

# Federal and State Land Acquisition in Hawaii: Conservation in the Epicenter of Extinction

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## Abstract

The Land and Water Conservation Fund Act of 1965, reinstated in 2018 through the John D. Dingell, Jr. Conservation, Management, and Recreation Act, provided the United States Federal Government the ability to acquire and fund land acquisition for the purpose of preservation, development, and public enjoyment. In 2005, the state of Hawaii passed Act 156 which was later amended by Hawaii Revised Statutes §173A. Established through this legislation is a land conservation fund providing the state government of Hawaii analogous land acquisition abilities to that of the federal government. It is through these laws that the federal government and state of Hawaii can reinforce the conservation of the fragile Hawaiian tropical rainforest ecosystem. This paper will identify discontinuities as well as opportunities in the implementation of this legislation to provide recommendations to improve the ability of both state and federal government to protect and conserve at risk ecosystems and lands like those present in Hawaii.

## Keywords

Hawaii, Endemism, Extinction, Land Conservation, Public Policy

## 1. Introduction

Pursuant to 43 USCS§1715(a), the federal government is permitted to purchase, receive through donation, or acquire through eminent domain lands to be held in public ownership. States otherwise retain exclusive power over land titles, land transfers, and inheritance [1]. Signed into law on September 3<sup>rd</sup> of 1964, the Land and Water Conservation Fund (LWCF) Act of 1965 promotes the preservation, development, and accessibility of outdoor recreation resources by the American people through funding federal land acquisition ([2], §1(b)). Hawaii Revised Statutes (HRS) §173A provides for state acquisition and management of

lands which have natural, environmental, recreational, scenic or historic value through the establishment of a conservation fund ([3], §173A-1). Through distinct public policies, the federal government and Hawaiian state government can regulate and fund land acquisition in Hawaii. Notably, both public policies place acquired land in protected, public ownership as a conservation strategy.

Hawaii is the only state within the United States that contains tropical rainforests. Within the Hawaiian tropical rainforests, there exists an amalgamation of biological peculiarities which contributes to a fragile ecosystem. In this context, there exists a need by both the federal and state government to preserve the ecological integrity of the tropical rainforests found in Hawaii. Many land conservation advocates desire to see government action to protect ecologically valuable lands; however, conservation initiatives must align with social, environmental, and economic features of a landscape for benefit to be equally received [4]. An effective conservation program should satisfy those cognizant of the intrinsic value of an ecosystem as well as those concerned with social benefit. Land conservation is a dynamic process which first requires an extensive understanding of ecological interactions [5]. Through a foundation in ecological understanding, conservation policy can be appropriately written and implemented to mitigate deleterious effects associated with ecological alterations.

This policy analysis first summarizes the ecological impact of the Hawaiian tropical rainforests. It is the objective to outline the extinction crisis occurring in Hawaii as well as the ecological stressors jeopardizing the future of tropical rainforests in Hawaii. Through an examination of these environmental concerns, conservation advocates will be better equipped to utilize the language already present in the LWCF Act of 1965, superseded by its amendments as well as the John D. Dingell, Jr. Conservation, Management, and Recreation Act (Public Law 116-9), and HRS §173A to best provide conservation resources for the Hawaiian tropical rainforests or amend language found within these policies that is disagreeable to the conservation initiative.

Part III procures a legal analysis of the amended LWCF Act of 1965, Public Law 116-9, and the HRS §173A. The third part of this legal analysis conducts a comparative evaluation of the state and federal policies which will further expand the legal analysis of each. The framework for the comparative evaluation will consist of examining the funding structure of each bill as well as its respective capacity to assess the effectiveness of land management techniques post acquisition.

Part IV summarizes the historical background of the annexation of Hawaii as first a territory of the United States in 1900 and then as a state in 1959. The use of historical context will be later used in Part VI of this policy analysis to aid in the analysis of the current form of the LWCF Act of 1965 which is Public Law 116-9 and HRS §173A past and present ability to protect and conserve at risk ecosystems and lands like that of the Hawaiian tropical rainforests while continuing to provide benefit to the state and federal economy.

## 2. Methods

To begin, this work draws upon Evolutionary Theory as described by John in *Analyzing Public Policy*. Evolution, in the biological sciences as well as in political science, is considered in terms of survival, in gene or thought, and not as the competitive struggle for the fittest form [6]. While it is understood that Evolutionary Theory generates causal explanations rather than descriptions, it is recognized research in ecology and public policy, especially in relation to Hawaii, is limited. Barasko *et al.* [7] recognize that causality cannot be supported without description. Therefore, this piece seeks to establish a description of the relationship between ecology, land conservation, and public policy in Hawaii while forwarding some modest suggestions for areas of improvement. Further research may then investigate these suggestions within the context of causality and Evolutionary Theory.

