-drone-use/ [https://perma.cc/AWH9-GV2X] (explaining examples of commercial drone use are: real estate photography, aerial mapping, construction, surveying land, and emergency management; thus, preservation of World Heritage sites fits within commercial drone use since it employs surveys, aerial mapping and emergency management.).

81 See id.

82 See id.

83 See Drones, CitizensCount, https://www.citizenscount.org/issues/drones?gclid=CF0KgQqDze5dBhC4AItSAGj36uGauQV_7P33Lw3BNkDSeoobTLNS hqu7gmnOElsFl4sE15jxBe-dWEaAuefWEALw_wcB [https://perma.cc/2VA7-9E5B].
pending on how restrictive the state regulations are.\textsuperscript{84} For example, New Mexico and Arizona have the most World Heritage sites in America.\textsuperscript{85} However, in New Mexico there is only one law outside of the FAA, requiring that drone operators must comply with the prohibition of unwanted surveillance.\textsuperscript{86} Meanwhile, in Arizona, there are multiple state-specific laws prohibiting interfering with police, firefighters, or manned aircraft; flying within 500 feet of any critical facility; and allowing cities and towns in Arizona to create their own drone regulations.\textsuperscript{87} Additionally, Arizona has laws prohibiting recreational drone use from state parks, though commercial drone rights in state parks are determined through a separate permit application.\textsuperscript{88} However, while drone laws may be decentralized, one court has expressly found that the FAA laws preempt any state laws on drones.\textsuperscript{89} Thus, when considering the legal scope of drone legislation in the United States, it is necessary to look at both the FAA and any state regulations to identify potential disparities in site preservation throughout the country.

While there may be federal and state law surrounding the use of drones, another area to consider is legislation surrounding the right to privacy from drone surveillance. Notably, there are no federal privacy laws that specifically address drones.\textsuperscript{90} Not only is there no federal legislation, the FAA announced that privacy is outside the scope and focus of existing drone regulations.\textsuperscript{91} In response to a lack of federal law, states like California have begun addressing drone privacy concerns by passing Assembly Bill No. 1129, which makes using a drone to invade personal privacy a misdemeanor.\textsuperscript{92} Similarly, Tennessee prohibited drones from taking photographs or filming when there are

\textsuperscript{85} See id.
\textsuperscript{87} See Drone Laws in Arizona (2023), UAV COACH, https://uavcoach.com/drone-laws-arizona/ [https://perma.cc/BEW5-6PNV] (explaining critical facilities are considered hospitals, power plants, military installations, etc.).
\textsuperscript{88} See id.
\textsuperscript{90} See Lee, supra note 3, at 2.
\textsuperscript{91} See id. at 4.
\textsuperscript{92} See id.
more than one hundred people gathered unless the drone user has obtained consent. While increased commercial drone use by law enforcement can further public policy by offering a more comprehensive analysis of damage from events like wildfires and natural disaster damage—or by extension, damage caused to World Heritage sites—their use could also violate the Fourth Amendment’s ban on unreasonable search and seizures. With the threat of drones violating a constitutional right, states like California and Tennessee exemplify burgeoning privacy legislation. Thus, before preservation researchers use their drones at any site, it is important to identify what actions constitute a “search” violating the Fourth Amendment.

According to Katz v. United States, using drones on someone else’s property will constitute a search if “(1) the property owner shows a subjective expectation of privacy in the area examined, and (2) if society views that expectation of privacy as reasonable.” However, the difficult analysis is in the second requirement—whether an individual has an expectation of the right to privacy. In another case, Silverman v. United States, the United States Supreme Court found that privacy rights are protected the most inside the home. Thus, it is unsurprising how concerned civilians were when Kyllo v. United States confirmed law enforcement using undetectable thermal cameras inside a home to produce evidence needed a search warrant. While these types of scenarios heighten peoples’ fears of Fourth Amendment violations and potential escalation of drone surveillance by law enforcement, the case ultimately found that a search warrant was required in order to use the thermal cameras. As Justice Scalia noted: “[W]here . . . the government uses a device that is not in general public use to explore details of the home . . . the surveillance is a ‘search’ and is presump-
tively unreasonable without a warrant." Thus, while *Kyllo* does not directly implicate drones, it offers a framework to anticipate how searches and seizures will apply to drone surveillance, since courts likely consider drones equally invasive.

