EVALUATING THE SPATIAL AND TEMPORAL EXTENT OF INUNDATION DUE TO SEA LEVEL RISE ON LAND, BUILDINGS, AND PEOPLE IN MO’OREA, FRENCH POLYNESIA

by

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May 2019

Masters project submitted in partial fulfillment of the
requirements for the Master of Environmental Management degree in
the Nicholas School of the Environment of
Duke University

Executive Summary

Driven by a combination of ice sheet loss, ocean thermal expansion, and changes in land water storage, sea levels are expected to rise, though local rates of change vary considerably. Historically, small island nations have been understudied despite disproportionate impacts relative to their emissions contributions. This paper presents a case study of Mo’orea, a small South Pacific island in French Polynesia. Using LIDAR data collected in 2015 and IPCC regional sea level rise models, we evaluate how local sea level rise will inundate land, buildings, and displace people. LIDAR data was used to create a Digital Elevation Model (DEM) with a 5 m resolution, giving us the ability to resolve the scale of the built environment. The IPCC 4.5 and 8.5 sea level rise models were applied to the DEM at decadal intervals using an 8 point model. If decadal sea level rise was greater than the elevation of that pixel and the pixel boundary touched the ocean or an adjacent inundated pixel, the pixel was classified as inundated. In order to classify buildings as inundated, each building was sampled through the inundation datasets and buildings were classified as inundated if the center of the structure intersected with the inundation layer. Human displacement was modeled using publicly available census data from 2017. The census data was divided into each of the five watersheds of the island: Afareaitu, Haapiti, Papetoai, Paopao, and Teavaro. The average number of people in each watershed was averaged by the number of pixels in the watershed that were classified as residential buildings. Human displacement was calculated by summing of the pixels classified as both residential and inundated in a given decade. By 2100, our models show that 462 ha of land will be inundated by 2100 under RCP 8.5 and 248 ha under RCP 4.5. While this inundation represents less than 4% of the island, the island is mountainous, with the majority of the island having more than 20 m of elevation. In contrast, 95% of all infrastructure is located in areas below 20 m elevation, bordering the coastline. The inundation will mostly be constrained to the northern and eastern portions of the island, and is modeled to inundate homes, public infrastructure, professional buildings, and farmland. Professional buildings include the ferry, airport, and hotels, infrastructure intrinsic to the island’s economy. Of the different building classifications, housing will be the most impacted at over 7% under RCP 4.5 and 20% under RCP 8.5. Energy and water treatment plants will be the least impacted, with no infrastructure in this category projected to be inundated by the end of the century. Under RCP 4.5, nearly 8% of the island’s inhabitants are projected to be displaced while under RCP 8.5 over 20% are projected to be displaced. There are two distinct dominant patterns of inundation that will occur throughout the island: beginning through low lying points and seeping inland to low lying areas not directly on the coast or moving inland from the coast. Understanding where each of these patterns occurs is important when planning for the future. Our results can be used by stakeholders to better plan for future sea level rise and mitigate some of the predicted impacts.

1.1 Introduction

Sea level rise (SLR) is expected to have profound impacts on coastal areas, causing billions of dollars of infrastructural damage and human displacement (Stocker et al. 2013). Due to these impacts, SLR is an important facet of climate change to understand in order to mitigate impacts on coastal communities. Global sea levels are rising due to a combination of ice sheet loss, ocean thermal expansion, and changes in land water storage, though local rates of change vary considerably (Nerem et al. 2018, Stammer et al. 2013, Stocker et al. 2013). In order to model various effects of climate change, Representative Concentration Pathways (RCPs) have been used over the last decade which project future emissions scenarios based on assumptions of global population changes, shifts in energy generation from fossil fuels to renewable sources and, technological innovation (Moss et al. 2010, Chaturvedi et al. 2012).

SLR is not globally uniform or temporally constant (Stammer et al. 2013) so studies examining local or regional SLR should use projections incorporating the regional and local forcing to account for differential rise. Environmental factors including winds, plate subduction, and land accretion can affect local SLR patterns (Stammer et al. 2013). On a regional level, gravity can redistribute the land ice input to SLR and variable wind and ocean currents can skew sea level from the global average, presenting challenges to creating regional SLR projections as these processes can be difficult to model (Katsman et al. 2011, Slangen et al. 2011, Perrette et al. 2013). While regional projections of future SLR remain uncertain, the Intergovernmental Panel on Climate Change (IPCC) has released preliminary regional datasets of projected SLR that take into account local forcing and tide gauge measurements while researchers continue to develop improved methods for modeling regional effects (Perrette et al. 2013).