## 3. An Ecological Perspective

In consideration of land conservation in Hawaii, it is beneficial to first examine the state from an ecological perspective. Forests are supported in a wide range of environments across Hawaii. Over 18% of land cover present on the main islands of Hawaii are “wet” or tropical rainforests—a larger area cover than dry and mesic forests combined [8]. The tropical rainforest is the most diverse and productive biome on earth. Over half of the total number of species of plants and animals found anywhere on earth are found either exclusively or mainly within the tropical rainforest biome [9].

Unique to Hawaii is the endemic nature of many species contained in the tropical forests across the islands. There are over 10,000 species native to Hawaii, 90% of which can be found nowhere else on the planet [10]. The prominence associated with the endemism found in Hawaii is contributed to the isolated, archipelago arrangement of the land in addition to land area and geologic age [11].

Habitat availability, closely related to the concept of land area, is identified as the primary threat associated with extinction. Loss of biodiversity, broadly assessed through species extinction, has become an increasing problem as humans have continued to alter the environment [12]. The extinction of a singular species causes the inexorable loss of all interactions in which they are involved. Taxonomic knowledge, or therefore lack of, has been identified as an impediment in many conservation initiatives taking place in tropical regions. There exists an inadequate amount of research available on the distribution of native and alien species as well as their evolutionary history [13]. A lacking understanding of the ecological role maintained by each endemic species jeopardizes the loss of an unannounced keystone interaction. When viewed from the perspective of ecological interaction extinction, the loss of biodiversity can be seen to have an accelerated effect of degeneration on an ecosystem—ultimately leading to collapse [14]. It has therefore been established that marine species face a significant

threat as a result of biodiversity loss; however, there is no evidence that this crisis is affecting the oceans to the same extent as the land. In particular, island species, such as those of the Hawaiian Islands, are much more affected than continental species [15].

Concluded by the World Conservation Monitoring Centre, the two major challenges present in species conservation is the preservation of intact habitat and prevention of invasive species introduction [16]. In remote archipelagos, like that of the Hawaii, invasive species present much greater consequences for native biota. It is estimated that 3046 arthropods, 20 reptiles, 46 land birds, 19 mammals, and 927 plant species, all of nonnative origins, have been introduced and have become established in Hawaii [11]. The United States National Park Service has reported the establishment of many of these species has come at the cost of the native species that remain largely outcompeted [17]. Research in Hawaii suggests that invasive species possess the ability to expand their range when faced with novel conditions [11]. This has caused monumental devastation with few measures proving effective in the control of these invasive species.

Human alteration through colonization, deforestation, and crop cultivation influences the loss of native habitat while introducing new threats to the few, fragile native ecosystems that remain in Hawaii [18]. Low resilience is demonstrated by tropical rainforests as nutrient poor soils leave this ecosystem vulnerable to inadequate resilience despite conservation efforts [19]. However, assisted conservation has shown, in regards to the removal of ungulates, reduction in non-native plant cover and regeneration of ecosystems analogous to the original, native ecosystems. Regeneration of natural conditions once fostered within an ecosystem often requires a period of time comparable to the time in which degradation was endured [20]. The accomplishment of such an initiative requires conservation strategies combining evolutionary and ecological dynamics as well as recognizing the dynamic nature of natural systems [11]. It is thus paramount that the public policy implemented by the state and federal government parallels these objectives in order to best protect this habitat.

#### **4. Federal and State Legislation**

Thereupon, the analysis of state and federal policy on land conservation in Hawaii includes the assessment of HRS §173A and Public Law 116-9. Relatively analogous are the policies of HRS §173A and Public Law 116-9; however, distinct histories influence the conservation initiatives promulgated by each. Conservation is delineated in Hawaii's Constitution in Amendment X as a charge of the state [21]. It is therefore intuitive that proceeding acts of the legislation would carry out this initiative within the multifaceted scope of conservation. The LWCF Act of 1965, contrarily, came as a recommendation of the Outdoor Recreation Resource Review Commission [22]. The resulting legislation was the conclusion of proposals by Joe Penfold who was renowned for his influence on federal government conservation initiatives [23]. Various legislations have cul-

minated in these conservation policies that fund land conservation. Within these policies, power is lent to conservation initiatives that place land in the public domain. Legal analysis of HRS §173A provides an assessment of the effectiveness of state land management techniques whereas examination of the LWCF Act of 1965, its amendments, and Public Law 116-9 contributes to the understanding of federal land management.