While there may be more certain protection of privacy rights in the home, privacy rights outside the home remain more contested. There are four factors to determine what constitutes a search outside the home: the distance from home, whether the area is enclosed by a fence, whether the area is used for intimate activities, and whether the property owner has tried to protect the area from outside people seeing in. For example, the 1986 United States Supreme Court case *California v. Ciraolo* purported that there is no expectation of privacy when an airplane flies within the area right around a person’s home, and that law enforcement has the right to observe private property from public airspace. Though *Ciraolo* addresses airplanes, scholars have likened the holding to apply to drones as well, which would give cultural heritage preservationists the ability to use commercial drones in public parks and airspaces and on private land where people cannot expect a right of privacy. However, researchers likely should not rely exclusively on potential dicta from *Ciraolo*, as the United States’ National Parks Service states that World Heritage site status “does not regulate or place restrictions on private property or private property owners. Direct authority over individual properties remains with the national, state, tribal, local government or private organization that owns and manages the site[s].” Thus, while many United States UNESCO sites are National Parks and do not implicate private property drone regulations, others such as Monticello and the University of Virginia are privately owned, which complicates the legal landscape for preservationists. As drone privacy regulations continue developing, preservationists may find that the disjunctive legal field between federal and state privacy laws

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101 *Id.*
102 See *id.*
103 See *id.*
104 See *id.*
105 See Martin, *supra* note 89.
106 See *id.*
108 See *id.* For example, Monticello is owned by a private foundation.
make it more difficult to preserve and monitor UNESCO sites in a consistent manner.

B. ITALY

Next, this Comment will analyze drone regulations and privacy initiatives in Italy, which is tied for highest number of UNESCO sites in the world. Since Italy is a member of the European Union (EU) and must comply with agreed upon regulations, this Comment will also broadly analyze the EU’s drone policies to contextualize Italy’s legislation. As a member of the EU, Italy follows drone regulations implemented by the European Union Aviation Safety Agency (EASA). Beginning in 2021, the EASA standardized drone regulations in member states, naming it the “Regulation (EU) 2019/947 of May 24, 2019 on the Rules and Procedures for the Operation of Unmanned Aircraft.” Unlike the United States, the EASA’s regulations do not differentiate between recreational and commercial drone use. Instead, the regulations create three categories for drone regulations—open, specific, and certified—that focus on weight and specific drone operation.

First, the open category requires that a drone purchased before January 1, 2023, must have a mass of less than fifty-five pounds, operate a safe distance away from people, stay within the remote pilot’s visual line of sight, and not fly above 400 feet. Next, the specific category is for drones bearing too much of a risk to meet the open category requirements. The specific category requires that remote pilots “operate under a standard scenario issued by the EASA or the country’s National Aviation Authority (NAA).” Additionally, if the flight is not
conducted under the standard scenario, then the pilot must run a Predefined Risk Assessment (PDRA) before the operation and obtain the NAA’s approval. Alternatively, a flight can be in the specific category without running a PDRA if the remote pilot has a Light UAS Operate Certificate (LUC). Finally, the certified category is for drones that are high risk due to their size and potential for risk to civilians or the environment. Once the user registers their drone in its intended category, the user must take an online training before the EASA can authorize them to fly. Additionally, once in the air, drone traffic is monitored by U-space, which is a group of services helping manned and unmanned aircrafts to co-exist in the airspace safely. Thus, members of the EU must consider the category of their drone and ensure proper registration before flying in EU airspace.

While Italy is required to comply with the above classifications and regulations as an EASA member, it also has a range of country-specific legislation. For example, drone pilots must be able to see their drone during flight, they must fly 164 feet away from people and 150 feet away from urban centers, they may not fly their drones at night, they may not fly over people or crowds, and they may not fly within three miles of an airport or 492 feet above the ground. However, since the EU and Italy do not distinguish between recreational and commercial drone use, the current drone regulations offer less restrictive regulations than the United States. Thus, since drones for preservation would be categorized as low-risk with little restrictions, archaeologists in Italy likely have greater autonomy in their research which is beneficial for cultural site preservation.

Just as in analyzing drone regulations, evaluating drone privacy policies in Italy requires consulting the EU’s legislation. Specifically, the EU addresses privacy rights in Article 7 and data protection in Article 8 of the Charter for Fundamental Rights,
which is effective through the Regulation (EU) 2016/679 of the European Parliament. Additionally, the UK Human Rights Act of 1998 and the European Convention on Human Rights aid in regulating drones. While the EU has general legislation concerning privacy rights, drone privacy legislation has not been fully developed and codified, making the rights of drone users and the privacy rights of civilians hard to identify.

