

Introduction

Under the United Nations Framework Convention of Climate Change, countries have signed on to take responsibility for a portion of the global challenge that continues to change the face of the Earth. Through Nationally Determined Contributions, parties have decided on a set of goals in order to reduce their greenhouse gas emissions and mitigate further damage due to committed warming (NDC Registry). Prior to the landmark signing of the Paris Agreement in 2015, 196 countries came to the international negotiation table with set contributions - but how do countries get the strategies to achieve them?

Moreover, as we get closer to the Earth's temperature tipping point, parties have other, more pressing, concerns to deal with than an international contract. In 2017 alone, island nations were battered with a number of weather-related disasters that may be indirectly caused by climate change, due to the warming of oceans and record-breaking temperatures. Hurricanes, massive crop failures due to drought, and flooding have all occurred throughout the course of this year (Atkins, 2017).

Thus, adaptation to effects of climate change must also be considered while negotiators and policymakers consider the reduction of greenhouse gas emissions and the country's related contributions. More vulnerable parties, like island nations, must consider finding ways to both mitigate emissions to reach their committed goals, and build resilience for their populations subject to feel the effects of committed warming within the near future.

Mitigation strategies must also work in tandem with adaptation and resilience initiatives put in place by parties. Using the island nation of the Dominican Republic (DR) as a case study, three suggestions are given to understand how island nations like the DR can both reach their emission mitigation goals while building capacity for their vulnerable populations.

Community-based (oftentimes included in ecosystem-based) adaptation is a prerequisite for effective implementation of policy, and will be the first suggestion to be unpacked within this paper. Because of the smaller population within the DR, governments must strive to implement initiatives in consultation with locals in order to ensure the safety and security of more socioeconomically and climatically vulnerable citizens. This has not only been shown to successfully reduce risk for populations, but has been effective in the reduction of greenhouse gas emissions.

Forests in the DR maintain a highly biodiverse ecoregion that carries species endemic to the island, and provide natural resources like timber, rubber, and medicinal products ("Caribbean: Haiti and the Dominican Republic"). In the context of this paper, this ecoregion is also an important carbon sink and has been shown to effectively reduce the impact of natural disasters like droughts, floods, and extreme weather events like hurricanes (Estrella et al., 2013).

A program entitled "Reducing Emissions from Deforestation and forest Degradation", known as REDD+, has been successful in tropical island nations struggling with NDC targets. This second solution meets the prerequisite of community-based initiatives, and would be a great addition to projects working to create more resilient communities in the DR.

And finally, agroecology and agroforestry have been growing movements that politically mobilize populations like smallholder and subsistence farmers. Organizations like Via Campesina ensure equitable treatment of peasant farmers throughout the world in order to ensure economic and environmental stability, while reducing greenhouse gas emissions through fairer trade policies (Vazquez, 2017). Political movements can be an alternative solution that may be scaled to the national level in order to meet emissions targets.

Thus, countries like the DR may turn to these any of these three viable solutions, which can be taken individually or work in tandem for a more aggressive and community-based policy. This paper seeks to aid island nations who oftentimes will pay more for the price of polluting less.

The Problem(s):

While climate change will leave no area of the globe unaffected, certain regions will be hit first - and harder - than other nations. Scientists and climate experts believe we will be pushing past Earth's many planetary boundaries, such as the amount of greenhouse gases within the atmosphere that further warm the planet, as early as 2020 (Steffen et al., 2015). Man-made emissions that will push past this tenuous limit will accelerate warming - creating a runaway greenhouse effect like the one seen in Venus (Kasting, 1988).

Studies have shown indirect links to severe weather and climate change as recent as 35 years ago. A large increase was seen in the number and proportion of hurricanes reaching categories 4 and 5 correlating with record sea surface temperatures in the North Pacific, Indian, and Southwest Pacific Oceans (Webster et al., 2015).

Massive crop failures throughout the world have devastated food-vulnerable populations and economies. Due to record-breaking temperatures, seasonal changes have prolonged summers or shifted seasons to mismatch pollination times or rain availability (Stenseth and Mysterud, 2002). Additionally, an increase in the emergence of infectious diseases for plants in tropical regions have been recorded as seasons become warmer, and friendlier to pests (Anderson et al., 2004).