Regional SLR models combined with detailed digital elevation models (DEMs) can aid understanding of examine future land inundation. Nicholls and Mimura (1998) summarized potential land loss due to inundation using this methodology in Europe, West Africa, and Asia. Other studies have combined these data and decreased the scale of analysis to observe impacts at local levels (Josenhans et al. 1997, Voris et al. 2000, Marfai & King 2007, Knowles 2010, Becker et al. 2012). Instead of future projections, SLR analyses on islands often focus on understanding historic water level patterns leaving questions of future inundation unanswered

(Josenhans et al. 1997, Voris et al. 2000, Becker et al. 2012). While other studies have looked at the potential impact of SLR, few have made attempts to quantify the number of buildings impacted and many of these studies do not take into account more recent SLR projections based on emission pathways modeling (Dennis et al. 1996, Han et al. 1996, Lewsey et al. 2004).

While SLR impacts have the potential to affect all coastal areas, they pose a unique threat to Small Island Developing States (SIDS). Despite being some of the lowest emitters of greenhouse gases, SIDS are “disproportionately exposed to [environmental] shocks”, therefore making it important to understand the impacts of climate change on these islands (Hurley 2015). While SIDS have been instrumental in securing international goals to limit global warming to under 1.5°C (Ourbank & Magnan 2017), very few studies have quantified land inundation and human displacement for SIDS (Brown et al. 2018, Kench et al. 2018) and none have attempted to quantify future inundation in French Polynesia, although some studies have used records of sea-level from the mid- to late- Holocene as a “baseline for natural variability in sea level and global ice volume prior to the Anthropocene” (Hallman et al. 2018). French Polynesia is a non-United Nations (UN) member of UN SIDS regional commissions and is home to Mo’orea. We present a case study using regional SLR models to examine the impacts of rising water on the island of Mo’orea.

1.2 Case Study of Mo'orea

Mo'orea is a member of the Society Islands within French Polynesia, along with Tahiti and Bora Bora (Fig. 1).

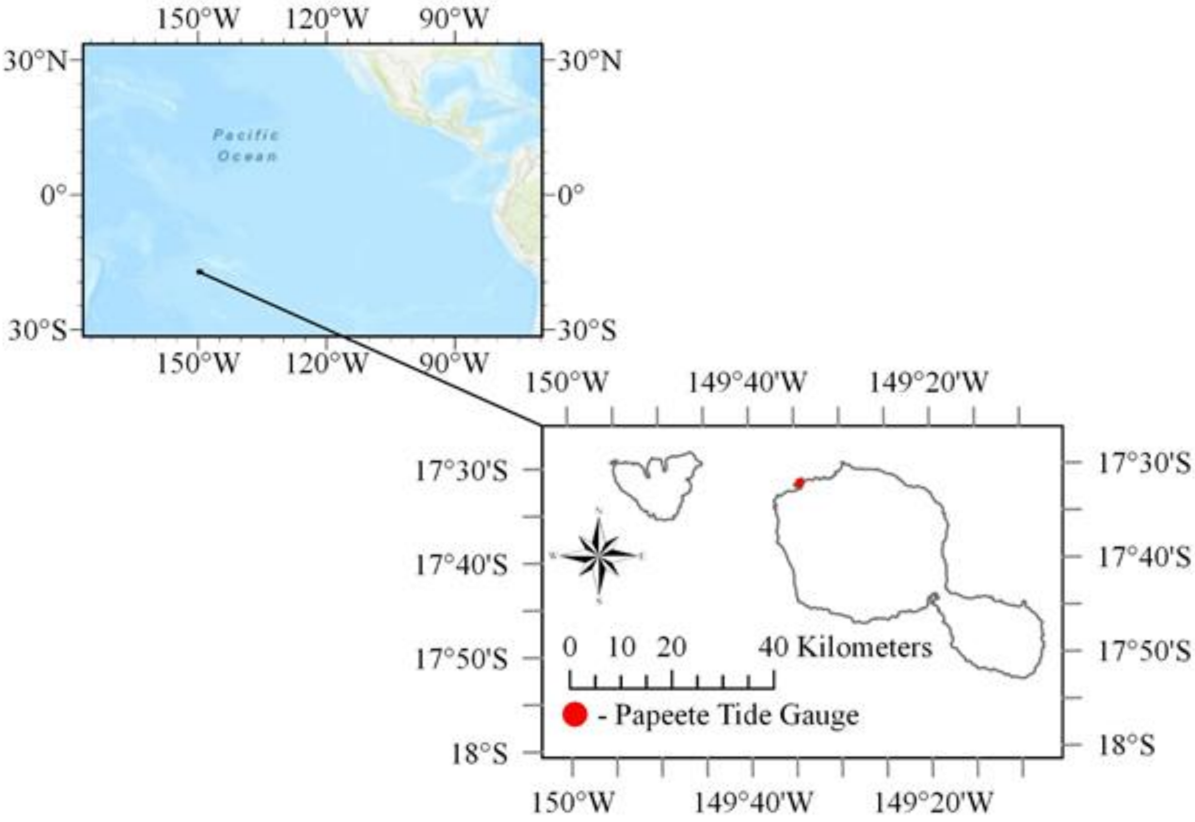

Figure 1. a) Location of Mo'orea in South Pacific Ocean and b) map of islands of Mo'orea (left) and Tahiti (right). Location of long-term water level gauge at Papeete is indicated.