Similarly to the United States, the EU and Italy do not have specific regulations regarding privacy from drones. A comparative framework through which to analyze drone privacy laws is the governance of personal data, which is controlled by the EU Data Protection Directive and the General Data Protection Regulation (GDPR). Created in 2015, the GDPR is a mandatory regulatory approach that, though it does not directly discuss drones, provides a regulatory framework for privacy in digitalization and emphasizes the rights of the “data subject.” In particular, anything comprising personal data, meaning images from drones that identify an individual, fall within data protection legislation. This regulation primarily targets third parties seeking to bring drones inside the EU. While most current drone usage is by military or law enforcement, anyone using drones in populous areas must be cognizant of the Universal Declaration of Human rights, which holds that “no one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honour or reputation. Everyone has the right to the protection of the law against such interference or attacks.” Thus, while there is a clear lack of legislation protecting people from drones, this declaration helps set an expectation as to civilian privacy rights that future legislation may build from.

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127 See id.
128 See Lee, supra note 3, at 4.
129 See Lee, supra note 3, at 4.
131 See Lee, supra note 3, at 4.
132 See id. (explaining personal data are things such as locations, vehicle information, phone numbers, or anything that can be linked to an individual).
134 Id. (citing U.N.G.A in 1948, Resolution 217A, article 12).
135 See id.
C. CHINA

Subsequently, this Comment analyzes and compares drone use and privacy regulations in China. According to China’s national aviation authority, the Civil Aviation Administration of China (CAAC), flying a drone is legal in China.\(^{136}\) However, there are several fundamental rules for flying a drone in China.\(^{137}\) Specifically, any drone that weighs more than half a pound must be registered, and drones operating commercially or for certain scenarios must also be licensed by the CAAC.\(^{138}\) In order to register and license a drone, a user must provide personal information such as the drone owner’s name, a valid identification number, a phone number and email address, the drone serial number, and the purpose of drone use.\(^{139}\) Similar to the United States and Italy, some of China’s other fundamental rules include not flying beyond the visual line of sight, not flying above 120 meters, not flying in densely populated areas, and not flying around airports or militarily controlled areas.\(^{140}\)

While some regulations in China reflect those of the United States and Italy, others express tighter control over the rights of drone users. Once a drone is registered in China, the user is obligated to consult the China No-Fly Zone map to confirm the flight path is permitted.\(^{141}\) Additionally, there are two important regulatory platforms referred to as the “UAS Cloud” and the “electronic fence.”\(^{142}\) The UAS Cloud is a database that collects flight information in real-time and has an alarm that activates when a UAS flies into an electronic fence, which is a system that prevents aircrafts from entering certain areas.\(^{143}\) Drones that are in higher classifications due to their weight and purpose are required to report every second they operate in high density areas.
and every thirty seconds from lower density areas. Surprisingly, while China exerts strict, internal control over drone usage, it dominates the global drone market, producing seventy percent of global civilian drones and fifty percent of global industrial drones. Thus, the current drone regulations in China indicate that archaeologists may face increased barriers compared to the United States and Italy, potentially resulting in more technically restrictive barriers to UNESCO site preservation.

Though China has implemented a framework for drone regulation, similar to the US and Italy, it lacks legislation for drone privacy. In response to the policy gaps, Chinese experts advocate for more laws that will protect peoples’ privacy from drones, such as requiring criminal background checks before purchasing drones. Additionally, scholars note how some local governments’ approach of “blocking” to “banning” drones are ineffective and should instead be a combination of leniency and strictness. While blocking drones would be an effective and easy way for governments to emphasize public safety, scholars worry about how those rules would suppress innovation and infringe on peoples’ right to use the new technology. On the other hand, some scholars suggest that clarifying responsibilities and qualifications of drone users and setting an increased amount of no-fly zones that limit drone activity would effectively protect privacy rights. Additionally, they argue that drone technology requires a new framework as opposed to traditional aviation supervision methods, and that drones should be monitored according to their different types and uses. While China has developed adequate drone regulations, the debates among scholars indicate a lack of privacy legislation similar to the

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144 See id.
146 See Urban, supra note 142, at 29 (explaining the idea of criminal background checks would be beneficial for all countries, as it would help monitor for cybersecurity threats and prevent those with bad intentions from operating drones).
148 See id. at 58–63.
149 See id. at 60.
150 See id. at 57.
United States and Italy. Thus, as privacy policies increase in China, archaeologists may face barriers in preservation drone use, particularly if China amplifies no-fly zones.