This white paper seeks to solve a number of these problems by efficiently coupling policies of mitigation and adaptation, or simply "killing two birds with one stone." As a part of mitigating emissions, adaptation must be brought in to ensure the wellbeing of the community as a whole. To better understand how this will work, concepts such as mitigation and adaptation will be introduced and discussed in relation to the Dominican Republic (DR).

Mitigation:

Mitigation, in the case of climate change and policy, is defined as tackling the causes of climate change before experiencing the consequences. Countries usually achieve this by either reducing the emissions of greenhouse gases from their nation, or by enhancing their carbon sink (Burch p. 140, 2014). In this paper, the solutions will be centered on reduction of greenhouse gases by enhancing the carbon sink found in forests within the DR, but will discuss reduction of emissions through the work Via Campesina does with smallholder farmers.

Strategies focused on mitigation are often more attractive to policymakers and politicians: although this is quickly changing, adaptation was often seen as an admission to failure on the issue of human-contributed climatic change.

Adaptation:

Adaptation focuses more on responding to the impacts already felt by climate change. Increasing the capacity for natural and human systems to adapt to changing climatic conditions will allow mitigation projects to go forward, making them inextricably connected. For example,

a biodiversity project to increase a carbon sinks' capacity cannot be successful if the forest has been through a recent drought it could have been better prepared to face.

Study of Interest: the Dominican Republic

The island housing the Dominican Republic shares its land mass with Haiti to the west, and is the second largest island in the West Indies, east of Cuba and West of Puerto Rico. On the eastern side of the island, the DR is a country of modest wealth that relies primarily on the extraction of gold, exportation of medical instruments, and tourism (Observatory of Economic Complexity).

In terms of their natural capital, the wet forests of the Dominican Republic have maintained exceptionally distinct flora and fauna, many of them endemic to the island. Unfortunately, because of illegal forestry operations and agricultural expansion, the status of conservation within this ecoregion is currently endangered (Caribbean: Haiti and the Dominican Republic).

Although degraded, forest cover in the Dominican Republic is still an important part of the island's wellbeing. With about 41% of cover remaining as of 2010, forests provide a key carbon sink for the island and is a biodiversity hub within the Caribbean.

Goals and Contributions:

The Dominican Republic's 2030 National Development Strategy details the intended nationally determined contributions related to sustainable production and consumption. As an island nation vulnerable to sea level rise, and the frequency and intensity of extreme weather events, the Dominican Republic has a personal stake in achieving a global agreement that limits the increase in global average temperature to 2 degrees Celsius, with progressive reduction to 1.5 C.

The Dominican Republic's emissions reduction target is now set at 25% by the year 2030, conditional mostly on financial support for the implementation of their projects. Because it is a middle income country, the Dominican Republic's proposed goals are seen as ambitious, with room for improvement if they encounter other issues along the way. Representing less than .1% of emissions, their goal is to both reduce where they can and provide capacity building to citizens of DR most vulnerable to climate change (Intended Nationally Determined Contribution).

Failure to reduce emissions for the DR may not have as much of an effect globally, but failure to successfully create adaptation strategies can be catastrophic. The impacts of some extreme events have meant economic losses in the order of USD 9,470 million; some of the sectors most impacted have include agriculture, housing, and energy (USAID).

Solutions:

Prerequisite Solution: Community-Based Adaptation

73% of Nationally Determined Contributions, including in the Dominican Republic, are nature-based solutions. While this is exciting in terms of the precedent it will set in international environmental policy going forward, it must be done with consideration of the community. Communities have the skills, experience, local knowledge, and networks to undertake locally appropriate activities that will increase resilience and reduce vulnerability.

Community-based adaptation practitioners “work with communities in low- and middle-income countries that are highly vulnerable to climate change because of poverty, their occupation of areas that are already prone to shocks such as floods or droughts, and their high level of dependence on natural resources” (Dodman and Mitlin p. 642, 2013). This is relevant and important for the progress of this case study: 30.5% of the population in the DR live below the poverty line (“Population Below Poverty Line”).

