

# One island, two worlds

A comparative political ecology of deforestation disparity  
causes in Haiti and the Dominican Republic

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# Abstract

On the Caribbean island of Hispaniola, two countries share the same environmental and climatic pre-conditions, but show monumental differences in current forest-cover. While tropical forests are covering almost half of the Dominican Republic, Haiti is down on just a few percent. In this thesis, political ecology and earlier research is combined to formulate four hypotheses: colonial history, human development and demography, local institutional context, and energy. The hypotheses are tested against a timeframe compiled from temporal data on Hispaniolan forest-cover and compared in a dynamic case-study approach design. The approach was inspired by Mill's logic of inference, causal case-study criteria, process-tracing and the dynamic-comparative case study method. By asking what factors that explain the difference in forest-cover in the Dominican Republic and Haiti, and how they affect the countries' forest-cover, the thesis aims to contribute to the general understanding of deforestation and the interaction between society and nature.

The study finds that the current forest-cover disparities stems from a development in the 1980-90's, and that the policy, project approaches and norm changes within local institutional contexts matches and precedes the development of the forest-cover. Economic incentives and participatory approaches in reforestation projects are shown to have a positive effect.

*Key words:* Political ecology, deforestation, dynamic case-study approach, Haiti, Dominican Republic

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# 1 Introduction

“What we are doing to the forests of the world is but a mirror reflection of what we are doing to ourselves and to one another.”

*Chris Maser*

The temperature of the world is rising, and species are going extinct at a rate that has not been measured in over 10 million years (IPBES, 2019, p. 12). In the search for ways to halt the rapidly increasing rates of environmental degradation, countries have recognized the world’s forests as one of the main assets for fighting climate change and biodiversity loss (IPCC, 2020, p. 20). Despite their importance, an area the size of two thousand Manhattans are cut down every year (UNEP). The rapid deforestation is forcefully affecting the safety and livelihoods of millions of people and is especially devastating to already vulnerable groups in the Global South (Ibid.). Although the negative trend is apparent in every corner of the world, some countries are more threatened by deforestation than others. On the Caribbean island of Hispaniola, two countries share the same environmental and climatic pre-conditions, but show monumental differences in current forest-cover. In the Dominican Republic, the tropical forests are covering almost half of the country. In Haiti, the forest-cover is down to 3,5 percent, one of the lowest measured figures in the tropical zone and twenty-four times lower than the mean of small Caribbean states (World Bank, 2016a).

The theories on the causes of this immense difference vary greatly among scientists. In this thesis I will present, and test four hypotheses developed by combining political ecology with earlier research. The hypotheses cover the areas of colonial history, human development, local institutional context, and energy policies. The hypotheses are then tested using a comparative model - the dynamic case-study approach - in which cross-time forest-cover data is used to identify a timeframe of the countries’ deforestation disparities. By comparing the countries’ to one another, I aim to find an answer to the enigma of the Hispaniolan forests and

contribute to the understanding of the complex relationship between society and nature.

## 1.1 Understanding deforestation

Global deforestation is a pressing issue that transcends the traditional divisions of political governance areas. Forests worldwide are not only known for their ability to capture carbon dioxide and regulating the climate. They are also home to the majority of the world's terrestrial flora and fauna, the source of income for millions of people and play an important role in reducing the impact of natural disasters and long-term environmental degradation (FAO, 2020).

### 1.1.1 Climate Change

Land use changes and deforestation accounts for a fourth of all global greenhouse gas emissions (UNEP). The forests' ability to capture carbon dioxide from the atmosphere serves as an important mechanism in stabilizing the ongoing climate changes. It is not only important to halt the current deforestation but to replant and create new forests, a strategy that is greatly emphasized by the Intergovernmental Panel on Climate Change (2019), the United Nations Environmental Programme (UNEP) and the Food and Agriculture Organization (2020), as well as stated in the Paris Agreement (UN, 2015).

A wide-scale deforestation counteracts mitigation efforts in several ways. When forests are cut down, the trees are usually burned or do in other ways end up releasing their enclosed carbon into the atmosphere. This directly accelerates the greenhouse effect. The long-term effects however come from the deforested area's loss of ability to sequester carbon in the future, a mechanism that would help regulate the carbon levels of the atmosphere continuously (Runyan & D'Odorico, 2016, p. 37). Because of the tropical forests' density, their carbon capture ability is greater than other forest types, making them extra valuable for carbon mitigation (FAO, 2001, p. 63). Lastly, deforested land absorbs more heat than forested areas. The increased albedo allows more of the sun's heat to stay in the atmosphere instead

of being reflected into space, further adding to the heating of the planet (Runyan & D'Odorico, 2016, p. 68).

The cutting of forests has also been shown to affect regional climate directly. Forested areas create higher levels of evapotranspiration, a process where water evaporates from soil, waterbodies and vegetation, which regulates and cool the regional surface temperature (IPCC, 2019, p. 14).

One of the risks of a warmer climate is the increased occurrence of extreme weather. While deforestation contributes to this risk, it also affects the population's vulnerability to it. In the case of heavy rainfall or hurricanes, forests function as a protection that lower the impacts of the floods and winds on communities and land by soaking up water and obstructing the wind. Their ability to hold water is also important to prevent droughts or forest fires to spread (FAO, 2000).

### 1.1.2 Biodiversity

Forests constitute one of the world's most important living environments for a variety of plant and animal species. The highest levels of biodiversity are found in tropical forests and rainforests, where many of the worlds endemic species are found. Since endemic species only exists in one certain area or region, deforestation of tropical forests has a direct impact on these species' chance of survival. The threat of deforestation of these forests has already resulted in an extensive amount of species going extinct or becoming endangered (FAO, 2020, p. 36). The connection between deforestation and biodiversity loss is evident in Haiti, where recent studies have found that "Haiti is already undergoing a mass extinction of its biodiversity because of deforestation" (Hedges, et al., 2018, p. 11850).

### 1.1.3 Human health and safety

The environmental effects of deforestation indirectly lead to massive consequences for the livelihood, safety, and health of the local population. A healthy forest provides important ecosystem services that benefit humans. Forests regulate the water cycle, keeps the soil nutritious, handles waste, and support communities with food, raw materials and economic as well as cultural values. It also prevents and

protects the area from the impacts of extreme weather such as floods, droughts, forest fires and storms (FAO, 2020, p. 62–79) (Runyan & D'Odorico, 2016).

As the forests disappear, the characteristics of the land changes dramatically. The soil is no longer held steady by the roots of trees or vegetation, making it sensitive to the forces of the wind and the rain. The loosened soil is easily eroded and without the roots soaking up the water, the soil become more exposed to weather and temperature. This phenomenon is especially impactful in parts of the Global South where the year consists of a dry and a rain season. In the dry season, the deforested soil becomes arid, and in the rain season the soil is easily displaced by the water masses. Both scenarios further increase the likelihood of soil erosion and land degradation. Many deforested areas are thus eventually turned into deserts (IPCC, 2019, p. 9). On Hispaniola, the soil is particularly prone to erosion due to the mountainous landscape, which allows the soil to fall downwards when loosened (FAO, 2015, p. 4) (Blaikie, 1985, p. 133).

With the forests removed, the local population has poorer access to raw materials, medicinal plants, wild meat, and other non-cultivated food sources usually provided by the forests. The land degradation causes the community to lose out on income from tourism and perhaps most importantly, it becomes considerably harder to grow sufficient and nutritious yields (Runyan & D'Odorico, 2016, p. 147). Soil erosion leaves the crops at the mercy of the weather forces, allowing heavy rainfalls or drought to worsen their chances of survival. The soil degradation causes nutrient depletion and impairs the food security further (FAO, 2020, p. 58–72). All these consequences have effects on the health, economy and living standard of the local population.

## 1.2 Purpose and Research Questions

The purpose of the thesis is to gain insight into the causes of the difference in forest cover in Haiti and the Dominican Republic. By identifying these causes, the study can contribute to the general understanding of deforestation and the interaction between society and the environment. The aim of the study is also to apply and expand the political ecology approach and its explanatory value on deforestation

issues in the Global South. To reach these purposes, the study will answer the following question:

*What factors explain the difference in forest-cover in the Dominican Republic and Haiti, and how do they affect the countries' forest-cover?*

### 1.3 Material

The material used in this thesis can be divided into two categories – historic forest-cover data and literature and statistics on Hispaniola. As the data of the thesis is not gathered on-site, but from a wide collection of earlier research and historic documents, it is conducted solely based on secondary sources. Secondary sources are not ideal, but nearly inevitable when the analysis is based on large-scale data and covers historical developments. To ensure that the data and its interpretations are correct and verifiable, the sources are clearly cited, and the thesis' chain of logic is thoroughly explained.