As a 13,000 hectare volcanic island, Mo'orea is mountainous with the majority of low-lying land found around the perimeter of the island along the coast line. Most of Mo'orea's 18,071 inhabitants (ISPF 2017) and infrastructure lie within 0.5 km of the shoreline. Mo'orea has a single road circumscribing the island and much of the island's economy is derived from agricultural sources vulnerable to salt water intrusion. SLR presents a threat to the movement of goods and the livelihood of much of the island's population, with the majority of Mo'orea's infrastructure being situated on low flat land (Fig. 2).As such, understanding how SLR will impact the landscape and built environment is imperative for planning and adaptation efforts.

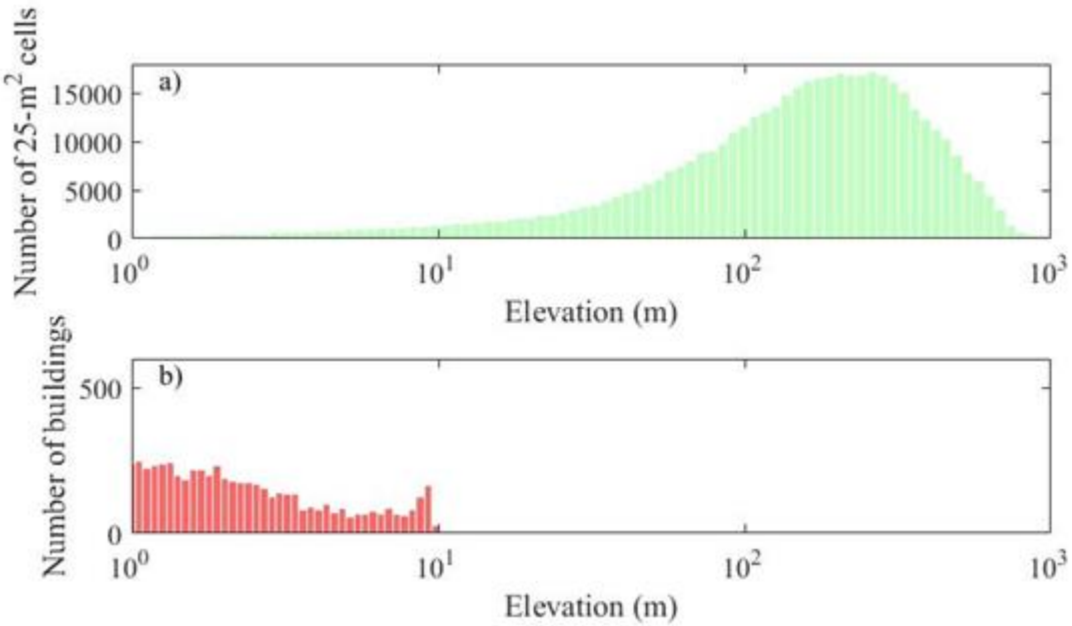

Figure 2. Histogram of a) land area and b) buildings by elevation.

Using the IPCC RCP 4.5 and 8.5 models, a DEM from 2015, an infrastructure database, and census data, we address three questions about how SLR will impact the island of Mo'orea: 1) What are the temporal and spatial patterns of land inundation; 2) how will island infrastructure be impacted by inundation; and 3) what is the spatial distribution and amount of people that will be displaced by SLR. Answering these questions will help inform stakeholders regarding policy and adaptation plans.

2. Data and Methods

2.1 Data

This study uses four primary sources data, (1) a LiDAR dataset (2) SLR models (3) an infrastructural database and (4) a 2017 island wide census.

2.1.1 LiDAR

LiDAR data was provided via the Mo'orea LTER program (Fugro LADS Corporation 2015). Collected in 2015, this data set is an ASCII point cloud with a resolution of 5x5 m with occasional holes where outliers were removed (Fugro LADS Corporation 2015). This point cloud extends from Mo’orea’s outer reef to the 10 m isocline with the center of the island not represented.

2.1.2 SLR Models

Historical sea level data was obtained from this source. This gauge has collected daily data spanning from 1975 to present and is located on the island of Tahiti, located just Southeast of Mo’orea (Fig. 1).

SLR models used in this study come from the IPCC 5th Assessment Report (AR5) using the likely range determined under RCP 4.5 and 8.5. This time series dataset has a yearly resolution spanning from 2007 to 2100 (Fig. 3) (Church et al 2013).