Studies show that, although NGOs, policymakers, and other stakeholders feel the need to focus solely on adaptation or on mitigation, communities are aware of the importance of climate-friendly lifestyles or on pressuring leaders to pursue more aggressive national mitigation strategies, all in tandem with adaptation. This must be taken into account as the two solutions are discussed (Dodman and Mitlin p. 653, 2013).

REDD+ Initiatives: Mitigation & Adaptation Measures

REDD+ stands for countries' efforts to reduce emissions from deforestation and forest degradation, and foster conservation, sustainable management of forests, and enhancement of forest carbon stocks. The UN-REDD program is a multi-donor trust fund that allows donors to pool resources and provide funding with the aim of significantly reducing global emissions from deforestation and forest degradation (Ojea, 2016).

Deforestation and forest degradation are the second leading cause of global warming, responsible for about 15% of global greenhouse gas emissions, which makes the loss and depletion of forests a major issue for climate change (“What is REDD+”).

Through the support the UN-REDD Programme can provide, this can be one of the most effective solutions to coupling mitigation and adaptation within the DR. They will be split into benefits both community and ecosystem-based, as well as regarding mitigation and adaptation.

Community Benefits through REDD+: Mitigation & Adaptation

Following the prerequisites for community-based implementation of mitigation and adaptation strategies, REDD+ offers a variety of successful examples involving community efforts. Named “Community-Based REDD+” (CBR+), this subsection of the organization is a partnership between the UN REDD Programme and the GEF Small Grants Programme in order to deliver grants directly to the people most affected by the initiatives. For more information about the GEF Small Grants Programme, please refer to [this guide on adaptation funding mechanisms](#).

The CBR+ programme includes mitigation objectives that fit into the goals set by this paper, as well as adaptation mechanisms to build more resilient communities:

- Support the full and effective participation of indigenous peoples, communities and civil society in national-level processes related to reducing emissions for deforestation and forest degradation;
- Build the capacity and awareness of communities to engage in REDD+ activities and processes

Scaling up is always a concern for those who are not sold on community-based projects. Although there are some projects that work on the local level due to specific natural qualities of the area, REDD+ and CBR+ work on national goals set for the Paris Agreement. Not only does

REDD+ facilitate nationwide projects and programs, the initiative creates a forum for other countries with similar systems to transfer knowledge and best practices amongst themselves.

Ecosystem Benefits through REDD+: Mitigation & Adaptation

Human communities are often highly dependent on the resources and protections forests can provide, even if indirectly. Not only do forests provide highly-valued commodities like wood products, medicines, and food, but it also offers protection from the extremes related to climate change - such as droughts, floods, and landslides.

Recent research suggests that reducing deforestation may be a relatively less expensive climate change mitigation option compared to other mitigation options, bringing in foreign investment through adaptation programs and country donations.

During the United Nations Climate Change Conference in Bonn, Germany in November 2017, an [interview was conducted with two ministers](#) from the Ministry of Environment representing the Dominican Republic. Mr. Pedro Garcia, Director of the REDD+ Initiative, and Dr. Carol Franco, technical advisor and professor at Virginia Tech, spoke about the benefits of REDD+ and the progress they have seen so far since its implementation.

This is being cited as a solution because REDD+ is not officially recognized as a strategy by the Dominican Republic in their NDCs, but is being assessed as a major contender to meet emissions and adaptation targets.

Political Mobilization via Agroforestry & Agroecology: La Vía Campesina Case Study

A centuries-old practice, agroforestry is the intentional integration of trees and shrubs into crop and animal farming systems to create environmental, economic, and social benefits (USDA Agroforestry Factsheet).