#### 4.1. Legal Analysis of Hawaii Revised Statutes §173a

Land use in the State of Hawaii is regulated through the Hawaii State Planning Act of 1978. Land use regulation serves to support the economy, the physical environment, and the society of Hawaii ([24], §226-4). Pursuant to HRS §173A-1, land use laws are able to regulate the use and development of lands determined to have natural, environmental, recreational, scenic, or historic value. State acquisition, funded through HRS §173A, places these lands in the public domain. The expansion of public accessibility to natural resources is outlined as an objective in the Conservation Lands Functional Plan [25]. Land acquired as a resource to the State can be classified beyond recreation and still fulfil the requirement of serving a public purpose which would include:

- 1) Watershed protection
- 2) Coastal areas, beaches, and ocean access
- 3) Habitat protection
- 4) Cultural and historical sites
- 5) Recreational and public hunting areas
- 6) Parks
- 7) Natural areas
- 8) Agricultural production
- 9) Open spaces and scenic resources ([3], §173A-5(g)).

Noted in §173A-2.6 are land features also taken into consideration and prioritized by the state for potential acquisition. Regarded is the ability of these features to contribute to society through public purpose making it worthwhile to acquire by the state:

- 1) Lands having exceptional value due to the presence of:
  - a) Unique aesthetic resources
  - b) Unique and valuable cultural or archaeological resources
  - c) Habitats for threatened or endangered species of flora, fauna, or aquatic resources
- 2) Lands that are in imminent danger of development
- 3) Lands that are in imminent danger of being modified, changed, or used in a manner to diminish its value
- 4) Lands providing critical habitats for threatened or endangered species that are in imminent danger of being harmed or negatively impacted
- 5) Lands containing cultural or archaeological sites or resources that are in danger of theft or destruction

6) Lands that are unique and productive agricultural lands ([3], §173A-2.6).

Land acquisition by the state government is made possible through the Land Conservation Fund (LCF). Proceeds from general obligation bonds, revenue from land operation, tax collection, and private contributions are addressed and distributed through this fund ([3], §173A-5). In addition to the purchase of fee titles or permanent conservation easements, the LCF is able to support payment on debt service relating to land interests or rights; annual administration costs; and land maintenance costs. It is stipulated that administration and maintenance costs may not exceed five percent of annual fund revenues of the previous year ([3], §173A-5(h)).

Through the LCF, state or county agencies as well as nonprofit land conservation organizations may be the recipient of grant monies that support the acquisition of land. County agencies or nonprofit land conservation organizations awarded grants are obligated to provide matching funds of at least twenty-five percent of the total project costs ([3], §173A-5(j)). Land sold, leased, rented, or disposed of by any state agency, county, or nonprofit land conservation organization is required to direct a portion of the proceeds equal to the original grant awarded by the state to the state. These proceeds will be redeposited or credited to the LCF.

State acquired land under Hawaii Revised Statutes §173A-8 allows for the potential approval of land development. Land development must be consistent with the regulation set forth by the Hawaii State Planning Act. Development includes 1) any building or mining operation; 2) any material change in use, intensity of use, or appearance of any structure or land; or 3) the division of land into two or more parcels ([3], §173A-10).

#### **4.2. Legal Analysis of Public Law 116-9**

On September 3<sup>rd</sup> of 1964, the LWCF Act of 1965 was passed by the 88<sup>th</sup> United States Congress Assembled ([2], §1(a)). It was the intent of this Act to promote the preservation, development, and accessibility of outdoor recreation resources for present and future citizens of the United States of America ([2], §1(b)) [22]. This initiative was promulgated by funding and authorizing federal assistance to 1) state-initiated planning, acquisition, and development of needed land, water areas, and facilities as well the 2) federal acquisition and development of certain lands and other areas ([2], §1(b)).