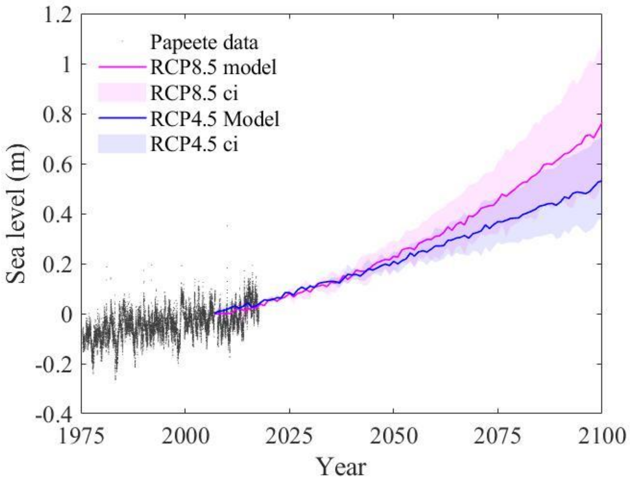

Figure 3. Observed and projected sea level at Papeete, French Polynesia. Observed values span 1975 – 2018. Predicted values from IPCC models span 2007-2100. Shading indicates 5% to 95% confidence intervals.

These RCPs are used in climate models that project future glacial ice sheet loss, ocean thermal expansion and other variables that affect SLR. RCP 4.5 and 8.5 are often used in SLR studies reflecting the “Best Realistic Scenario” and the conservative “Business as Usual Scenario” (Riahi et al. 2011, Chaturvedi et al. 2012). RCP 4.5 assumes there will be a medium to high level of effort to curb carbon emissions, with a gradual switch from fossil fuel energy generation to renewable energy, and a moderate decrease in the rate of population growth (Thomson et al. 2011, Nazarenko et al. 2015). Current emissions are tracking more closely to the RCP 8.5 pathway, which assumes low efforts to curb carbon emissions, the continued use of fossil fuels for energy generation, and a continued increase in population growth (Riahi et al. 2011, Nazarenko et al. 2015).

2.1.3 Infrastructural Database

Files of the island's infrastructure were shared via the French Polynesian Government Service de l'Urbanisme (Gouvernement de la Polynesie Française 2014). This database contains the location and footprint of each of the island's buildings along with information on the building. There are no known omissions of buildings and there are nearly 1000 buildings on the island as of 2010, when these data were recorded. These buildings are sorted under eight different classifications: housing, energy, education, public, professional, remarkable, cultural and agricultural. In addition to this classification, each building also has an attribute describing its specific use, such as police stations under the classification of public.

2.1.4 Census Data

Population information was acquired from Mo'orea's 2017 census (ISPF 2017). The census is divided into each of the five jurisdictions of the island (Afareaitu, Haapiti, Papetoai, Paopao, and Teavaro) showing each of the municipal populations. The census data being divided into each of the jurisdictions allowed for better accuracy in estimating human displacement.

2.2 Methodology

2.2.1 Quantifying Land Inundation

The LiDAR point cloud was first converted to a DEM using tools within ESRI's ArcGIS Pro software using the geodetic parameters of International Terrestrial Reference Frame (ITRF) 1992 with a Universal Transverse Mercator (UTM) Zone 6 South projection. The DEM has the same resolution as the LiDAR data set with gaps filled using the *point to raster* tool within Arc. It was further processed in order to remove all bathymetric cells, leaving only cells from the coast to the 10m isocline. SLR models were zeroed to a 2015 initial date in order set SLR baselines to match the 2015 DEM. Tide data gathered from Papeete were plotted alongside SLR models in order to verify that early years of SLR coincided with current water level patterns. Using RCP 4.5 and RCP 8.5 models, we extracted the predicted amount of SLR at a decadal interval from 2020 to

2100. In lieu of complex geological modeling, we followed previous studies' methodologies that operate under the premise that land becomes inundated once it is below sea level *and* is connected to the ocean or adjacent land that is also inundated (Kuhn et al 2011). Working under this framework and our timestamps, we used the *Raster Reclassify* tool within ArcGIS Pro, setting all DEM cells above the predicted amount of rise to 0 (not inundated) and everything below to 1 (inundated). To mitigate the effects of bathtub modeling, we then removed all cells in the rasters that were not connected to the ocean or adjacent to other inundated cells. The resultant raster contains cells of the DEM that are predicted to be inundated after considering low lying areas that are safeguarded by cells of high elevation. This was repeated for each decade, resulting in nine rasters showing which portions of the island would become inundated in each decade. This method of quantifying land inundation assumes that land geomorphology will remain the same throughout the duration of the study period, so elevations are not changing over time. The IPCC models take into account local forcing such as subsidence. To quantify the area of land projected to be inundated under each decade, the total number of cells in each of the nine rasters was multiplied by the geographic area of a single cell in square meters. To quantify the percentage of land inundated under each decade, the total area of projected inundation was divided by the total area of the island.