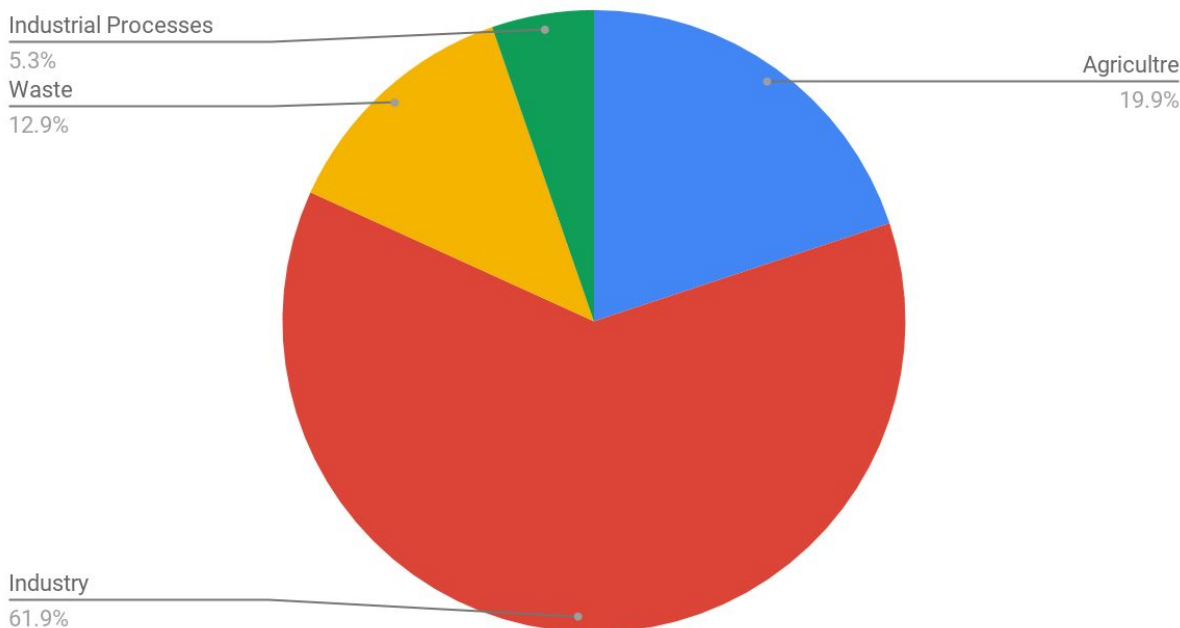
Agroecology, or agroecological farming, is a related concept that applies ecological processes to farming, often diametrically opposed to industrial farming practices. It is farming that “centers on food production that makes the best use of nature’s goods and services while not damaging these resources” (“Agroecological Farming”).

Projects can range from smallholder, subsistence farming all the way to widespread farms employing more than 300 people. Because this is an underutilized source, the movement has turned into political mobilization. Organizations like La Vía Campesina are trying to spread the word about food sovereignty and the work farmers can do to mitigate emissions related to agriculture, as well as adapt their livelihoods for a more resilient future.

The main argument of La Vía Campesina is the push away from transnational agricultural corporations, that accounted for 70% of man-made emissions last year (“Grassroots and Peasants Movement...”). Although subsistence farming and smaller commercial holdings produce sugarcane - the DR’s main cash crop, sugarcane, is controlled by three agricultural corporations: Central Romana, Cristobal Colon, and Barahona control 95% of the sugarcane industry (“About the Industry”).

The breakdown of greenhouse gas emissions in the DR is shown in the pie chart below, with 31% coming from agricultural practices dominated by Central Romana.

Breakdown of Greenhouse Gases in the DR: 2010 CAIT Report



Community Benefits through La Via Campesina: Mitigation & Adaptation

In their own white paper entitled “Small scale sustainable farmers are cooling down the Earth,” La Via Campesina details the benefits for communities as well as the environment in joining the political movement and sharing agroecological practices. Food sovereignty is a major part of their mission at the organization; “it is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems” (Small Scale Farmers...).

Ecosystem Benefits through La Via Campesina: Mitigation & Adaptation

Soil rebuilding is one of the main tenets of the agricultural movement through Via Campesina. Their goals are to rebuild soil fertility in order to sequester the carbon back into the appropriate sink, which is estimated around 220 to 330 billion tons globally (Small Scale Farmers, p. 14). GRAIN calculates that, by using existing sustainable farming techniques, farmers under Via Campesina can increase progressively soil organic matter by 60 tonnes/hectare over the next 50 years, capturing more than $\frac{2}{3}$ of the excess CO₂ in the atmosphere currently.