The forest-cover data is gathered from several sources<sup>1</sup>. The data from the Food and Agriculture Organization (FAO) and the World Bank all follow the same measurement. The FAO has conducted environmental assessments of forest conditions in the Global South since mid-century, with many of the studies including forest-cover data for Haiti and the Dominican Republic. However, since the data collection and estimation technology evolved considerably during the 20<sup>th</sup> century, it should be noted that later estimations are more accurate than earlier ones. Earlier figures and on-site estimations from the FAO experts are therefore not to be considered exact, but as approximates of the forest-cover at the time. The forest-cover measurements used include both primary and planted forest and recently planted forests that are expected to reach the height and density of the measurement indicators.

The literature on Hispaniola consists of an array of earlier research, reaching from historic descriptions of colonial rule to World Bank data on economic

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<sup>1</sup> See Appendix 1

developments. The analysis of the four hypotheses requires different measurements depending on the hypothesis' characteristics, available data and operationalization. This will be further discussed in chapter 4.4 Operationalization.

The layout of the thesis starts with an introduction of the study and the deforestation issue. It is thereafter followed by a short conclusion of earlier research, a review of political ecology and a presentation of the four identified hypotheses. Thereafter, the method and comparative logic is presented together with the dynamic case-study approach design. Following these initial chapters, the cross-time forest data is introduced, and the hypotheses on colonial history, human development, local institutional context, and energy are analysed in relation to the identified timeframe. The chapter is followed by a conclusion and discussion on the results. Lastly, the thesis ends with a review on future research ideas.

## 2 Literature review

The differences between Haiti and the Dominican Republic have baffled many minds, and the countries have been compared extensively in many research areas. Some studies have focused on the countries' differing economic developments (Jaramillo & Sancak, 2009), others on the representation of women in historic literature (Chancy, 2012) or on structural racism (Law & Tate, 2015).

Within this area of research, the relation between nature and society is a recurring theme. Alscher (2011) studies how the environment and migration is interlinked, Sheller & León (2016) analyse the countries' differing ability to adapt to climate changes, and Pichler & Striessnig (2013) focus on the role of education in coping with natural.

Although the study of human-nature relations has gained recent popularity, there are still massive questions that remain unanswered. This knowledge gap is perhaps most obvious when faced with the lack of global political action addressing environmental challenges. By connecting the causal relationship between societal factors and deforestation, some of these questions can be answered. The more we understand what role political, economic and social structures play in society's relations to the environment, the better the chances are of creating and implementing well-constructed, just and effective policies that fight environmental degradation.

While many studies on the Hispaniolan environment have been conducted, the research usually either does not compare the countries' developments historically or do not include an analysis of societal factors (Hedges, et al., 2018). This thesis aims to answer the question of how the difference has occurred in a way that static or non-political studies cannot.

The purpose of this study is primarily to understand the deforestation issue on Hispaniola, but a causal relationship can also contribute to the general understanding of deforestation causes and prevention methods. The design of the dynamic case-study approach can also be replicated and applied in other cases where answers have not been conclusive.

## 3 Political Ecology

In this thesis, political ecology is used in two different levels of analysis. First, it functions as an overarching theory that allows for an umbrella perspective and a theoretical framework of relations between society and the environment. This holistic approach enables an understanding of contexts and interlinkage analyses. Secondly, the theory is used to develop hypotheses on the causes of Hispaniolan deforestation together with the support of earlier research.

The following chapter introduces political ecology and present a reconstruction of the deforestation hypotheses and their connection to political ecology and earlier research.

### 3.1 A political community of practice

Political ecology is a field of critical research that studies human caused environmental degradation and its consequences. It focuses on human-nature relations and share many conceptual similarities with political economy and environmental justice. According to Robbins (2012), political ecology is neither a theory or a method but a community of practice. A once clear-defined theory has evolved into a wide and diverse set of approaches, theories, and methods over the last decades. Political ecology can thus not be defined through a static list of theories or areas of interests, neither be limited to the conclusions of the research of its pioneers (Ibid.). What binds together all interpretations and variations of political ecology is, according to Robbins, three fundamental similarities. Political ecology constitutes an alternative to apolitical studies of the environment, it is based on shared assumptions and it adopts fairly similar explanatory narratives and approaches (Robbins, 2012, p. 14).

The political dimension of political ecology is a reaction to apolitical ecological studies, where the dominant framing of environmental issues is that people degrade the environment because of malice, carelessness, or irresponsibility. Instead it is the

firm belief of political ecologists that the human-caused degradation of nature is created by political and economic circumstances (Bryant & Bailey, 1997, p. 3). Political ecology challenges the first notion by including tools of critical analysis. An analysis without the understanding of political and economic structures and their inherent power-relations cannot fully grasp the complex relationship between environmental degradation and society (Robbins, 2012, p. 13).

While apolitical studies do not explicitly present political motives or narratives, the disinclination towards political analysis still leads to political implications. The way environmental problems are studied and framed has consequences on how the issues are perceived, how resources are distributed and what measures that are taken to handle the problem (Robbins, 2012, p. 18–9). Political ecological studies are therefore not more political than other ecology studies but do consciously and openly include the political and economic level of analysis in its research (Ibid.).

The common assumptions of political ecology intertwine with its narrative. One of the fundamental assumptions of the practice is the marginalization of the poor. Socially and economically marginalized groups in the Global South are repressed into areas where the soil is less fertile, the environment is less adaptable, and the ecosystems are less resistant. The difficulties of surviving on such lands force people to intensify the pressure on the environment, gradually impoverishing the soil and the community simultaneously in “a cycle of social and environmental degradation” (Robbins, 2012, p. 91). The process of environmental marginalization is thus seen as a product of economic and social injustices, communicating a narrative of a wider system that oppresses the already marginalized. This analysis can be applied on a global scale, where labour and soil-intense economies are dependent on the environment for survival at a higher degree than industrialized countries, both for subsistence farming and for exports of raw material and non-value-added products. The narrative does however also present hope of an effective solution; by breaking the cycle of social and economic injustice, the environment will benefit too.

In the analysis, the history and development of power structures are central. By studying larger long-term contexts, political ecology enables an understanding of influencing changes, path dependencies, relationships and structures (Sheller & León, 2016) (Blaikie & Brookfield, 2017, p. 64). These long-term developments can also cause changes in people’s perception of the environment, which in turn

leads to changed behaviour. Robbins (2012) suggest that starting a chain of positive environmental examples and trusting communities to be responsible helps the population to develop an identity of environmental stewardship.

Political ecology studies usually mix two separate approaches of analysis. A study of the environment oftentimes includes a realist description of the issue or the characteristics of the studied environment. Such a presentation is needed to understand the circumstances of the problem. However, the analysis also includes critical, normative and constructivist perspectives on the formation of environmental knowledge and human-nature relations perceptions. Partly contradictory, political ecology studies thereby often combine descriptions of biological and chemical processes with analyses of how discourses and power relations affect human perceptions and normative ideas of the world (Robbins, 2012, p. 97), a combination of natural science and politics.

## 3.2 Hypotheses on Hispaniolan deforestation

There are many hypotheses on why and how Hispaniola have come to suffer from such aggressive deforestation throughout history (UNEP, 2013). In this thesis, I have divided the array of hypotheses into four categories that will be presented below. The categories are colonial history, human development and demography, local institutional context, and energy.

### 3.2.1 Colonial history

In the study of global economic relations, political ecology emphasizes how the history of colonialism, systems of economic inequality and environmental impoverishment are all intertwined. Historically colonized lands were considered valuable to the colonizers primarily because of their natural assets, were it raw material, human labour, or luxury goods. The lands were drained on its people and resources in the capacity that was most profitable for the colonizers, irrespective of the indigenous population, the environment or the history of knowledge found in their interconnected relation (Bryant & Bailey, 1997, p. 54–6). The production system set up by the colonial powers often forced the colonized regions to change

from diversified farming and full production processes to monocultures of cash-crops (Ibid. pp. 7, 160). The raw materials were refined in richer parts of the world, allowing most of the profit to stay within the colonizers' spheres. The remnants of this economic system persisted the countries' independencies, with many earlier colonized countries continuing to being dependent on the exploitation of their natural resources and the production of low-profit primary products (Ibid.). The colonial terms of trade created a "perpetual economic order of underdevelopment" (Robbins, 2012, p. 56) for the Global South.