D. India

Finally, this Comment analyzes drone regulations and privacy laws in India. In India, the national aviation authority, the Ministry of Civil Aviation, handles all drone regulations. Specifically, all drone users must register their aircraft with the Ministry of Civil Aviation, and are categorized according to weight with the “micro” category being half a pound to the “large” category being greater than thirty-three pounds. Additionally, in order to fly a drone there are specific equipment requirements such as: “GPS, return-to-home, anti-collision light, ID plate, and ID along with a SIM/No Permission No Takeoff.” Similar to the United States, Italy, and China, India also has common general rules. For example, every drone must be registered and obtain a Unique Identification Number, they must have a permit for commercial drone operations, they must fly in a direct visual line of sight, they cannot be flown higher than 400 feet vertically, and they cannot be flown in areas specified as a “no-fly zone.”

However, a unique aspect of India drone law is its “No Permission, No Takeoff” policy. The policy requires drone users to request permission for flight over a mobile application that processes the request and then approves or denies it. If a drone tries to fly without permission, it will be prohibited from taking off. To request permission, all drone users must register through India’s Digital Sky Platform. Another critical difference in India is that it is illegal for foreigners to fly drones. This requires foreign commercial operators to rent a drone from an Indian organization that can obtain a “Unique Identification Number” from the Directorate General of Civil Avia-
Thus, while it is still possible for archaeologists to conduct preservation research with drones, the process may present more obstacles than other countries since they must rent a drone and gain permission to fly.

As with the other countries this Comment evaluated, privacy is at the center of scholars’ concerns about drone security in India. In 2021, India created the Unmanned Aircraft System Rules, which required drones to “ensure the privacy of a person and its property during operation and further allowed the capturing of images and data by an unmanned aircraft only after ensuring the privacy of a person . . . .”161 However, this is India’s only drone privacy initiative and does not offer guidance as to the steps that constitute protecting personal privacy.162 Additionally, scholars point out that unintended privacy infringements are more likely due to transmitting cameras that operate in high definition, and legislators ought to address these specific privacy concerns.163 Not only is visual infringement a concern, but drones are also able to record sound and capture data that results in much more invasive infringement.164 As of now, India has made little attempt at legislation that would concern privacy from drones.165 While India does have an Information Technologies Act that addresses certain privacy questions involving technology, it does not address drones.166 Thus, scholars argue that the government needs to address privacy rights related to drones more directly so that “prosecutions of breaches of privacy [do not] become more convoluted.”167

Additionally, drone privacy concerns also involve regulating government surveillance by drones.168 Specifically, the government is considering using drones for traffic monitoring or social

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160 See id.
162 See id.
164 See id. at 12.
165 See id. Comparatively, the United States addressed privacy importance when President Obama published a memorandum acknowledging the need to develop laws protecting privacy while allowing for freedom to operate drones.
166 See id.
167 Id. at 13.
168 See id.
concerns like crowd control and surveillance.\footnote{See id.} While the technology offers improved law enforcement strategies, it also raises privacy concerns surrounding over-monitoring activity.\footnote{See id.} Though privacy regulations limiting government drone use may benefit the general community, it is unclear the effect new regulations could have on government entities using drones to preserve cultural sites. Since UNESCO sites in India may be located in more densely populated areas, questions arise over how obtaining critical video footage of sites can be balanced with new regulations limiting drone use in dense places. For example, lawmakers may have to answer which outcome is more important—preserving ancient monuments or protecting privacy rights.\footnote{See id.} Ideally, legislators would be able to draft drone privacy policies in a way to avoid such a drastic question, but potentially limiting government use of drones opens the possibility for larger questions. Thus, India’s drone regulation policies demonstrate the tension many countries experience between protecting privacy rights and maintaining optimal drone use.

With the rise of drone technology being relatively recent, this Comment’s broad, comparative analysis demonstrates a common lack of drone privacy regulations. As these countries represent those with the greatest amount of UNESCO World Heritage Sites, it is evident that the future of preservation will be affected by the legislation countries draft to fill the policy gaps. Thus, it is critical that UNESCO and archaeologists consider the potential policies, and that they advocate for a space within new laws to ensure they can continue employing the necessary technology to protect treasured cultural sites.

IV. FUTURE IMPACTS OF INCREASED DRONE REGULATIONS

As drone use becomes more common, countries will likely address increasing privacy concerns through legislation. While the potential effects of increased drone legislation on cultural heritage preservation remain unclear, it is important to understand the possible ways legislation could limit drone use. Moreover, as UNESCO and field archaeologists consider the changing regulatory landscape that preservation will exist in, it may be beneficial for them to draw comparisons with the parallel field of environ-
mental conservation. Observing conservationists’ proactive push for protection for conservation drone use may inspire UNESCO and archaeologists to advocate for an exception within drone privacy laws for drone use on private property for preservation purposes. Thus, this Comment seeks to identify the potential challenges preservationists may face with increased drone regulation while highlighting possible methods to help protect drone use for preservation.