It is in §2 of the Act that it is specified that revenue from (a) entrance and user fees of federal lands, (b) surplus property sales, and (c) motorboat fuel tax support the fund. Expenditures from this fund are appropriated by Congress. This language was amended in 1968 with the authorization of the appropriation of the amounts necessary to make the income of the fund not less than \$200,000,000 for five fiscal years ([26], §2(c)(1)). The difference is provided through revenues received from the amended Outer Continental Shelf Lands Act ([26], §2(c)(1)). This act allows for revenue received through the leasing of land on the outer

continental shelf to contribute to federal land acquisition ([26], §2(c)(1)). Further amended in 1970, not less \$300,000,000 may be apportioned to the LWCF through fiscal year 1989 ([27], §1(a)). In 1977, funding apportionments to the LWCF was further increased to \$900,000,000 for the fiscal year 1978 and thereafter ([28], §1(1)).

The LWCF Act of 1965 expired in 2015. Through 54 U.S.C. §200301, the fund was extended through 2018. Public Law 116-9, passed in 2019, permanently reinstated the fund ([29], §3001(a)(2)). Earlier provisions made through the amendments of the LWCF Act of 1965 and 54 U.S.C. §200301 were maintained through the language found in Public Law 116-9.

On August 4<sup>th</sup> of 2020, the Great American Outdoors Act was signed into the law. This act permanently establishes appropriations of no less than \$900,000,000 to the Land and Water Conservation Fund. These revenues are received from oil and gas leases made available through the Gulf of Mexico Energy Security Act of 2006 ([30], §200303(b)). This yearly appropriation to the Land and Water Conservation fund is in addition to the revenues received from (a) entrance and user fees of federal lands, (b) surplus property sales, and (c) motorboat fuel tax as well as oil and gas leases on the Outer Continental Shelf (OCS) ([30], §200303(b)).

It was first specified in the LWCF Act of 1965 that appropriations to state and federal programs are made available in the ratio of 60 percent and 40 percent, respectively ([3], §4(a)(i)). The President was able to adjust the percentage appropriation to meet the current and relative needs of the states and the federal government ([3], §4(a)(i)). Since the inception of this act, a total of \$18.4 billion has been appropriated. Presidential discretion has contributed to disproportionate appropriations with federal land acquisition projects receiving 61 percent of allocations. The state grant program has received 25 percent of the associated allocations with 14 percent being dedicated to other purposes [31]. When 54 U.S.C. §200301 first reinstated the LWCF, specifications were made to provide states funding under the following formula.

1) Forty percent of the 1<sup>st</sup> \$225,000,000; 30 percent of the next \$275,000,000; and 20 percent of all additional appropriations shall be apportioned equally among the states.

2) At any time, the remaining appropriation shall be apportioned on the basis of need to individual states by the Secretary in such amounts as in the Secretary's judgment will best accomplish the purposes of this chapter. The determination of need shall include consideration of

- a) the proportion that the population of each state bears to the total population of the United States
- b) the use of outdoor recreation resources of each state by persons from outside the state
- c) the federal resources and programs in each state

3) The total allocation to a state under paragraphs (1) and (2) shall not exceed 10 percent of the total amount allocated to all of the states in any one year ([32],

§2003).

It was additionally acknowledged no less than 40 percent of such appropriations shall be available for federal purposes ([32], §200304).

Through the reinstatement of the LWCF through Public Law 116-9, no less than 40 percent of fund apportionments for federal purposes as well as no less than 40 percent of fund apportionments for financial assistance to states shall be made available ([29], [3], §3001).

State recipients of monies from the Fund are stated to be for the purposes of 1) planning, 2) acquisition of land, waters, or interests in land or waters, or 3) development ([32], §200305(a)). It is required that funds received by a state must cover no more than 50 percent of the total cost of planning, acquisition, or development of the project ([32], §200305(c)). A state receiving funding for a project must commit to the maintenance of the project, facilities or developed lands after the completion of the project. Maintenance is the expense of the state ([32], §200305(f)).

Federal recipients of monies from the LWCF are stated to be for the purposes of acquisition of land and water or contribute to the payment of capital cost offset ([32], §200306(a)(3)). Capital cost offset is defined as payment allotted to capital costs occurred from federal water development projects authorized or constructed pursuant to the passing of 54 U.S.C. §200301. Federal projects unrelated to the water and not commenced prior to the passing of this act are restricted in scope. These projects must relate to the acquisition of land and water and advance or support the following agencies or initiatives:

- a) system units and recreation areas administered for recreation purposes
- b) national forest species
- c) endangered species and threatened species; fish and wildlife refuge areas; national wildlife refuge system ([32], §200306(a)(3)).