In addition to the very tangible effects on the economic system, colonial rule also changed the countries' political and administrative jurisdiction of the environment. The indigenous peoples' relation to the environment was considered primitive and attempts to 'rationalize' the environment for profit were carried out. These political remnants are still seen in the environmental legislation of many countries today (Bryant & Bailey, 1997, p. 54). The combination of the economic, social, and political remains of the colonial period has put many of the countries in a path dependency on that system itself, continuing to support the disproportionately disfavoured of poor and earlier colonized countries.

Colonial impact on forest and soil quality is not a new topic of discussion<sup>2</sup>. On Hispaniola, the two countries share a common colonial history but have also spent a substantial amount of the last centuries subjugated to different colonial powers. Hispaniola was the first American soil sieged by the Spanish conquistadores and in 1492 it became the first base of the Spanish colonial empire in the Americas (Hartlyn, 2001a, p. 14–15). The island stayed under the control of the Spaniards for more than 200 years until France gained power of the Western third of the island from Spain in 1697 (Greene, 2001, p. 266).

While both countries suffered from colonialism, the two colonial powers had different strategies and presence over time. The hypothesis on colonial history thus postulates that the difference between the countries' forests stems from the variations in their institutional and environmental colonial legacy.

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<sup>2</sup> See Marchand's *The colonial origins of deforestation* (2015), Das' *Colonialism and the environment in India* (2010) and Scales' *Tropical forests, politics, and power* (2017).

### 3.2.2 Human development and demography

From the political ecology perspective, economic and social circumstances greatly affect the risk of human-caused environmental degradation (Blaikie, 1985). Living standard as well as distribution of wealth, resources, education, and other services play an important role in the society's marginalization of people and land. Poverty cause people to exhaust the land for survival, and inequality makes it hard to escape impoverishment. For education, a study by Dolisca et. al. (2007) suggests that the education level of the head of the household has an effect on Haitian families' tendency to deforest. Besides the socio-economic factors, population pressure is a common explanation for land degradation (Smucker, 1999)(FAO, 2000). The combination of inequality, poverty and a high population density makes it difficult for the land to sustain its inhabitants.

The hypothesis on human development and demography proposes that it is the differences in socio-economic circumstances and population pressure on the land between Haiti and the Dominican Republic that causes the deforestation disparity.

### 3.2.3 Local institutional context

The political and institutional context in which communities exist shapes the behaviour and possibilities of its inhabitants (Holifield, 2015, p. 587–8). The institutional context can affect both the material circumstances that cause people to degrade the environment as well as to shape ideas of how the environment is valued and perceived and therethrough how people act (Robbins, 2012, p. 75). This study focuses primarily on the environmental legislation, land tenure and ownership, inequality, and discrimination in the respective countries.

Land- and forest related legislation regulate land access, land use and conservation measures. Land tenure and ownership affects the land distribution, land security and the possibilities for acquiring new land. The quality of the administrative system and whether the land registers are followed are also important. According to a study by Dolisca et. al. (2007), the land tenure status of Haitian farmers' have an effect on the amount of trees they cut down. Other institutional contexts such as inequal or discriminatory access to resources and services, or disproportionate focus on the perspectives of certain groups in national

policy, are also highly relevant. In the narrative of political ecology, the local institutional context is decisive in creating, upholding or escaping situations of marginalization (Andersson, et al., 2011).

The hypothesis on local institutional context does thus assume that the differences in forest cover is a consequence stemming from the local institutional contexts in which the circumstances for local communities are shaped.

### 3.2.4 Energy

Political ecology does not primarily see the natural resources as the sole reason for degradational behaviour. It is rather the political, economic, and social circumstances that affect the material reality, and therethrough people's behaviour. Apolitical interpretations of the deforestation issue on Hispaniola often consider the energy consumption as the source of the degradation. The population need fuelwood and charcoal for their everyday life, and thus they cut down trees and vegetation through 'slash and burn'-practices (Oxfam, 2010, p. 12) (USAID, 1985, p. 84). A political ecology perspective focuses on the political structures and circumstances that is causing the energy need, rather than the individual deforester, as "resources are constructed rather than given" (Robbins, 2012, p. 17). The need for energy exists in all societies, but the way that need is met differs. This need is commonly missed in environmental protection initiatives, which ultimately undermines the environmental objective (Blaikie, 1985, p. 53).

The hypothesis on energy consider the energy policies and governance as the reason for the difference in forest-cover in Haiti and the Dominican Republic.

## 4 Method

The following chapter introduces the research approach, the comparative logic, and the operationalization of central areas in the study. Foremost, the dynamic case-study approach is presented together with its comparative design.

### 4.1 Research approach

The research question of the thesis consists of two parts. First, it asks for *what* factors that have caused the differences in forest conditions in Haiti and the Dominican Republic. To answer this question, the study takes an open approach where the case is examined holistically by combining political ecology and earlier research with cross-time data on Hispaniolan deforestation. While the political ecology hypotheses rests on the foundations of earlier research, the theory also enables the use of analytical tools that supply context and analytic depth to the results.

The second part of the question focuses on *how* the factors have caused the deforestation differences. This question is incorporated into the thesis with the aim of reaching further than just a confirmation of a causal linkage between the variables, but to also understand how that linkage operates

To answer this question, I make use of an abductive approach with a mixture of inductive and hypothetico-deductive strategies. It is built on the idea that a research process does not always follow a static script, but that sometimes a hypothesis or an idea is created in the confrontation with the empirical material (Teorell & Svensson, 2007, p. 51). This is especially fitting for case studies, where the process is more flexible than in statistical analyses, allowing a dialogue between empirical data and theory (Teorell & Svensson, 2007, p. 240).

A thesis' result is only to be considered as relevant as the intersubjectivity, validity and reliability of its method. For best quality of a study, these should be thoroughly discussed and confirmed throughout the thesis (Teorell & Svensson,

2007, p. 55–6). This study is conducted from a large set of data and literature. To ensure the thesis' intersubjectivity – that the research process and result can be controlled, verified and repeated (Ibid.) – all sources are clearly cited and the sources on forest-cover data are summarized in an appendix<sup>3</sup> to enable the reader to easily access the data and get an overview of its origins.

The validity and the reliability of a study indicate whether the method measures what it claims to do and how robust the presented knowledge is (Teorell & Svensson, 2007, p. 58–9). This is primarily discussed in the operationalization and the comparative design chapters. The operationalization chapter aims to show how deforestation and the hypotheses are translated into measurable variables, as well as to ensure that said translation is reasonable and correct. The comparative design is described to show how the hypotheses are tested against the timeframe and ensure that the comparative logic of the design is apparent and accessible to the reader. The logic of inference is thoroughly described and discussed throughout the study.

## 4.2 The dynamic case-study approach

The dynamic case-study approach has been developed for this thesis to enable the application of recognized comparative models onto temporal data covering long-term developments. It is not a completely new method but integrates aspects of i) Mill's (1967 [1843]) Method of Difference, in particular the associated logic of inference, ii) the comparative case-study design (Teorell & Svensson, 2007, p. 236), in particular the aspect of chronology, iii) process-tracing (Collier, 2011), and iv) the dynamic-comparative case study method developed to study organizational phenomena (Fox-Wolfgramm, 1997).

In this study, the approach is exercised by compiling historic Haitian and Dominican forest-cover data, from which a timeframe of forest-cover disparities is identified. Working from this timeframe, four hypotheses are tested by comparing the countries' historical developments against the forest-cover data.

i) The Method of Difference was first introduced by John Stuart Mill as a way of applying the logic of statistics onto studies with fewer cases (Mill, 1967 [1843]).

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<sup>3</sup> See Appendix 1.

The method is used to compare cases that are similar in as many variables as possible, but with different outcomes on the dependent variable. The design thus ensures that variables with similar results are not causing the result in the outcome variable. They are to some extent controlled for in the same way as in experiments with randomized selection. Ideally, all the independent variables have similar values for all cases, except one that covaries with the dependent variable (Teorell & Svensson, 2007, p. 226). However, with the dynamic case-study approach, the explanatory variables do not necessarily have to be similar in both cases to be controlled for.

Instead, it is their change over time in relation to the relevant timeframe that will determine their relevance for the outcome variable. In Mill's design, differences are explained by differences by controlling for similarities (Teorell & Svensson, 2007, p. 226). With this approach, it is instead *changes that explain changes* by controlling for constancy and mis-timed variable changes. The same logic of inference is exercised, and the variables are controlled for to the extent that is possible in non-experimental qualitative studies of society.