2.2.2 Quantifying Structural Inundation

To determine which buildings became inundated each decade, ArcGIS Pro's built in *Sample* tool was used. This tool creates a point at the center of each building, "sampling" through the centroid, in order to classify buildings as inundated in each decade. If the points used in the Sample tool intersected a binary decadal inundation raster, the pixel was demarcated as inundated in that decade. This method provided the number of buildings inundated per decade, cumulatively and as a percent of total buildings. In calculating building inundation in future decades, an assumption was made that all buildings will remain static, signifying that buildings will not be constructed or demolished and their uses will not change. This assumption was made as there is no accurate way to predict infrastructural change.

2.2.3 Quantifying Human Displacement

The number of people displaced by inundation was computed by dividing population census numbers for each of the five jurisdictions of the island by the number of pixels containing buildings identified as “housing”. The sum of people displaced was calculated based on the decade in which each building was predicted to be inundated. This methodology assumes that populations remain static, assuming that people do not move from one jurisdiction to the next and there is no immigration or emigration to the island. This assumption was used due to variable growth rates and low confidence in accurately predicting population change beyond the next decade.

3. Results

3.1 Land Inundation due to SLR

By the end of the century, Mo’orea is projected to have 245 hectares of land inundated under RCP 4.5 and 456 hectares of land inundated under RCP 8.5 (Fig. 4). While this only represents 2% and 3.5% of the island respectively, land inundation is concentrated near the coast, where the greatest amount of people reside. The rate of land inundation grows exponentially over time in both scenarios. From 2020 to 2070, the amount of land inundated in a single decade does not rise above 45 hectares. However, under RCP 8.5, there is an increase of inundation from 2071-2080, where 147 hectares of land is projected to be inundated in a single decade. RCP 4.5 shows this same pattern occurring a decade later, where over 100 hectares of land is projected to be inundated.

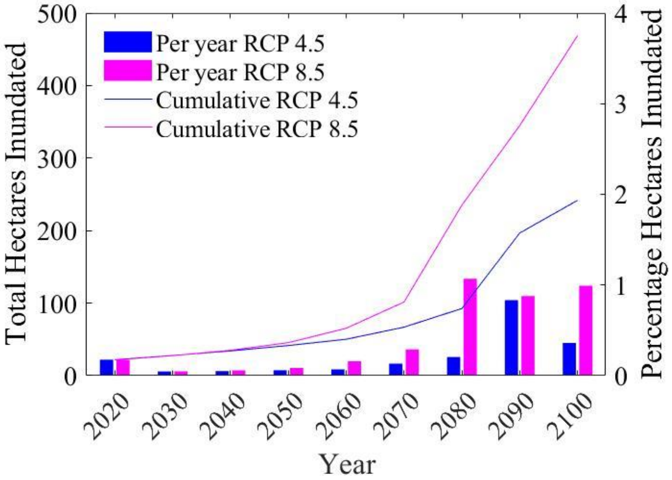

Figure 4. Hectares of overall island inundation in Mo'orea by year. Total hectares inundated is show on the left axis, while inundation as a percentage of the total island is shown on the right.

In many areas, inundation will occur away from present shoreline. From rivers and creeks that egress at the coast, seawater will spread inland and inundate low regions between the mountains and the elevated coast. The region around the airport in the northwest corner of the island is an example of this process (Fig. 5 c, g). Inundation begins near the mouth of a river in the northeast portion of the airport. It is from this access point that almost the entire airport becomes inundated before the coastline nearest the airport by 2090 under RCP 4.5 and by 2070 under RCP 8.5. The same process is seen at the city of Maharepa (Fig. 5 b, f), and at the Viare ferry docks (Fig. 5 d, h), where the majority of tourists and residents enter and leave the island.