A. SPECULATIVE CURSES TO GAPS IN DRONE PRIVACY REGULATION

Due to the international lack of privacy regulations for drones specifically, many scholars are predicting potential trajectories that countries may take to protect their citizens. Some suggest that countries should employ penalties against drone users who violate privacy rights.\textsuperscript{172} While penalties could aid in curbing invasive drone use, those positing this solution do not give enough depth to the suggestion, leaving it unclear whether a penalty would be financial or potentially criminal. Additionally, it fails to identify boundaries of privacy and what would constitute an invasion of privacy warranting a penalty. Another suggestion is to allow for “opt-out rights for private residences or companies whose premises or activities are recorded.”\textsuperscript{173} In a broad view of privacy rights, allowing for people to opt-out of surveillance seems like a good idea; however, for the purposes of preserving World Heritage sites, giving private land owners the right to refuse video footage from drones on their land could harm the preservation process. It also has the potential to cause inconsistent site preservation, as certain countries may have more sites located on private land allowing the citizens to opt-out.\textsuperscript{174} Once again, the opt-out suggestion highlights the tension between respecting privacy rights and preserving a country’s memorials.

Another scholarly suggestion is a “detailed differentiation of safety, privacy, and certification rules based on specific use cases.”\textsuperscript{175} If cultural preservation is the primary goal, this option seems to best balance the tension between acknowledging and

\textsuperscript{172} See Lee, supra note 3, at 7.
\textsuperscript{173} Id.
\textsuperscript{174} See id.
\textsuperscript{175} Id. (explaining other options considered to fill gaps in regulation and privacy laws include: mandatory data reporting, unique identifiers for drones that would resemble car registrations, requiring drone users to disclose their data management practices, creating a government agency or third-party to monitor
respecting privacy rights while also carving out an exception for specific-use like cultural preservation. Finally, the least restrictive privacy regulations considered is adding privacy training to the certification process for drone users.\textsuperscript{176} Adding training would be beneficial because it would not limit areas where drones can fly, which would ensure that archaeologists could view World Heritage sites adequately but also reduce invasive drone use since users have to understand privacy rights before getting licensed.\textsuperscript{177} As an increased number of civilians and corporations inevitably begin to use drones, countries will have to develop further legislation surrounding privacy. However, it is in nations’ interests to consider the impact drone privacy legislation could have on the race to preserve vital cultural sites that may reside on private land.

B. Learning from Parallel Drone Use in Environmental Conservation

As tension between drones and privacy begins to produce new legislation, UNESCO and archaeologists may benefit from comparing their situation to similar drone use in environmental conservation. While the two fields address different topics, they fight for the same purpose—safeguarding the world’s natural and manmade treasures. In particular, conservationists use drones referred to as “conservation drones,” for a variety of purposes ranging from “land-cover mapping, vegetation monitoring, biomass estimation, and animal detection.”\textsuperscript{178} Whereas drones for cultural heritage preservation assist researchers who cannot access remote or dangerous sites, researchers use conservation drones when “the acquisition of cloud-free satellite data is impractical,” in order to research, monitor and conserve the biosphere.\textsuperscript{179} Like cultural heritage preservation, drone use in environmental conservation is relatively new, which results in the fields facing similar challenges to privacy legislation. Specifically, some of those challenges involve: whether researchers privacy practices and store and manage data collected by drones, and an effort to standardize drone classifications).

\textsuperscript{176} See id.

\textsuperscript{177} See id.

\textsuperscript{178} Gernot Seier, Claudia Hödl, Jakob Abermann, Stefan Schöttle, Alexander Maringer, Daniel N. Hofstadler, Ulrike Pröbstl-Haider, & Gerhard K. Lieb, Unmanned Aircraft Systems for Protected Areas: Gadgetry or Necessity?, 64 J. FOR NATURE CONSERVATION 1, 1 (2021).