## 5. Hawaii-Historical Context

In addition to the procurement of an analysis of the state and federal public policy governing land conservation in Hawaii, the provision of historical context in relation to Hawaii and the use of its land resources is provided. Hawaiian culture flourished after the arrival of ocean-voyaging Polynesians beginning in 1200 A.D. and continuing through 1400 A.D [33]. Paleoclimate data supports that the cession of variable conditions that allowed for ideal sailing prior to 1500 A.D. led to almost complete isolation of the Hawaiian Archipelago for almost 400 years [34]. It was during this time that a sense of reciprocity, comparable to that of feudal law, shaped land usage among the inhabitants of Hawaii [35]. This land usage system was also influenced, in part, by Native Hawaiian belief in environmental gods. Native Hawaiians were stewards of the land as each individual, including the chiefs as well as the high chief, were all responsible for the careful cultivation of the land and sea. In turn, these natural resources would provide food and other goods for society and sustain the propagation of the next genera-

tion. This social commitment is succinctly described by the Hawaiian phrase, “care for the land, care for the sea” [36].

Native Hawaiians are recognized for their broad agricultural developments associated with crop cultivation despite diverse climate, altitude, weather, substrate, and exposure. It is well documented the use of *lo'i* (wetland) and *māla* (dryland) agricultural techniques in Hawaiian culture [37]. Many crops, such as taro, sweet potatoes, bananas, breadfruit, and coconuts, arrived with the Polynesians that first settled the islands. These crops were cultivated as staples of the Hawaiian diet [38]. Astute agricultural practices increased nutrient cycles associated with forests and increased moisture which contributed to large variations in the crops produced [39]. In this regard, as recognized in the book *Native Planters in Old Hawai'i*, “Hawaiians were truly experimental horticulturalists” [40].

Agriculture influenced the physical structure of Hawaiian society which too reflected feudal law. Chiefs ruled over *ahupuaa* or tracts of land that ran from the mountains to the beach [41]. Commoners had their own plots they worked as well as shared lands they were responsible for cultivating. Crop yields were relinquished to the presiding chief. Subchiefs and land agents were additional actors with an *ahupuaa*. A high chief managed islands which were typically composed of multiple *ahupuaa*. The death of a high chief could engender the changing of *ahupuaa* leadership. Land was not held in fee simple absolute which afforded no inheritance [35].

In 1778, Captain James Cook, an Englishman renowned for his oceanic explorations and pursuit of a passage between the Pacific and Atlantic Ocean, landed on the shores of Kauai, Hawaii [42]. The arrival of Captain Cook to the Hawaiian Islands marked the first of a procession of Westerners that would follow [43]. By 1795, western influence aided in the unification of Hawaii, excluding Kauai, under King Kamehameha I [44]. Accordingly, Hawaii underwent significant social changes as the economy shifted from dependence on subsistence agriculture to supplying goods in international trade [45]. One of the most prominent demonstrations of Hawaii's burgeoning industrial culture included the sale of sandalwood. *Circa* 1810, Kamehameha I established a trade contract with foreigners to sell the once prized wood in a distribution center in Guangzhou, China. After the death of Kamehameha I, strained political relations led to the near collapse of the monopoly he had built [43].

It was the accession of Kamehameha III to the throne that brought stability to the kingdom through the passing of legislation favorable to Western capitalism. Land tenure supported the industrial efforts of Westerners while maintaining the monarchy's ownership of the land. Problems arose when chiefs began to cede land usage to Westerners without express approval of the crown and when Western initiatives displaced Native Hawaiian labor. The Constitution of 1840, sought to mend this growing divide [35]. In spite of this, the Constitution of 1840 led the way for land leases to arise between the crown and foreign operations. In fear that foreign operations would eventually leave Native Hawaiians landless, the Kuleana Act of August 1850 established private land ownership. In

plots of one to fifty acres, Native Hawaiians could hold their land in simple fee with rights over their harvest [36]. This became known as the “Great Mahele”—or division. Although restrictions were placed on those who initially qualified for *kuleana*, laws allowing for non-native individuals to purchase or hold land in simple fee sanctioned the sale of large tracts of government land. Less than 30,000 acres, equivalent to approximately 1% of the land, was owned by Native Hawaiians while the remainder was held by government entities. By 1852, thousands of acres of prime Hawaiian land were owned by foreigners [35].