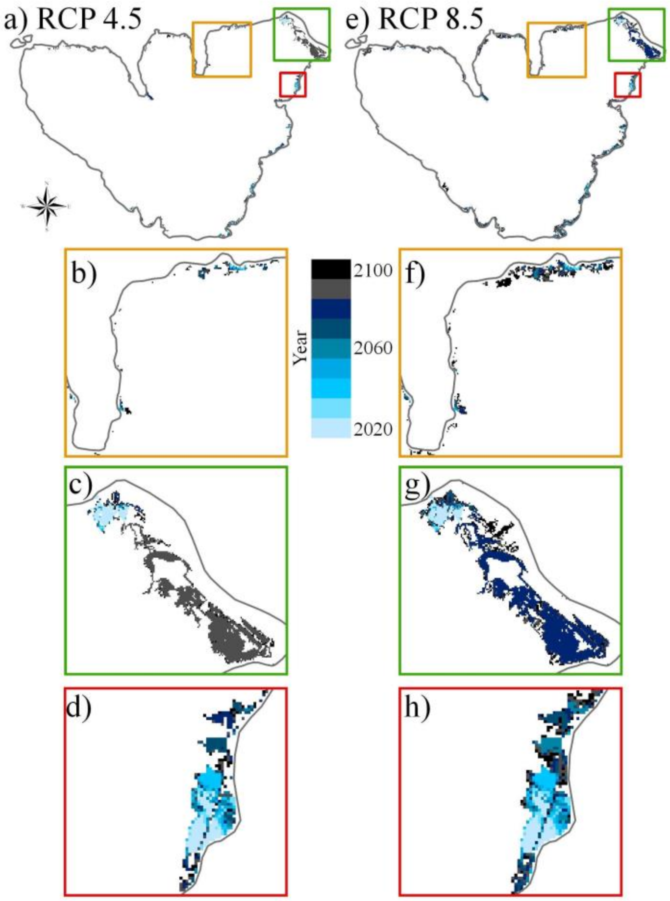

Figure 5. Inundation projected under RCP 4.5 (a-d) and RCP 8.5 (e-h). Insets for Paopao Bay and Maharepa (b, f), airport (c, g), and ferry (d, h). Colors represent inundation for each decade.

3.2 Infrastructural Inundation Due to Land Inundation

The inundation model presented here projects that by 2100, 723 buildings representing 7% of all buildings will be impacted by rising sea level under RCP 4.5 and up to 1900 buildings or 17% of total buildings impacted under RCP 8.5 (Fig. 6). For infrastructure, differences between the scenarios are distinct, with RCP 8.5 predicting 250% more buildings impacted than RCP 4.5. Like overall island inundation, earlier decades show little difference between scenarios. However, past 2050, the quantity of buildings inundated under RCP 8.5 becomes notably larger compared to RCP 4.5. There is no decade in which inundation rates increase disproportionately to prior decades. There is a gradual increase of buildings impacted with each consecutive decade.

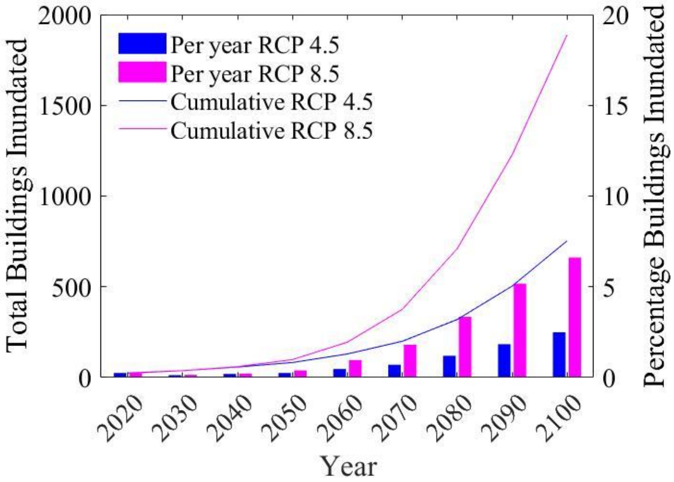

Figure 6. Total predicted building inundated on Mo'orea by year. Number of buildings inundated is show on the left axis, while buildings inundated as a percentage is shown on the right.

Separating total buildings into different classifications reveals new patterns (Fig. 7a). By classification, housing will be the most impacted by SLR. By 2100, 1555 homes, 18% of total homes, will be inundated under RCP 8.5 while 613 homes, about 8% of total homes, will be inundated under RCP 4.5. These percentages are larger than aggregated building estimate percentages. Public facilities comprising of hospitals, schools, and government facilities will also be heavily impacted (Fig. 7c). While comprising much less of the total amount of infrastructure, almost 20% of the island's public infrastructure will be inundated under RCP 8.5 by 2100. Public buildings will not be impacted until 2080 under RCP 8.5 and not until 2100 under RCP 4.5. Under this classification, only five buildings are expected to be impacted under RCP 8.5 by 2100. The first building inundated in this classification is expected to be inundated between 2071 and 2080 and is a town hall within the district of Te'avaro. The additional four buildings in this classification projected to be impacted are expected to be inundated in the last decade of the study and include two of the four hospitals on the island and two administrative buildings. Other categories of buildings will be impacted to a lesser extent. Eleven percent of professional (private) infrastructure are projected to become inundated by 2100 under RCP 8.5, an increase in inundation of 6% compared to RCP 4.5 (Fig. 7b). This category also experiences delayed inundation with impacts not predicted until 2060. Within this classification, hotels and banks will be the most impacted. Farmland is one of the sectors most impacted by SLR (Fig. 7d). By 2100, almost 25% of agricultural fields will be inundated under RCP 8.5 and almost 15% under RCP 4.5. Much of

Mo’orea’s agriculture is near the low-lying coastal access points, thus large amounts of inundation are predicted to occur as early as 2020, making agriculture one of the sectors first impacted by rising sea level. Coconut plantations are the only agricultural lands projected to be impacted by SLR until 2040. Subsistence agriculture originating on the island will not be impacted until 2071. The energy infrastructure of Mo’orea is the least impacted of all building types, with no inundation predicted under both RCPs.