\textsuperscript{179} Id. at 2.
need to ask for consent to use data obtained from drones for research purposes; whether drone data might be used with negative repercussions; and whether law enforcement might use drone data to extend policing.\footnote{See Sandbrook, \textit{supra} note 72, at 640.}

However, one concern for conservation drone use is how it affects protected areas (PAs) due to emissions and potential waste.\footnote{See Seier, \textit{supra} note 178 (explaining the term “protected areas” has various definitions, but typically refers to “water, forest and open landscape that are incidentally valuable for biodiversity and nature conservation and/or are perceived unique due to their cultural and/or scenic value” and consists of legally defined land boundaries that require management.).} As UNESCO sites are divided into natural and cultural sites, the fields of environmental conservation and cultural heritage preservation may start to overlap as future drone legislation in PAs might affect surveying natural UNESCO sites like the Grand Canyon, the Galapagos Islands, or the Great Barrier Reef.\footnote{See World Heritage List, \textit{supra} note 21.} Thus, archaeologists may need to be aware of both legislation surrounding general drone privacy rights as well as specific legislation around drone use in PAs.

While the field of cultural heritage preservation has a lack of scholarship addressing how future drone law could affect preservation efforts, environmental conservationists’ considerations and insights may benefit UNESCO and archaeologists as they consider the impacts on their own field.\footnote{See Jesús Jiménez López & Margarita Mulero-Pázmány, \textit{Drones for Conservation in Protected Areas: Present and Future}, 3 DRONES 1, 1 (Jan. 9, 2019).} Scholars in conservation have highlighted that, while not without reason, “overly restrictive and indiscriminate regulatory framework arguing privacy and safety issues is currently limiting the applications of drones in the field of conservation.”\footnote{Id. at 8.} They further emphasized the need for “consensus among countries [to] adapt legislation to distinguish between the purpose of leisure, research and management.”\footnote{\textit{Id.}} The conservationists’ argument for drone legislation that accounts for the necessity of conservation use parallels the cultural heritage preservation push for an exception allowing drone use on private property for preservation purposes. While conservation scholars are proactively advocating for their protection in future drone laws, the field of cultural heritage preservation is newer to drone use and slower to ad-
dress how future laws could impact their work.186 Thus, due to the parallels between the two fields, preservationists may benefit from observing conservationists’ advocacy and implementing some of their tactics. Additionally, as future drone privacy legislation will impact both fields in similar ways, both groups may benefit from advocating together for legislation protecting necessary drone use for both preservation and conservation purposes.187

C. Exceptions for Equitable Preservation

As indicated above by the analysis of each nation, many countries have adequate regulations regarding drone use, but most fall short in drone-specific privacy legislation.188 For now, this is beneficial for archaeologists and historians because they do not have as much legislation preventing them from filming or photographing cultural heritage sites that may be on private land. However, as governments begin to address drone-specific privacy concerns, there may be more issues for archaeologists who hope to use drones for surveying sites on private land. As countries develop their privacy laws, it is important for them to think about the repercussions overly-strict regulations could have on their national culture and preservation. Due to the lack of drone specific privacy regulations in most countries, there is an opportunity for nations to develop a framework that works together to allow drones to protect cultural heritage sites in a uniform manner, ensuring consistent preservation across the world.

Similar to the scholarly suggestion of creating a differentiation in drone law for “safety, privacy, [or] certification,” state members of UNESCO could agree on a universal exception to any state’s drone privacy laws allowing for commercial drone use on private land for the purpose of surveying a UNESCO World Heritage site.189 The implementation of uniform exceptions would ensure that all nations with UNESCO sites would be guaranteed the same protection and means for preservation. UNESCO member states could agree upon set regulations of how drones would be used if the site were on private property, such as restrictions to ensure the drone user respects both pri-

186 See id.
187 See id.
188 See id. at 19.
189 Lee, supra note 3, at 7.
vate land rights and personal privacy rights from recordings or photographs. This exception could ensure that archaeologists and historians are able to obtain the data necessary to preserve these vital sites and cultures for future generations while also maintaining consistent levels of preservation between different national sites.

Additionally, this exception would be feasible for most, if not all, countries with UNESCO sites to adopt because the general concept of the exception could be adjusted to the needs of the specific country. For example, countries could require UNESCO to pay a fee to a private land owner whose property contains a UNESCO site when the archaeologists need to use a drone on their property. However, if countries opposed the privacy exception, UNESCO could require that for official recognition as a UNESCO site a country must adopt the exception to ensure the country will be able to adequately preserve sites on private property. Nevertheless, it is important to recognize that for an exception of this breadth to be effective, enforcers would have to prevent bad actors from extending the privilege in inappropriate ways, such as invading the privacy rights of citizens who own private land with no cultural site on it under the pretext of this exception.