The onset of the American Civil War in 1861 prompted cession of sugar cane supplied by Louisiana. Hawaiian sugar cane soon became an attractive import to the United States [46]. Sugar cane was introduced to the Hawaiian archipelago in the 10<sup>th</sup> Century A.D. when it is estimated that Polynesians first arrived [40]. Cultivation by Native Hawaiians had taken place since; however, it was not until the Kuleana Act of 1850 that large, Western plantations began emerging. The Reciprocity Treaty of 1876 granted Hawaiian sugar entry to the United States duty-free which further fueled American industrialization efforts of sugar cane on Hawaiian soil [35]. Quickly, sugarcane became a dominant force within the economy of Hawaii. Incorporated American sugarcane ventures held over \$22,459,610 in stock, while unincorporated American ventures held \$2,276,000 in stock [46]. American corporations, however, were not the only foreign companies to exploit Hawaii’s ideal climate for growing sugarcane. **Table 1** and **Table 2** provide detailed accounts of Hawaiian sugarcane stock held by other foreign corporations as well as by Native Hawaiians and American ventures. As demonstrated in **Table 3**, Native Hawaiians owned less than 1% of the total

**Table 1.** Incorporated stock held in sugar corporations in Hawaii according to nationality *circa* 1892 as tabulated by the U.S. Treasury Department [47].

Ownership	Dollars
American	22,459,610
British	4,433,130
German	834,600
Native Hawaiian	266,250
Other Nationalities	299,100
<b>Total</b>	<b>28,292,690</b>

**Table 2.** Unincorporated stock held in sugar corporations in Hawaii according to nationality *circa* 1892 as tabulated by the U.S. Treasury Department [47].

Ownership	Dollars
American	2,276,000
British	1,605,000
German	1,174,000
<b>Total</b>	<b>5,055,000</b>

**Table 3.** Total stock held in sugar corporations in Hawaii according to nationality *circa* 1892 as tabulated by the U.S. Treasury Department [46] [47].

Ownership	Dollars	Percent
American	24,735,610	74.17
British	6,038,130	18.11
German	2,008,600	6.02
Native Hawaiian	266,250	0.80
Other Nationalities	299,100	0.90
<b>Total</b>	<b>33,347,690</b>	<b>100.00</b>

market share in sugarcane production while American industry had captured over 74% of the market by 1892 [46] [47]. American industrialization forced the adoption of monocultural agricultural practices. This trend can be observed in the growth in total area of land associated with sugar cane production which increased from 10,260 acres in 1870 to 128,000 acres in 1900 [46].

As the turn of the millennium was approaching, conversations began emerging on the annexation of Hawaii as a territory with sugar cane production as the predominant motivation. Associated with these interests was the “down-town” party which was composed of sugar planters and proprietors [48]. On July 6<sup>th</sup>, 1887, the reign of the Hawaiian monarchy came to an end with the signature of the king on what became known as the “Bayonet Constitution.” [35] Signed under duress, this Constitution stripped the monarchy of its power [48]. Hawaii was officially a territory annexed by the United States in 1900 with the U.S. Minister to Hawaii, John Stevens, receiving much of the credit for organizing the coup in 1887 that overthrow the monarchy of the Kingdom of Hawaii. Fifty-nine years later, Hawaii would become the 50<sup>th</sup> state admitted to the Union by the United States Congress [49].

Post annexation, the sugarcane industry exploded. From 1900 to 1920, total acreage of sugarcane expanded from 128,000 acres to 236,500 acres [50]. Likewise, the average plantation size in the years prior to 1900 and continuing forward demonstrated significant growth in the required labor force on plantations [46]. Congress took its first steps towards Hawaiian land conservation in 1916 through the passing of The Act of August 1, 1916 titled “An Act to Establish a National Park in the Territory of Hawaii.” This act recognized a portion of land located on the main island as a public park under the direction of the United States Congress. In the years following, numerous additional acts have been passed by Congress to further establish more land as national parks. These acts have also implemented a management system as well as funding system [51]. There are currently two federally established national parks in Hawaii. Volcanos National Park is located on the main island, Hawaii, while Haleakalā National Park is located on the island of Maui.

National Parks are one of numerous ways the federal government can set

aside land for public use. Historical sites and national trail systems are additional land designations among a host of others [51]. Determining how land is labeled by the government is dependent on the written language of the policy. Land designations impacts not only the size of the public land that is set aside but also the funding opportunities for maintenance of that land [51].

*Kuleana* rights remain a salient issue in Hawaii. A great deal of *kuleana* land once awarded to Native Hawaiians has since changed title from the families of the original *kuleana* holders [45]. This is a result of two notable situations which includes the inability to identify natural landmarks demarcating *kuleana* lands and third-party acquisition through adverse possession [35].