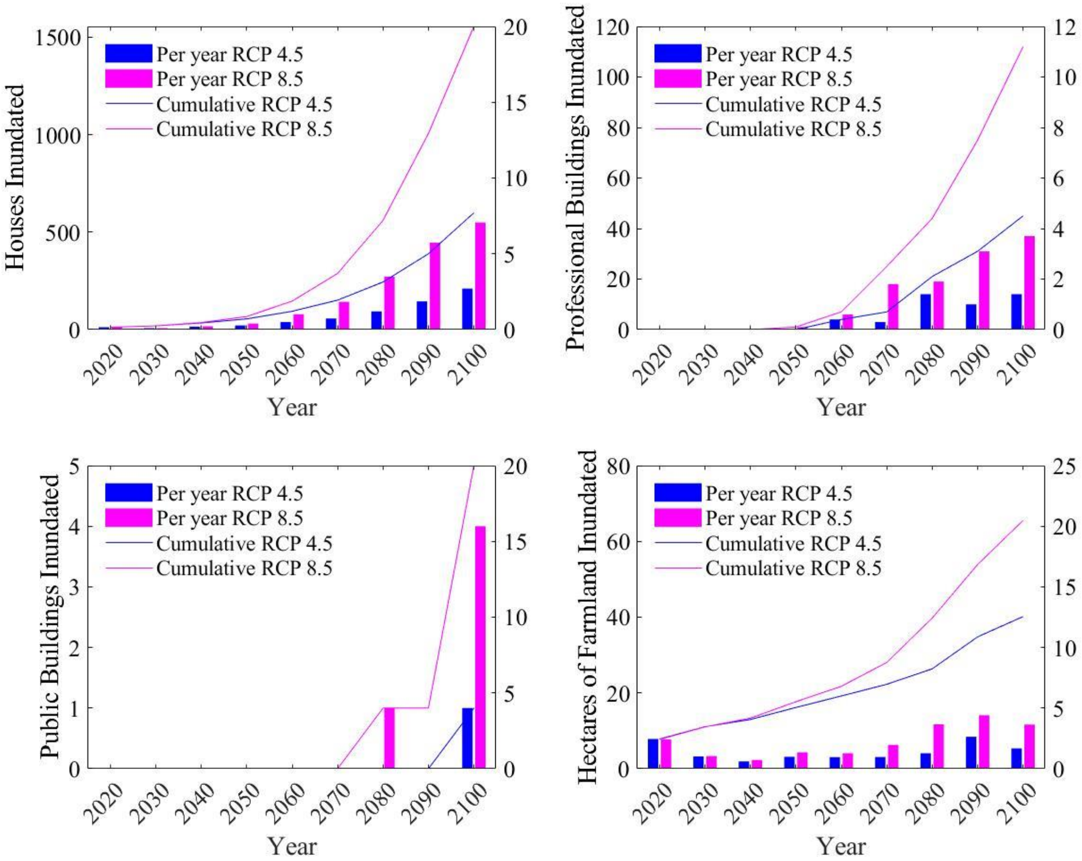

Figure 7. Predicted number of a) hectares of houses, b) professional, c) public buildings, and d) hectares of farmland inundated. Left axis shows total inundation, right axis shows inundation as percentage.

Disaggregating infrastructure inundation reveals spatial patterns of flooding (Fig. 8). For example, in the Te’avaro region (Fig. 8 c, f), inland buildings are predicted to be inundated first following low elevation pathways from the coast followed by coastal building inundation in later decades. The city of Ma’atea (Fig. 8 d, g) shows a different pattern in which multiple buildings directly on the coast become inundated as early as 2020 and inland inundation follows in the coming decades. The city of Maharepa shows inundation patterns representing a combination of both processes. On the western side of the city, inundation will first occur farther inland due a river and relatively high coastline elevation while on the eastern side inundation will occur first on the relatively low coastline.