To explain causality, ii) the comparative case-study design should fulfil four criteria: contrafactual difference, chronology, isolation and causal mechanism (Teorell & Svensson, 2007, p. 64). The contrafactual difference criterion is used to establish whether a change in the independent variable would have resulted in a change in the outcome, all else unchanged. Ideally, the explanatory variable would be tested through an experiment where all other variables stay constant. If the outcome variable exhibits a different result, this indicates a causal relation. However, it is rarely possible, nor ethical, to execute such experiments in the study of society. In the search for causes of the Haitian deforestation disparities, it is impossible to test the effects of variables in an identical situation, since history cannot be redone.

This fundamental problem of causal inference establishes that it is not possible to witness the *actual* contrafactual difference in non-experimental studies, only to gather partial knowledge that indicates the hypothetical difference (Teorell & Svensson, 2007, pp. 28, 64). This indication can be found by studying cases that resembles a contrafactual situation. For deforestation on Hispaniola, the countries are favourably alike in environmental and climatic pre-conditions, which indicates that it is a societal, rather than natural, difference that causes the disparities in forest-

cover. The result will thus not confirm a causal relationship unless a societal explanatory variable covariates with the deforestation outcomes (Teorell & Svensson, 2007, p. 226).

The chronology tests the course of events of the tested variables. Without a confirmed direction of impact, the causal relationship can be misunderstood as opposite. By including the chronology criterion, the study can control whether the cause precedes the outcome. Case-studies allows for in-detail analysis of long-time developments and have thus accessible analytic tools to confirm variable chronology (Teorell & Svensson, 2007, p. 262). The dynamic case-study approach is especially focused on this criterion, as the time dimension of the design is central in its logic of inference. The time-dimension enables the study to distinguish the variables' effects on forest-cover trend changes.

Isolation controls that it is the tested variable that causes the effect on the outcome. This is tried by isolating the effect and study whether the probability or intensity of the outcome is changed when everything else stays the same (Teorell & Svensson, 2007, p. 64). The possibility to isolate an effect is available in statistical analysis but in case-studies, this is more difficult. With only one or a few cases, there are no statistical methods to discover disparities in the variable relationship. However, this can be partly compensated for by studying the case carefully and look for alternative explanations or underlying variable effects.

The causal mechanism is the chain of reaction between the input and the outcome, the explanation of the effect. A case fulfilling the three criteria above has come far, but only to establish *what* caused the outcome. To fully grasp the causality, the researcher must also understand *why* and *how* it has happened (Teorell & Svensson, 2007, pp. 62-63). The thesis' second question is directly addressed to this mechanism through its search for the explanation to *how* the cause affects deforestation.

By studying the context in which the mechanism exists, the mechanism's linkages and development can be understood. In this sense, it is easier to gain understanding of a causal mechanism through a case-study approach than through a quantitative study (Teorell & Svensson, 2007, p. 261).

The ability to study developments in-depth is relevant for both the chronology, isolation, and causal mechanism criteria, and is also one of the central aspects of iii) Process-tracing (Collier, 2011). Process-tracing is a research strategy used to

investigate causal inference in both qualitative and quantitative studies. The strategy consists of three dimensions: description, sequence, and causal-process observations. The description builds a solid understanding of the case which helps enables a holistic perspective and insight of potential underlying variables. The description alone is valued as a contribution to the research (Ibid). By learning about the case at specific points in time, the study can map the sequence of events and interlinkages between variables. This enable the knowledge to be put together to determine the causal inference of the process. This strategy is especially fitting for evaluating and developing hypotheses, studying causal mechanisms and long-term developments(Ibid).

iv) The dynamic-comparative case-study method was developed by Fox-Wolfgramm (1997) for organizational studies. While the study area differs from that of this thesis, the dynamic case-study approach has been inspired by Fox-Wolfgramm's study of processes and mechanisms. The approaches are especially alike with regards to contextual analyses over time.

By applying Mill's logic of inference, the causality criteria of the case-study design, the three-dimension strategy of process-tracing and the contextual analysis of the dynamic-comparative case study method, the following design is created for the study of the Hispaniolan case.

	Haiti		Dominican Republic		Relevant trend change in relation to timeframe?
	Before timeframe	After timeframe	Before timeframe	After timeframe	
Colonial History					Yes/No
Humand development and demography					Yes/No
Energy					Yes/No
Local institutional context					Yes/No

Figure 1. The dynamic case-study approach design, Hispaniolan deforestation disparities

The design compares the explanatory variables of the hypotheses between the countries in relation to the timeframe. The differences between the countries is thus not the focus, but the changes at a certain point in time. The time dimension of the dynamic case-study design enables several analytic tools which can add this insight and help exclude non-related variables, that static studies cannot.

As the cases have shown similar values in the outcome variable earlier, the start of the disparity will be identified and used to execute a more precise assessment. By time-stamping the trend change, the study can exclude several of the variables that are currently different but that have no relation to the changes in the outcome variable during the identified point in time. This can be done in three different ways: when variables have shown constant differences, when a variable becomes different long before or when it becomes different long after the relevant timeframe.

### 4.3 Operationalization

Well-constructed and correct operationalizations are crucial for a study's validity and relevance (Teorell & Svensson, 2007). The study consists of several measurements and areas of analysis with very different characteristics. Primarily, this difference is seen between the quantitative forest-cover, human development and energy data compilations and the qualitative literature research on the

hypotheses. The forest-cover data is built by large sets of quantitative data covering a long time-period while the hypotheses are developed and analysed through theory, quantitative and qualitative data. Because of these differences, the operationalization of the respective measurements differs too.

The historical development of deforestation on Hispaniola is operationalized as forest-cover as percentage of a country's total area. Forest-cover is the general measurement for studying deforestation, used by the Food and Agriculture Organization of the United Nations (FAO, 2020).

The effect of colonial history on present day deforestation are measured by studying the colonial remnants that have affected the political, economic, or cultural relation between society and nature. The differences in the French and the Spanish colonial rule and their strategies on forest and land-related management are primarily in focus.

The hypothesis on human development and demography is measured through a combination of expected life expectancy at birth, mean years of schooling, GDP per capita at current PPP, and population density measurements. The local institutional context hypothesis is studied by reviewing literature on the countries' forest legislation, land tenure and ownership, discrimination, and equality in relation to deforestation. The energy hypothesis is measured by compiling data and literature on energy use, energy policies and governance.

# 5 Analysis

In this chapter, the analysis is divided into two parts. First, the time-data analysis of forest-cover on Hispaniola is introduced and interpreted. From the presented data, a timeframe is identified. Thereafter, the hypotheses on Hispaniolan deforestation are analysed by applying the dynamic case study approach.

## 5.1 Historical forest development on Hispaniola

The deforestation on Hispaniola have a long history. Estimations of early forest-cover vary widely between researchers and estimation projects, but the countries are believed to have had similar pre-conditions for forest growth. The collected data from the Forest and Agriculture Agency of the United Nations (FAO), the World Bank and the United States Agency for International Development (USAID) show how the forest-cover has changed from mid-20<sup>th</sup> century to present day.

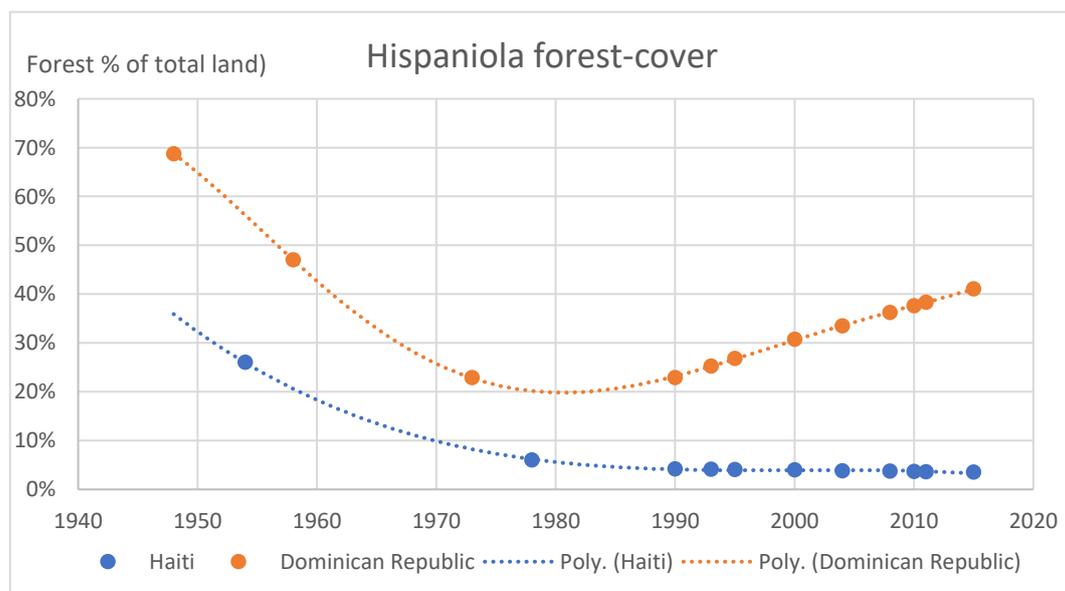


Figure 2. Forest-cover in Haiti and the Dominican Republic. Data sources cited in Appendix 1.