There does exist the ability for the state and federal government to intercede and address *kuleana* rights and conservation within Hawaii. Despite the establishment of two national parks among an array of historical sites and national trail systems, it important to recognize the persistence of the extinction crisis occurring in the Hawaii. This perpetuation of extinction despite the establishment of protected areas implies the existence of a larger problem-the fragmentation and scale of the protected lands. Habitat fragments present amongst these lands are too small and dispersed to support a constituent species. Over time, these parcels of protected land will lose their constituent species ultimately failing to conserve the native ecosystems once present [52].

## 6. Policy Opportunities

Synthesis of the above analyses concludes extinction is not a disease; it is a symptom. The disease plaguing Hawaii is multifaceted incorporating both biodiversity loss and ecosystem collapse. This disease is not isolated to Hawaii. However, the idiosyncrasies of the Hawaiian tropical rainforests, its comorbidities, make it especially susceptible to this disease process which is why its effects can be seen so prominently on this island state. As previously stated, the endemic nature of many species found in Hawaii is notable [10]. Endemism is multi-dimensional which means its effects are demonstrated across space, time, gene pattern, and trophic levels [53]. As a result, detrimental modifications made to Hawaiian ecosystems through the introduction of invasive species and habitat loss or fragmentation can and have caused pervasive devastation. It has even been suggested that human disturbance enhances the success of invasive species colonization [54]. Because the isolated nature of the Hawaiian archipelago has lent to the evolution of profound organisms and ecosystems, isolated instances of disturbance can have observable impacts across the entirety of an ecosystem effecting both biotic and abiotic elements in various magnitudes.

The purpose of this paper, therefore, is to provide an assessment of the effectiveness of state and federal land management in contributing to conservation of at-risk ecosystems and lands like that of the Hawaiian tropical rainforests. There are two policies, one federal and one at the state level, Public Law 116-9 and HRS §173A, respectively, that will be compared and analyzed. The evaluation of these

policies will be guided by ecological data as effective conservation policy must properly reflect the characteristics of the land and the culture of the people residing there.

Public Policy 116-9 as well as HRS §173A advocate for the preservation and development of ecologically and socially important land. Through these initiatives, it is promoted the accessibility of these resources to the American public. Recreation is cited as a fundamental objective of each land acquisition program ([3], §173A-1) ([29], §3001(b)(2)). Protected networks such as national parks do pose a difficult dilemma, however, in that they possess a characteristically high number of invasive, non-native flora [55]. It is found by the National Park Service that human-introduced invasive species cause deterioration of the Hawaiian landscape [17]. Protected lands cannot effectively lend to conservation initiatives if they propagate invasive species that threaten the existence of native or endemic species. Nonetheless, it is recognized the importance of public accessibility to natural, outdoor resources in encouraging health, well-being, positive emotions, attitudes, and behavior [56]. Again, it is also the objective of both these public policies to promote public recreation ([3], §173A-1) ([29], §3001(b)(2)). Recommended, therefore, is that assessment of conserved habitats is made a necessary requirement included in the language of all conservation land acquisition legislation [13]. Such language would require incremental, scientific evaluations of the ecological integrity of the land purchased and managed. This would ensure the conservation strategy of government land acquisition is, indeed, effective. It would additionally recognize the land held by the government as a dynamic habitat with the capability of undergoing change through time. This is not a revolutionary concept but one that has been recommended previously within the field of ecology [4].

It is noted in HRS §173A that public land that is purchased through funding provided by the LCF has the ability to be developed. These developments can include 1) any building or mining operation; 2) any material change in use, intensity of use, or appearance of any structure or land; or 3) the division of land into two or more parcels ([3] §173A-10). A lack of secure tenure administration is associated with extensive cultivation and extractive practices which lead to ecosystem destruction [57]. In order to best protect Hawaiian tropical rainforests, developments must be further specificized and limited beyond the regulations introduced through Hawaii land use laws ([3], §173A-8). In 54 U.S.C. §200301, land leases are not specifically authorized, however, use of funds for development purposes are ([32], §200305(a)(3)). Ambiguous use of development, too, introduces the possibility of land degradation. A requirement of conserved habitat assessment in both HRS §173A and Public Law 116-9 would also contribute to negating the potential risk posed by developments that can occur on the land as permitted in both acts.