As countries begin addressing drone privacy legislation gaps, one example of a potential application of this exception for the benefit of cultural preservation is that of “R.N.O. Vendicari” in Syracuse, Italy. The project employed drones to analyze the site’s management and erosion problems. Vendicari is a beach reserve with “great natural and landscape value,” but it is constantly studied due to the damage each summer from over 100,000 tourists. In the report archaeologists prepared, they discuss the details of the project’s operations. Notably, the report included that the drone flew both at a maximum height of 70 meters and 150 meters away from tourists in order to maintain the civilians’ privacy since those distances didn’t allow the

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190 See id.
191 See id. at 2.
193 See id.
194 See id. at 81.
drone to pick up recognizable faces or features.\textsuperscript{195} The surveyors’ inclusion of data on how they were respecting privacy indicates that Italy and the EU’s directives on drone regulation do implicate the privacy realm even if they do not have explicit privacy legislation. Most importantly, this example highlights that it is possible to use technology to preserve cultural sites while also respecting individual privacy rights.

However, while the current report was able to account for privacy concerns, one potential risk may be if Italy were to increase privacy legislation, holding that even setting appropriate flight heights is not sufficient to protect civilian privacy rights. In that case, highly populated sites like \textit{Vendicari} may be harder to survey with drones while not interfering with peoples’ privacy rights since they are taking photos and videos.\textsuperscript{196} If the privacy issue stems from population density, however, one solution may be to require tourists to sign a waiver consenting to potential invasions of privacy through videography or photography at times when archaeologists are surveying the site. Additionally, another option could be to simply close the beach to civilians during a surveillance period to ensure the drone does not violate privacy rights. However, this potential scenario demonstrates the value that an exception for using drones for preservation of cultural heritage sites could have in a future of increased drone privacy regulations.

Another case study of UNESCO directly employing drones which could be affected by future regulations is the site of the ancient city of Aleppo, Syria.\textsuperscript{197} Through the use of drones, UNESCO was able to publish “The Five Years of Conflict: The State of Cultural Heritage in the Ancient City of Aleppo,” which was the first time people were able to see the intense destruction of a world heritage site due to the conflict in Syria.\textsuperscript{198} Drones were able to capture the images of otherwise inaccessible areas which allowed archaeologists and historians to see that ten percent of the historic city was completely destroyed and over half was severely damaged.\textsuperscript{199} While the lack of framework for privacy laws allows the sites to be examined with almost no interference, it is

\textsuperscript{195} See id. at 83.

\textsuperscript{196} See id.


\textsuperscript{198} See id.

\textsuperscript{199} See id.
uncertain what the future could look like as countries begin to address specific drone privacy laws. One particular concern is without a broad exception applying to all UNESCO sites, there could be significant differences in cultural preservation between nations depending on a variety of factors ranging from corruption to economic stability.

While this Comment has focused on analyzing countries further along the demographic transition model (DTM), it is important to address the needs of countries who are labeled by the United Nations as least developed countries (LDC).200 Out of the four countries this Comment analyzed, though India may be in a lower stage of the DTM, none are considered an LDC.201 The United Nations determines LDCs based on three factors: income, human assets, and economic and environmental vulnerability.202 The UN General Assembly mandated the Committee for Development Policy (CDP) to employ these metrics because they “are methodologically robust, maintain stability of the criteria, ensure equal treatment of countries over time, and are frequently updated for all countries.”203 Additionally, countries have the opportunity every three years to graduate from the

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200 See Drew Grover, What is the Demographic Transition Model?, POPULATION EDUC. (Oct. 13, 2014), https://populationeducation.org/what-demographic-transition-model/ [https://perma.cc/XXX2-T8U8] (explaining how the Demographic Transition Model uses birth and death rate to analyze social and economic development in each country; specifically, countries move through five stages, with most developed countries in stage four, with countries having strong economies, high levels of education, higher rates of female workers, and fertility rates ranging around two children per woman, though DTM has limitations as it does not account for migration and it cannot predict the length of time it takes a country to move stages.).

201 See Developing Countries, WORLD DATA, https://www.worlddata.info/developing-countries.php [https://perma.cc/9XBZ-5DBU]. Specifically, this Comment analyzed the United States, Italy, and China, which are all in Stage Four of the DTM. Comparatively, India is currently in Stage Three.

202 LCD Identification Criteria & Indicators, UNITED NATIONS: DEP’T OF ECON. AND SOC. AFFS., https://www.un.org/development/desa/dpad/least-developed-country-category/ldc-criteria.html [https://perma.cc/G2B5-F9NT] (explaining the UN offers rationales for each factor: first, looking at income because “Gross National Income per capita provides information on the income status and the overall level of resources available to a country;” second, the human assets factor measures human capital, as having a low level of human assets “indicates major structural impediments to sustainable development;” third, the economic and environmental index means that high vulnerability indicates “major structural impediments to sustainable development;” ultimately, the index considers eight indicators ranging from imports and exports to percentage of remote or low-level lands.).