From the figure (2) it is evident that both countries suffered from deforestation historically and continuously during the second half of the 20<sup>th</sup> century. Their respective deforestation rates were similar throughout several decades, indicating rapidly decreasing forest areas on both sides of the border. The countries' forest cover decreased similarly until the 1980's, when the Dominican deforestation suddenly halted completely and turned into a forest-cover increase that became most evident after 1990. While Haiti continued to uninterruptedly reduce its forest-cover, the Dominican Republic did thus manage to increase theirs radically. From 1980 to 2015, the Dominican forest area almost doubled from about 20% to more than 40% while Haiti's reached the all-time low of 3,5% in 2015 (World Bank, 2016a).

The time-data analysis indicates that the drastic divide between Haiti and the Dominican Republic started around the 1980's and the 1990's, not because Haiti's deforestation rates were increasing, but because the Dominican Republic succeeded in increasing its forest-cover after many years of constant deforestation. The timeframe is thus identified as between 1980-1995, as 1980 is around when the Dominican deforestation halts and the early 1990's is when the Dominican forest-cover starts to increase. With this additional information, the analysis gains a specific timeframe against which the hypotheses can be tested with added accuracy.

## 5.2 Comparing Haiti and the Dominican Republic

In the following section, the hypotheses on Hispaniolan deforestation are analysed in relation to the identified timeframe. The hypotheses are divided into four subchapters in which the two countries are compared correspondingly.

### 5.2.1 Colonial history

Haiti and the Dominican Republic have suffered from different colonial pasts. Both were colonized by Spain from 1492 until Haiti was sieged by France in 1697 (Greene, 2001, pp. 263-6). The colonizers effect on forest-cover is difficult to measure as there are no reliable data available on the actual forest-cover of the time. A recent study of sediment records from western Dominican Republic does

however show that the arrival of the first European colonial power resulted in dramatic land use changes (Hooghiemstra, et al., 2018). Up until ca 1525, the area was characterized by diverse forests with some small-scale subsistence farming. As colonization continued during the 1600's, many areas on the island were cleared for agriculture, cattle farming, firewood and construction, causing deforestation (Ibid.).

As Spain found more profitable lands in South America during the 1500's, they lost interest in Hispaniola and the colony's economy stagnated. The settlement decreased drastically and the general pressure on the land did the same. This situation persisted until the French seizure of the western part of the island, currently Haiti, in 1697 (Hartlyn, 2001a, p. 14–9).

The French created a profitable economy built on slave labour-intensive agriculture and wood extraction. They brought large numbers of enslaved West- and Central-African people to the island and begun a harsh and intense colonial rule. Large cash-crop-plantations were established and the agricultural pressure was further intensified, causing rapid deforestation in the low-lands. The forests were also cleared to sell on domestic and international wood markets. (World Bank, 2016b, p. 17–8). The French success partly spread to the neighbouring colony, and the bad economy was temporarily improved.

The French colony was notorious for its cruel and abusive treatment and after over a century of French colonization on Hispaniola, the enslaved Haitians carried out the first successful slave revolution in the world (Ibid.) (Hartlyn, 2001a, p. 19). At the end of the revolution, slave-run plantations were burned down to hinder reinstatement of slavery. With the newfound freedom, many Haitians settled in small communities in mountain areas. This move from the lowlands led to forest regrowth in the areas earlier used for plantations. However, the reforestation trend did not continue for long. While large areas were deforested to make room for farming in the new communities, the largest reason for deforestation was the timber practices. Following the independence, France has demanded reparations for their losses to a sum of 15 million francs. To pay off the large debt, Haiti intensified tree cutting for the timber market (World Bank, 2016b, p. 17–8).

As there is no available data on the forest-cover on Hispaniola during the colonial time-period, it is not included in the forest-cover graph (1). The colonial legacies of Haiti and the Dominican Republic are definitely different, and these differences can still be seen today. However, there is no indication that the colonial effects on the respective countries would change before or during the identified timeframe. It is therefore not likely that colonization can explain why the forest-cover disparity increased so dramatically during the 1980's and forward resulting in today's difference.

### 5.2.2 Human development and demography

The hypothesis on human development and demography proposes that it is the socio-economic and demographic differences between the countries that cause the deforestation disparity. The hypothesis is tested in this chapter by analysing data on life expectancy, mean years of schooling, GDP/capita at PPP and population density.

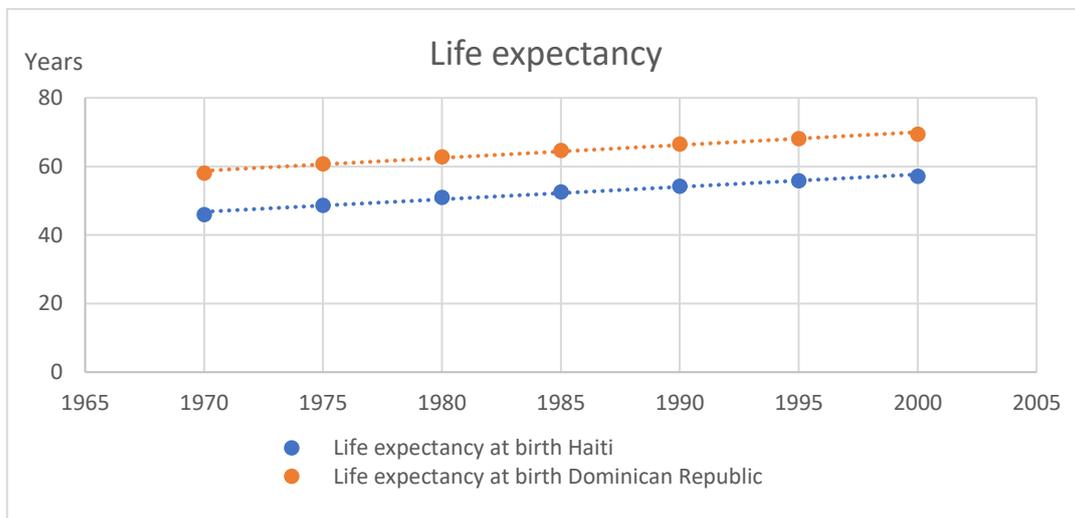


Figure 3. Life expectancy at birth (World Bank, 2018).

The figure (3) shows that the life expectancy has been constantly higher in the Dominican Republic than in Haiti and that it has increased similarly in both countries since 1970. However, there are no changes that stand out in relation to the

analysis' timeframe and life expectancy can thus not be the cause of the deforestation differences.

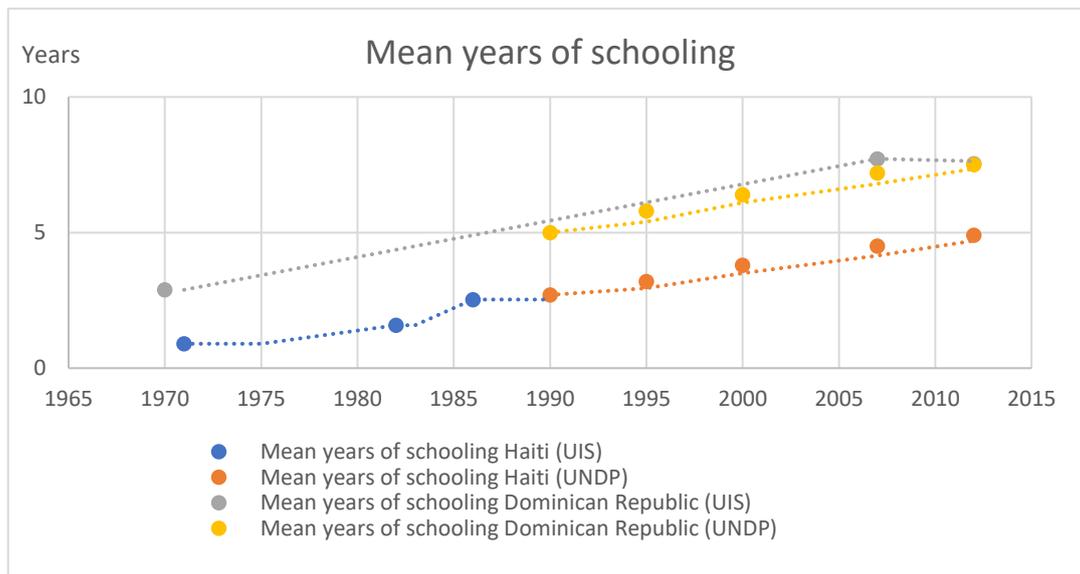


Figure 4. Mean years of schooling (UIS, 2016) (UNDP, 2018).