It is important to note the propagation of invasive species is not solely limited to human introduction through visitation to public conservation lands. Climate

alternations have also demonstrated impacts on invasive species through changes in distribution [58]. Evidence suggests offshore drilling lends to these climatic changes as well as has deleterious effects on marine communities, wildlife refuges, and coastal wetlands [59]. Public Law 116-9 utilizes funding from outer continental shelf oil and gas leases which is generated through the Outer Continental Shelf Lands Act in addition to drilling leases provided through the Gulf of Mexico Energy Security Act of 2006 as made available by the Great American Outdoors Act ([30], §200303(b)). It is beneficial that money being generated from these funds goes towards environmentally friendly initiatives such as the Land and Water Conservation Fund, however it does not necessarily cancel out the effects of drilling, especially since quantifying ecological impact for comparison is nearly impossible. It is suggested that funding the Land and Water Conservation Fund through monies not gained through offshore drilling may lend to better conservation outcomes as well as a reduced need for the government to acquire such lands for conservation purposes.

HRS §173A derives funding for the state of Hawaii LCF from general obligation bonds, revenue from land operation, tax collection, and private contributions ([3], §173A-5). Funding not derived from oil and gas leases is provided through §3(a) of the Great American Outdoors Act to 54 U.S.C §200303(b), subsequently Public Law 116-9, for the federal LWCF ([30], §200303(a)). The LCF has been subject to a great deal of fluctuations in funding similar to that seen in the early years of the implementation of the LWCF prior to funding being made available by offshore oil and gas leases. This demonstrates the impact outer continental oil and gases leases can have in increasing available funds and reducing fund volatility. The necessity of these funds can be questioned, however, in that less than half of the \$40.0 billion in total revenues that have accrued in the LWCF have been appropriated (\$18.4 billion) [31].

Public Law 116-9 as well as HRS §173A differ in funding recipients. Public Law 116-9 has the capability to provide both state and federal entities funding ([3], §173A-5(j)). HRS §173A is able to provide funding to state or county agencies as well as nonprofit land conservation organizations ([2], §4(a)(i)). It would be of value to incorporate the ability for non-profit land conservation organizations to also apply for and receive monies through the LWCF as non-government organizations have been recognized by the United Nations for well over a decade as essential to environmental protection [60]. Through allowing non-government organizations to also participate in these activities it would further support the initiative set forth in this act which includes the promotion of preservation, development, and accessibility of outdoor recreation resources ([2], §1(a)).

In present day, a small group of large landowners along with the state and the federal governments control the majority of land in Hawaii [61]. It was during the Great Land Division over 150 years ago that land privatization began in Hawaii. It was through the transition from feudal law to private land ownership that 70 percent of the original inhabitants of the Hawaiian islands were left

landless [36]. To this day, Native Hawaiians are of the belief a land base is required to live a traditional way of life as native culture is largely linked to the land [62]. Cooperation between conservation land trusts and *kuleana* has been suggested to provide broad benefits to both indigenous culture as well as conservation initiatives [63]. HRS §173A provides a reasonable platform of collaboration for the incorporation of native stewardship into the land conservation initiative ([3], §173S-4(c)). Extending *kuleana* to conservation initiatives would also assist HRS §173A in habitat connectivity which has been identified as a strength of Public Law 116-9. Public Law 116-9 tends to see government acquired land be utilized by the National Park Service to extend park boundaries [31]. It has been suggested that the conservation of island biodiversity, demonstrated through genome diversity as well as species diversity, requires the expansion of already existing protected lands. Habitat fragmentation, typically associated with human impact, leaves species threatened by inadequate resources. Protected habitat can further protect the species present if acquired conservation lands increase the area of already protected conservation networks [58].

## 7. Conclusion

In conclusion, Public Law 116-9 and HRS §173A lay the foundation for government land acquisition. However, it has long been called for by the ecology community for public policy to consider scientific findings in order to better protect the valuable resource that is habitat. The archipelago structure of the state of Hawaii lends to the manifestation of unique biological phenomena such as endemism. Disturbances, therefore, produce notable impacts in Hawaiian ecosystems, especially in tropical rainforests. Analysis of Public Law 116-9 and HRS §173A suggests public accessibility and utilization of oil and gas leases to fund the federal LWCF endangers the habitat conserved through government land acquisition. The modification of revenue sources for the LWCF in addition to expanding potential recipients of grants to non-governmental organizations may enhance the ability of the LWCF to conserve land. Incorporating Hawaii's historical land use laws into governing language of the LCF may better conservation efforts while supporting the native community. Edited in combination, Public Law 116-9 and HRS §173A possess the ability to protect and conserve at risk ecosystems and lands like that of the Hawaiian tropical rainforests while continuing to provide benefit to the state and federal economy.

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## Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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