Agroforestry and agroecology are the bread and butter of La Via Campesina, and are key to coupling both reduction in CO₂ via mitigation efforts as well as resilience building for vulnerable smallholder populations. Studies done by researchers across the United States concluded that agroecological methods on small scale farms is far less energy consumptive and far less responsible for the release of GHG than industrial agricultural production methods (Small Scale Farmers, p. 25).

In a side panel at the United Nations 23rd Conference of the Parties on Climate Change, La Via Campesina gave concrete examples of the changes they see on the ground in regards to

resistance to climate change. Jesus Vazquez, a representative of La Via Campesina in Puerto Rico, saw reduced rates of erosion when farmers applied agroecological and agroforestry methods. To learn more about Jesus Vazquez and La Via Campesina, [watch the video about the creation of this white paper.](#)

Conclusion

This white paper sought to give suggestions on inclusive, community-based policies the state of the Dominican Republic can take to both reduce greenhouse gas emissions and build more resilient agroecological communities.

A prerequisite to these initiatives must be community inclusion and consultation. While the DR is small enough to scale up initiatives to the national level, ecological regions and communities may further benefit from having their own system in place to meet necessary greenhouse gas reduction and capacity building goals.

The REDD+ Programme is a robust initiative happening in tropical zones around the world. Two of the five main objectives of this organization is to increase the capacity of the carbon sink in forest systems, as well as to build resilience to the communities who rely on the protection and resources of forests. Policies related to REDD+ have come into the Ministry of Environment in the Dominican Republic, as discussed by Minister Garcia who serves as Director of the REDD+ programme. They have shown promise since their implementation two years ago.

And finally, political mobilization through Via Campesina is a positive and active route towards reduction of greenhouse gases and building resilience to extreme weather events. Through the use of agroforestry and agroecology, Via Campesina has been able to show proven results that smallholders can both reduce their emissions, create more resilient livelihoods, and still be a productive part of the economy.

The second largest emitter in the Dominican Republic is related to agriculture. While the Ministry of Environment has been productive and proactive in achieving their INDCs, these are a few “out of the box” suggestions to consider.

Audiences interested in developing more knowledge or advocacy can learn more about funding and financing for adaptation projects on the international scale, as well as ecosystem-based strategies leading to the negotiation in Bonn, Germany.

References

“About the Industry.” *Dominican Sugar Industry*, www.dominicansugar.org/about-the-industry/.

“Agroecological Farming.” *Groundswell International*, www.groundswellinternational.org/approach/agroecological-farming/.

Altieri, Miguel A., Clara Nicholls, and Fernando Funes. "The scaling up of agroecology: spreading the hope for food sovereignty and resiliency." *A contribution to discussions at Rio 20* (2012).

Anderson, Pamela K., et al. "Emerging infectious diseases of plants: pathogen pollution, climate change and agrotechnology drivers." *Trends in Ecology & Evolution* 19.10 (2004):

535-544.

Atkins. "The Deadliest Natural Disasters of 2017." *The Telegraph*, Telegraph Media Group, 2 Oct. 2017,
www.telegraph.co.uk/education/stem-awards/design/deadliest-natural-disasters/.

Burch, Sarah L., and Sara E. Harris. *Understanding climate change: science, policy, and practice*. University of Toronto Press, 2014.

"Caribbean: Haiti and Dominican Republic." *Tropical and Subtropical Moist Broadleaf Forests: Dominican Republic and Haiti*, World Wildlife Fund,
www.worldwildlife.org/ecoregions/nt0127.

Dodman, David, and Diana Mitlin. "Challenges for community-based adaptation: discovering the potential for transformation." *Journal of International Development* 25.5 (2013): 640-659.

"Dominican Republic." Dominican Republic: Readiness Overview, The REDD Desk,
theredddesk.org/countries/dominican-republic.

"Dominican Republic." *Exports, Imports, and Trade Partners*, The Observatory of Economic Complexity, 2016, atlas.media.mit.edu/en/profile/country/dom/.

Estrella, Marisol, et al. *The Role of Ecosystems in Disaster Risk Reduction*. United Nations University Press, 2013.