The graph on mean years of schooling consists of two different sources and their data on Haitian and Dominican education. As the UNDP source only stretch back to 1990, it is combined with data from the UNESCO institute for Statistics (UIS). As seen in the figure (4), the measurements overlook quite evenly. From this data it is evident that the mean years of schooling has increased similarly in both countries since 1970, with the initial gap still persisting in 2012. Since there are no trend changes related to the timeframe, the data does not indicate that mean years of schooling affects forest-cover.

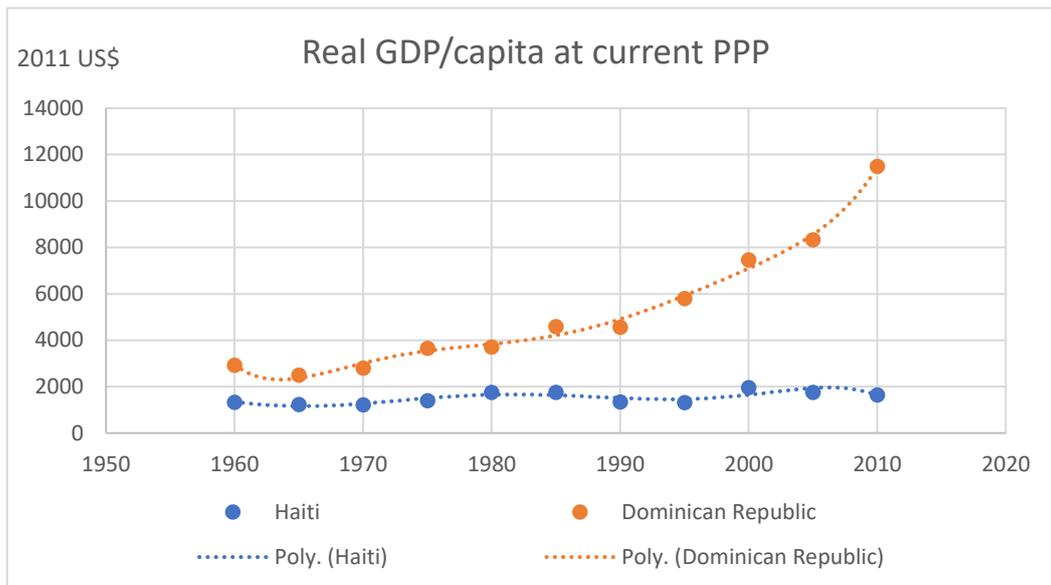


Figure 5. Real Gross Domestic Product per capita at current Purchasing Power Parity, 2011 US\$, (Penn World Table, 2015)

The figure (5) shows that there is a notable initial difference between the countries' GDP/capita values, where the Dominican have around double that of Haiti. Between the years of 1960 and 2010, the Dominican Republic's GDP/capita almost quadruple, while Haiti's only increases marginally. Although both countries experience growth during the time-period, the growth rates differ tremendously and the gap between them increases consistently throughout the time-period. Around 1960-1985 the countries have quite similar developments, but the Dominican Republic slowly starts its long-term increase. However, it is not until post-1990 that the Dominican GDP/capita starts to increase exponentially. The years between 1990 and 2010 is when most of the Dominican growth occurs.

While there are some small increases before the timeframe, there is a Dominican decrease between 1985 and 1990, and the noticeable increase does not occur until after 1990. There are thus no convincing data that indicates that GDP/capita affects forest-cover. However, there could potentially exist an opposite relationship, where the forest cover affects the economy.

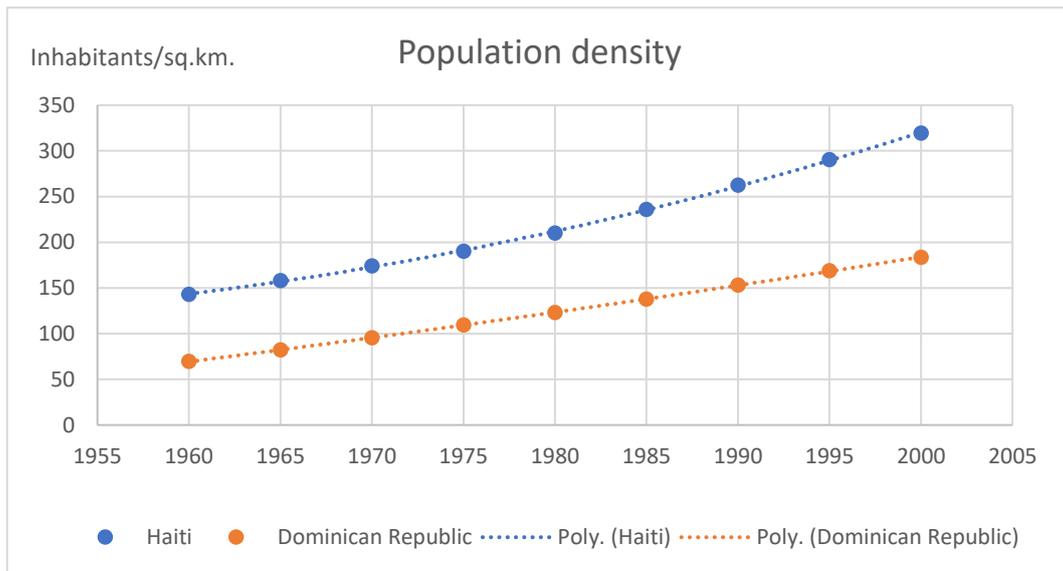


Figure 6. Inhabitants per square kilometre (HYDE, 2011).

The figure (6) indicates a constantly higher population density in Haiti, but the countries' developments are fairly similar. They both experience a steady increase in population density throughout the time-period without any evident trend discrepancies. Haiti's population density increases more than the Dominican, causing the already existing gap to widen further. There is no evident trend change that would indicate that population density affects the deforestation directly.

### 5.2.3 Local institutional context

The local institutional context of communities that suffers from or contribute to deforestation currently differs widely between Haiti and the Dominican Republic but have somewhat similar histories. Before the forest-cover changes, both countries suffered from unequal land distribution, insecure land tenancy and ownership rights, and marginal soil (IBP, 2020) (de Ceara, 1986). They had a similar situation with the government and urban elite being discriminatory towards rural and poor communities, as well as government services lacking on the countryside (Oxfam, 2010, p. 12). However, the majority of Dominican forests were state owned (FAO, 1982, p. 49), and almost all Haitian were privately owned (FAO, 1981) but neither of this has changed.

The Haitian land tenure system's legal framework is an unclear mixture of remnants from French colonial legislation and later additions inspired by

agricultural economy (IBP, 2020, p. 45–6). The country has had a problem with the law not clearly stating who has right to the land, but also with the insufficient land administration, corruption and inheritance uncertainty for a long time. This confusion has resulted in many land disputes, land fragmentation and a disregard for formal regulations (Ibid.).

The Duvalier family ruled Haiti between 1957-86 and continuously encouraged the cutting of forests, primarily because it decreases the possibilities for opponents to form resistance bases in the forests, and it was profitable to grant allies lucrative logging business (Haggerty, 1989a). The country's largest reforestation programme was set to start operating in 1980, but the reforestation efforts did not halt the deforestation development, as logging and tree cutting continued at a considerably higher rate (Haggerty, 1989a). At the same time, there was no forest legislation that in any way protected forests from exploitation (FAO, 1981).