203 Id.
category.\textsuperscript{204} As it relates to cultural heritage, it is crucial to acknowledge that of the 167 countries home to a UNESCO World Heritage Site, thirty-one are labeled LDCs.\textsuperscript{205} From those thirty-one countries, there are seventy-five UNESCO sites out of the global total of 1,157 sites.\textsuperscript{206} Finally, from the fifty-five endangered sites worldwide, thirteen are from LDCs.\textsuperscript{207}

Thus, as countries acknowledge the need for drone-specific privacy laws, UNESCO creating a broad exception to allow drones on private property to survey cultural heritage sites may be a critical component to ensuring consistent World Heritage site preservation.\textsuperscript{208} As the UNESCO Foundation says, “a well-conserved natural and historic environment, based on traditional knowledge and skills, considerably reduces underlying disaster risks’ factors, strengthens the resilience of communities, and saves lives.”\textsuperscript{209} This indicates how individual cultures have global importance and consistent preservation should be a priority. Therefore, while drone-privacy regulations will become increasingly necessary, it will also be vital to advocate for protection for archaeologists’ appropriate drone use to preserve cultural sites just as the case studies of \textit{Vendicari} and \textit{Aleppo} illustrated.\textsuperscript{210}

While the future of drone privacy legislation is unclear, it is evident that drones significantly benefit cultural heritage preservation ranging from entering inaccessible locations to alerting government officials of illegal looting.\textsuperscript{211} Moreover, as sites like \textit{Aleppo} that reside in war-torn regions face increased risk of destruction, their reliance on drones to hasten their preservation demonstrates how urgent effective and comprehensive drafting of drone privacy regulations is. Thus, acknowledging potential legislation, learning from others, and preparing strategies for

\textsuperscript{204} See id.; \textit{Least Developed Countries: UN Classification}, \textsc{The World Bank}, https://data.worldbank.org/country/XL [https://perma.cc/4GYB-95AL] (showing that examples of countries classified by the UN as LDC are: Afghanistan, Nepal, Myanmar, Senegal, Uganda, and many more. In total, there are forty-six countries that are LDCs).

\textsuperscript{205} See \textit{Least Developed Countries: UN Classification}, supra note 204; \textit{World Heritage List}, supra note 21.

\textsuperscript{206} See id.

\textsuperscript{207} See id.


\textsuperscript{209} Id.

\textsuperscript{210} See id.

\textsuperscript{211} See Kersel, supra note 51, at 314.
protecting drone use in certain private spaces is crucial in the fight to preserve some of the world’s most treasured places.

V. CONCLUSION

As global leaders from UNESCO and the WMF recognize the vital importance of protecting the world’s natural and cultural phenomena, drones have become an irreplaceable tool.212 However, the role of drones in cultural heritage preservation grows increasingly complicated due to countries’ differing legal frameworks.213 Through analyzing four countries with the world’s most UNESCO sites, this Comment has identified significant drone privacy policy gaps in each country.214 As drones become vital for accurate and efficient preservation, these policy gaps create uncertainty for future researchers.215

Specifically, as countries develop new privacy restrictions for drone use, the rate and consistency of UNESCO site preservation across the world could vary significantly depending on the intensity of differing privacy laws.216 As a respected world organization, UNESCO has a unique advantage to advocate for uniform global protections for drone use for preservation purposes.217 Either through countries agreeing to employ a uniform exception to their privacy laws for drones helping to preserve their cultural heritage or UNESCO requiring a variation of the exception for official site recognition and funds, now is the time for UNESCO and preservationists to protect appropriate drone use for the preservation of our collective human culture.218

While this Comment analyzed potential routes to safeguard cultural heritage preservation’s drone use, the research is not complete.219 Due to how recent drone technology advancements are, it is necessary for there to be more investigations regarding the tension between privacy rights and preservation efforts.220 Because privacy violations are so serious, the true efficacy of allowing a complete exception for preservation efforts

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212 See UNESCO in Brief, supra note 2.
213 See id. at 17.
214 See id.
215 See Lee, supra note 3, at 7.
216 See id.
217 See World Heritage and Sustainable Development, supra note 208.
218 See id.
219 See id. at 39.
220 See Lee, supra note 3, at 1.
remains a question.\textsuperscript{221} Thus, while research continues, UNESCO ought to advocate for protection for the benefit drones offer preservation, and lawmakers should consider the importance of consistent and accurate preservation when creating new drone privacy regulations.

\textsuperscript{221} See id.