Garcia, Pedro. Personal Interview. 8 November 2017.

"Grassroots and Peasant's Movements Deliver Solutions That COP23 Fails to Provide." *Vía Campesina English: International Peasants Movement*, La Vía Campesina, 17 Nov. 2017,
viacampesina.org/en/grassroots-peasants-movements-deliver-solutions-cop23-fails-provide/.

Greenhouse Gas Emissions Factsheet: Dominican Republic. USAID, 2017,
www.climatelinks.org/resources/greenhouse-gas-emissions-factsheet-dominican-republic

Hou-Jones, Xiaoting. "Community-Based Adaptation: Research, Practice and Partnerships for

Resilience-Building.” United Nations COP 23. Bonn, Germany. 6 November 2017. Side Panel.

Intended Nationally Determined Contribution. The Dominican Republic, 2015, [www4.unfccc.int/ndcregistry/PublishedDocuments/Dominican%20Republic%20First/INDC-DR%20August%202015%20\(unofficial%20translation\).pdf](http://www4.unfccc.int/ndcregistry/PublishedDocuments/Dominican%20Republic%20First/INDC-DR%20August%202015%20(unofficial%20translation).pdf).

Kasting, James F. "Runaway and moist greenhouse atmospheres and the evolution of Earth and Venus." *Icarus* 74.3 (1988): 472-494.

Mayol, Virgilio. *Global Agricultural Information Network (GAIN) Report: Dominican Republic*. USDA, 2017, https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Sugar%20Annual_Santo%20Domingo_Dominican%20Republic_4-4-2017.pdf

“NDC Registry: Dominican Republic.” *NDC Database*, UNFCCC, 2015, www4.unfccc.int/ndcregistry/Pages/Search.aspx?k=dominican%2Brepublik.

Ojea, Elena, et al. "Ecosystem services and REDD: estimating the benefits of non-carbon services in worldwide forests." *World Development* 78 (2016): 246-261.

“Population Below the Poverty Line.” *World Factbook*, Central Intelligence Agency, www.cia.gov/library/publications/the-world-factbook/fields/2046.html.

Renaud, Fabrice G., Karen Sudmeier-Rieux, and Marisol Estrella, eds. *The role of ecosystems in disaster risk reduction*. United Nations University Press, 2013.

Schroeder, P. "Carbon storage benefits of agroforestry systems." *Agroforestry systems* 27.1 (1994): 89-97.

Segura Warnholtz, Gerardo, and Raul Ivan Alfaro Pelico. *Dominican Republic: FCPF REDD Readiness Preparation*. World Bank, 2016, Dominican Republic: FCPF REDD Readiness Preparation, www.forestcarbonpartnership.org/sites/fcp/files/2017/Feb/GRM_TF0A1121_Dominican%20Rep._20160630_20170217_174606.PDF.

Small Scale Sustainable Farmers Are Cooling down the Earth. La Vía Campesina, GRAIN,

2009,

<https://www.grain.org/article/entries/4163-small-scale-sustainable-farmers-are-cooling-down-the-earth>

Steffen, Will, et al. "Planetary boundaries: Guiding human development on a changing planet." *Science* 347.6223 (2015): 1259855.

Stenseth, Nils Chr, and Atle Mysterud. "Climate, changing phenology, and other life history traits: nonlinearity and match–mismatch to the environment." *Proceedings of the National Academy of Sciences* 99.21 (2002): 13379-13381.

USAID. "Hurricane Georges Fact Sheet #6." ReliefWeb, 30 Sept. 1998, reliefweb.int/report/antigua-and-barbuda/caribbean-dominican-republic-haiti-hurricane-georges-fact-sheet-6.

USDA Agroforestry Factsheet. United States Department of Agriculture, www.usda.gov/sites/default/files/documents/FactSheet_final_8-1-11.pdf.

Vazquez, Jesus. "Peasant Agroecology Feeds the People and Cools the Planet." United Nations COP23. Bonn, Germany. 6 November 2017. Side Panel.

Webster, Peter J., et al. "Changes in tropical cyclone number, duration, and intensity in a warming environment." *Science* 309.5742 (2005): 1844-1846.