Following the end of the Duvalier rule, some efforts was made to reduce deforestation. In 1987, a law was passed that made it a sanctioned crime for landowners to contribute to soil erosion (FAO). In 1995, an institute for land reform was created but have had mixed successes (Malik, 2001, p. 391). Thereafter, there are not many initiatives aimed at reforestation or halting deforestation. In 2010, there were still no national policy or active national programme in Haiti (FAO, 2010, p. 302). Some attempts were made to strengthen women's land rights in 2006 (FAO), but land- and forest initiatives are largely lacking from modern Haitian history.

In the Dominican Republic, deforestation and land security had been worsened during the Trujillo dictatorship (1930-1961) who allowed large-scale logging business to exhaust the soil and forcibly remove farmers of their lands. The farmers instead took to mountain and watershed lands. The fall of the regime was followed by several parallel events regarding deforestation and land use. An agrarian reform was commenced, through which over 409,000 hectares of land would be redistributed between 1962-1990 (Haggerty, 1989b). The government attempted to stop the deteriorating deforestation by instating protected areas and banning commercial tree-felling on public lands and all tree-cutting without permit in 1967, causing the Dominican sawmills to close the same year (FAO, 1981). The strategy was to reduce deforestation through total control, and the laws were enforced by the military (Geilfus, 1998, p. 4). The deforestation issue started to be given

increased attention within the urban population who did not rely on the forest for income. An appreciation for the forest developed and their importance for sustaining biodiversity and watersheds was emphasized (Casanova, 1998, p. 229).

The rural experience was very different. The laws were harshly executed and detrimental for large parts of poor rural communities. Farmers could be jailed for cutting trees on their own, or other land, and many were forced to pay to use their own wood (Geilfus, 1998, p. 4). The laws failed to target the original causes of deforestation, and instead tried to terminate poor population's access to the remaining forests (Dotzauer, 1993). Being dependent on forest resources, people started clearing land illegally. As tree cutting had suddenly become dangerous, the incentives for tree replantation had decreased remarkably (OEA, 1984).

The harsh top-down approaches fostered a negative and suspicious perception of forestry, as any forest related activity risked the livelihood and safety of the farmer. The authorities considered rural farmers to be environmentally ignorant and uneducated (Geilfus, 1998, p. 2).

The land reforms were also heavily criticized by the rural community. Primarily for being badly managed, for not transferring land ownership rights correctly and for providing marginal lands. The majority of the redistributed lands were for example devoted to forestry and were not adequate for farming (Ibid.). While the mean farm size did decrease substantially as a result of the reform, the distribution was still very inequal with 2% of farms owning more than half of the country's farmland in 1981 (Ibid). The general dissatisfaction caused a wave of land seizures in the mid-80's, which served as an awakening for the government that there was still much to do (USAID).

From 1979, several new foreign and domestic reforestation initiatives started (Geilfus, 1998). In 1982, halting deforestation was deemed a national priority, and the government eased the access to forests again. The following year a new forest policy was issued that included increased resources, new reforestation initiatives, forest incentives and a forestry fund.

More reforestation initiatives were commenced throughout the 1980's, many with international funding (Haggerty, 1989b) and new alternative, democratic approaches. They based their operations on the needs of the rural population, with concerns to their circumstances (Geilfus, 1998), while the state initiatives were criticised for being paternalistic and continuing to disregard local community

knowledge. Instead of focusing on top-down education, NGO projects such as the Zambrana-Chacuey in 1984, focused on economic incentives and a participatory approach (Ibid). After several decades of soil exhaustion, land reform and illegal clearings, many in the poor rural population found themselves with small marginal plots of land at a time of low prices. The many technical alternatives provided by the organizations encouraged farmers from all circumstances to incorporate forestry on their lands. The farmer participation these projects helped the government to change their perception of farmers and land degradation (Ibid). This is evident in the 1987 sustainable forestry plan where the first aim was to enable

“production and management of forest resources to meet the needs of rural areas and subsequently also surplus for sale and income generation [My translation]” (Casanova, 1998, p. 252).

The initiatives spread, and state projects started to incorporate similar approaches. Between 1990-1995, farm forestry increased remarkably, with commercial harvesting beginning in 1990 (Geilfus, 1998). An FAO report writes that the perception of forests in 1998 is much more positive than a few years earlier (Casanova, 1998, p. 231). The result thus indicates that changes in policy, project approaches and perceptions of the rural poor caused the difference in forest-cover.

#### 5.2.4 Energy

Traditionally, Haitians and Dominicans have relied on the forests for charcoal production. During the 1970's, the US Developmental Agency reported that 80% of Dominicans relied on firewood and charcoal for cooking (1980, p. 46) and that wood and charcoal stood for 80% of the Haitian energy consumption (Smucker, 1999, p. 320). Today, this looks somewhat different. The Dominican charcoal and firewood production have largely decreased, but the Haitian dependency on traditional energy sources is still very evident, currently causing issues with illegal logging on the Dominican side of the border by Haitian nationals (UNEP, 2013).

With over 70% of Haiti's energy consumption still coming from wood, the situation has not changed much (USAID, 2020).

There are no data available on electricity access prior to 1990 for either country, but a World Bank report describes long-standing energy issues in the Dominican Republic. The reason was primarily insufficient generation capacities making multiple-hour blackouts a part of everyday life in the Dominican Republic during the 1980's and 90's. In 1997, the government started what would become a series of energy reforms, resulting in increased capacities and coverage (Krishnaswamy & Stuggins, 2007, p. 76). This development corresponds with the gradual increase in figure (7).

Earliest data on electricity access shows that the general access to electricity in Haiti was 31,3% in 1995, with only 9,4% of the rural population having access. In the Dominican Republic there are some earlier measures, establishing the general access to 78,2% and the rural to 55,4% in 1991. Both countries show a continuous increase in access thereafter.

However, data on the countries' energy use per capita is available. Even if does not include the percentage of access to electricity or other formally documented energy sources, it can indicate whether there have been any trend changes in energy use and therethrough the general supply and access to energy.

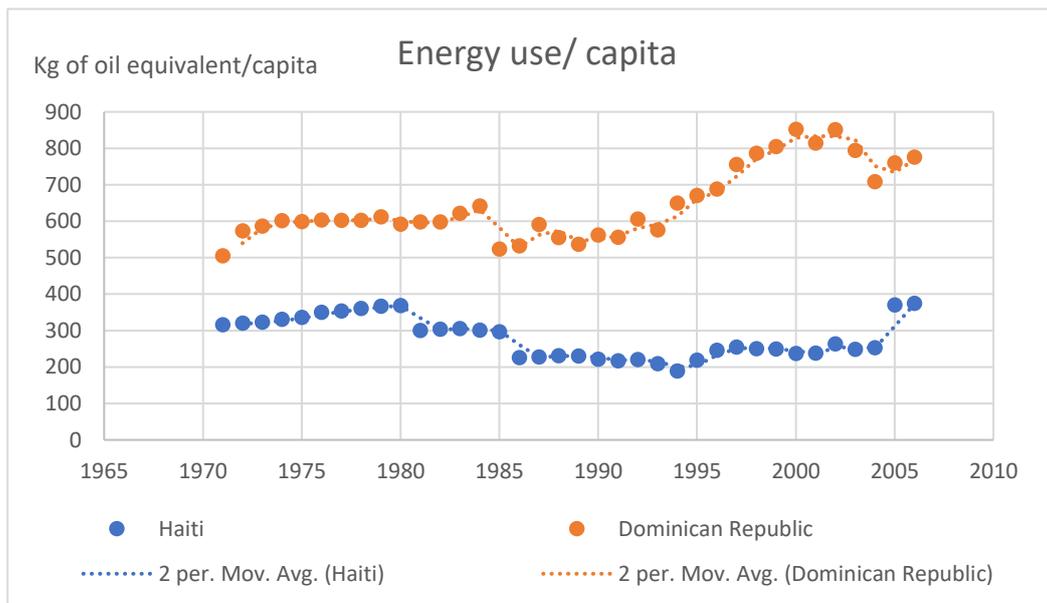


Figure 7. Kg of oil equivalent per capita, produced by (World Bank) from original OECD/IEA data on total energy use (IEA Policies and Measures Database © OECD/IEA, [Accessed 2020-08-02]).

The figure (7) shows that the Dominican energy use has been consistently higher than the Haitian. Both countries experience a rapid decrease in energy use around 1984, from which it takes longer for Haiti to recover than the Dominican Republic. Haiti only reaches the same levels 25 years later. The Dominican energy use drops dramatically in 1985 and stays at lower levels until 1994. The years between 1985 and 1995 are characterized by an inconsistent Dominican development with different levels from year to year. Thereafter, the use increases evenly until 2001. Large increases in energy use can indicate two things: 1) The demand increased, and the supply was sufficient to meet it, or 2) the supply increased, and met the already existing higher demand. According to the World Bank report, the Dominican energy supply was inadequate to meet the demand until after 2000 (Krishnaswamy & Stuggins, 2007). The energy use data together with the reports on sub-standard electricity access and quality up until mid-90's in the Dominican Republic does thus indicate that a change in energy access could not have preceded the forest-cover increase.

# 6 Conclusion

## 6.1 Summary

The colonial history of the countries was shown to have had different impact on deforestation at the time. However, as the available forest-cover data does not cover the colonial time-period the colonial impact cannot be tested equally to the other hypotheses. Also, the colonial history did not change in relation to the timeframe. There is however a significant possibility that the colonial history of the countries is the reason for the initial forest-cover differences seen in the figure (2)

The human development and demography data displayed a large difference between the countries in almost every area measured, with the Dominican Republic constantly having better circumstances for society in general. Neither the life expectancy, GDP/capita, mean years of schooling or population density developments demonstrated any trend changes that could relate to forest-cover.

The results on local institutional context show that even though the countries' had similar issues and contexts to a start, they became very different during the end of the century. Both countries were aware of the deforestation issues, but they handled it very differently. In Haiti, no policies with any noticeable effect was implemented, and there was a lack of both external and internal initiatives on reforestation. In the Dominican Republic, many private and government initiatives were implemented, with varying results.

Before the timeframe, harsh policies were implemented during the years following 1967. As they precede the halted deforestation rates, they can potentially have led to the decrease. These policies did not however seem to stimulate reforestation. Rather, they developed a negative attitude between farmers and forestry. After several unsuccessful attempts, it was instead participatory agroforestry projects that took the farmers situation into consideration that

eventually had a lasting effect. They worked incentive-based and offered a diversity of options, allowing the farmers to decide themselves. The situation at the time made the alternative uses of land unattractive. These initiatives started around 1979, spread throughout the country and are still continuing today. This gradual spread would explain the forest-cover developments. As these projects precede the increase in forest-cover, they are likely the reason for the trend change.

The study of the energy hypothesis showed that changes had occurred in energy use and access in both countries, but that the Haitian dependency on charcoal and firewood is still present. Both countries suffered from low electricity access before the timeframe, and both countries had increasing access after 1991. There is no data to follow the period of the timeframe. The data and literature on energy use showed how the Dominican increase could not have preceded the forest-cover change.

The results are summarized in the model on the following page.

	Haiti		Dominican Republic		Relevant trend change in relation to timeframe?
	Before	After	Before	After	
Colonial History	French, Aggressive land use	French, Aggressive land use	<i>Spanish, Stagnated land use</i>	<i>Spanish, Stagnated land use</i>	<b>No</b>
Humand development and demography	Gradual increase, life expectancy – Gradual increase, GDP/capita – Gradual increase, mean years of schooling – Gradual increase, population density	Gradual increase, life expectancy – Gradual increase, GDP/capita – Gradual increase, mean years of schooling – Gradual increase, population density	<i>Gradual increase, life expectancy</i> – <i>Gradual increase, GDP/capita</i> – <i>Gradual increase, mean years of schooling</i> – <i>Gradual increase, population density</i>	<i>Gradual increase, life expectancy</i> – <i>Higher gradual increase, GDP/capita</i> – <i>Gradual increase, mean years of schooling</i> – <i>Gradual increase, population density</i>	<b>No, no evident GDP/capita trend before timeframe and no consistent trend during timeframe.</b>
Local institutional context	No legislative forest-protection – Insecure land tenure and ownership  Land tenure and ownership	Some legislative forest protection – Insecure land tenure and ownership  Land tenure and ownership	<i>Deforestation ban, harshly implemented.</i> – <i>Negative farmer-forestry relationship</i> – <i>Patrimonial project approaches</i>	<i>More open access to forests</i> – <i>Neutral/Positive farmer-forestry relationship</i> – <i>Participatory project approaches</i>	<b>Yes, changes in policy and project approaches encouraged reforestation on the conditions of the rural poor. Fostered new perceptions of forests.</b>
Energy	High charcoal dependency – N/A	High charcoal dependency – Increased access to electricity	<i>High charcoal dependency</i> – <i>Failing energy system, constant energy use</i>	<i>N/A directly after timeframe, currently lower charcoal dependency</i> – <i>Failing energy system followed by energy</i>	<b>No, changes to late to precede forest-cover change</b>

Figure 8. Summary of results

## 6.2 Discussion

The results indicate a causal relationship between local institutional context and forest-cover. It is evident that there is not one, isolated cause, but a process where several factors affects the context in which a causal effect occurred.

The findings of the study confirm the political ecology perspective on marginalization of people and land. Marginalized people do not exhaust land because of ignorance, but for survival. The circle of environmental and social marginalization can thus be broken by enabling people to choose differently without risking their economic or physical safety. While strict policies can get some results, such as the 1967 and following ones, a general change in perception and behaviour is here shown to require inclusionary approaches and policies. To change the behaviour of a certain group of people, the circumstances of the people must be included in situations of marginalization.

The result can explain the difference in forest-cover between Haiti and the Dominican Republic that stems from the disparity that started in 1980-1990. As there is no way of statistically isolate the variables, the results should be interpreted with that in mind. For example, it is possible that surrounding variables affected the prospects of reforestation. The Dominican Republic had better circumstances on all measured indicators in this study. Even if they were not the direct cause of the changed forest-cover, they probably did favour it. This further emphasizes the political ecology perspective on how unequal material realities can affect the possibilities of change.

The result *cannot* explain the difference in forest-cover before the timeframe. As the countries had the same environmental and climatic pre-conditions, this initial difference must be caused by a societal factor. The French colonial agricultural pressure, timber-based economy and independency debt could likely be the reason for this difference, as the Spanish colonization did not show similar strategies or effects on Hispaniola.

The finding can be generalized to a certain extent. Generalizability does not mean that it is a universal answer, but a hypothesis that can be reproduced and applied onto another situation. Primarily, the findings offer an explanation for the Hispaniolan case, but there could be explanatory power for similar situations. For

example, the conclusion on favourable traits in reforestation projects can be tested on other initiatives or processes, or potentially be a source of inspiration for project planning.

The results of the study are hopeful for Haiti and other countries suffering from what seems to be unstoppable deforestation. It offers an alternative way of encouraging reforestation, while also favouring the rural poor.

### 6.3 Future research ideas

There are many questions that were raised during the research process. First, I would be interested in investigating the possibilities for Haitian reforestation, based on the conclusion of this thesis.

Secondly, it would be interesting to organize a historic study on the explanations for the forest-cover disparities on Hispaniola prior to the mid-20<sup>th</sup> century. With a more focused material, the literature can be analysed deeper and hopefully lead to a conclusion. It would also be exciting to analyse the differences in reforestation policies and projects, especially focusing on the cost-effectiveness versus the biodiversity of the planted forests.

Lastly, there seems to be many land reforms that have proven unsuccessful. A suggestion for future studies is a comparative study of several successful and unsuccessful reform processes to articulate a theory on the factors of success. Or, the reforms could be analysed by applying the dynamic case-study approach onto a few of the cases.

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# Appendix 1

Data and sources of information for figure 2, Hispaniola forest-cover:

Year	Haiti	Source	Dominican Republic	Source
1948			68,70%	FAO Report 1957
1954	26%	FAO Report 1957		
1958			47%	FAO Report 1960
1973			23%	FAO Country Study 2004
1978	6%	US AID Report 1985		
1990	4,20%	World Bank 2016a <sup>6</sup>	22,87%	World Bank 2016a
1993	4,10%	World Bank 2016a	25,24%	World Bank 2016a
1995	4,08%	World Bank 2016a	26,82%	World Bank 2016a
2000	4%	World Bank 2016a	30,76%	World Bank 2016a
2004	3,80%	World Bank 2016a	33,51%	World Bank 2016a
2008	3,70%	World Bank 2016a	36,25%	World Bank 2016a
2010	3,66%	World Bank 2016a	38%	World Bank 2016a
2011	3,60%	World Bank 2016a	38,30%	World Bank 2016a
2015	3,52%	World Bank 2016a	41,05%	World Bank 2016a

World Bank 2016a = World Bank; World Development Indicators; Forest area (% of land area), compiled from FAO reports and data.