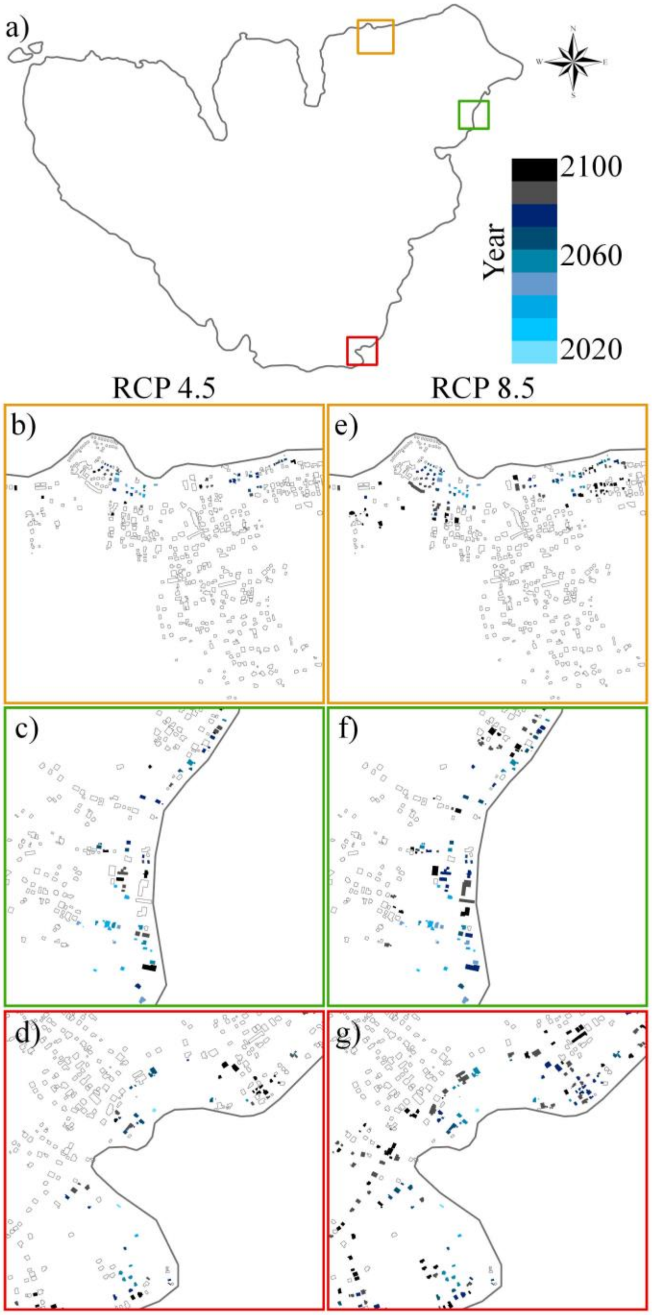

Figure 8. a) Predicted inundation of example developed areas around Mo'orea under RCP 4.5 (b-d) and RCP 8.5 (e-g). Insets for Maharepa (b, e), Te'avaro (c, f), and Ma'atea (d, g)

3.3 Human Displacement

Housing inundation will lead to human displacement. Our analysis estimates that human displacement under RCP 8.5 is more than 250% higher than predicted under RCP 4.5 (Table 1). Of the 17,781 inhabitants of Mo'orea, RCP 8.5 predicts that about 3,556 people will be displaced by 2100. Displacement will start relatively slowly, with less than 1% of the population predicted to be displaced by 2050. However, the displacement in the 2070's alone will equal the total displacement from 2015 to 2069. Rates of displacement continuously rise after this decade. Most of this displacement will occur in the district of Te'avaro.

Table 1. Cumulative displacement of residents of Mo'orea due to SLR inundation.

Year	IPCC 4.5	% Loss	IPCC 8.5	% Loss
2020	30.23	0.17%	24.93	0.14%
2030	48.68	0.28%	59.76	0.34%
2040	70.34	0.40%	70.34	0.40%
2050	116.75	0.67%	148.45	0.85%
2060	203.16	1.16%	328.50	1.88%
2070	334.04	1.91%	667.11	3.82%
2080	524.10	3.00%	1283.02	7.35%
2090	872.01	4.99%	2259.53	12.94%
2100	1358.23	7.78%	3555.97	20.36%

4. Discussion

Our analysis yields important patterns for policy makers and practitioners and shows that sea-level rise will impact the population and infrastructural integrity of Mo'orea. As a percentage, SLR will inundate less than 4% of the total island of Mo'orea. However, due to the mountainous nature of the center of the island, almost all the inhabitants of the island live near the coast where inundation is predicted to be widespread. Inundation will impact the eastern and northern portions of Mo'orea more than the western portion (Fig. 5 a, e). This inundation becomes particularly problematic as the eastern portion of the island contains critical infrastructure, such as hospitals, schools, and transportation services, mountains prevent people from moving inland, and sediment accretion over millennia has made the coastal borders the more habitable portion of the island.

Our results indicate that sea level for most of the century is predicted to inundate less than five hectares of land per year. This slow rate of rise provides time to develop policy and mitigation strategies. While inundation will occur on parts of the island with low coastal barriers, inundation will also occur in areas between higher coastlines and the mountains via inland access points such as low-lying parcels of land and rivers that egress to the coast. Once sea level breaches these access points, such as in the northwestern corner of the airport, saltwater will intrude inland, often causing more inundation inland than in areas along the coastline. Managing these points in the next decade may be a more cost effective and efficient method to prevent inland inundation than focusing on widespread coastal barriers.

While most of the impacts to buildings are predicted to occur in the second half of the century, locations such as Te’avaro will experience inundation within the next decade and others such as Haapiti on the western shore will experience almost no impact throughout the study period. This dichotomy highlights that inundation is not uniform throughout the island and impacts will be unevenly distributed. Buildings impacted include all parts of society ranging from schools, hospitals, town halls, police stations, banks, and hotels. Fortunately, the energy infrastructure is relatively safe as it is located more in the interior of the island. Mo’orea has only one primary road (Fig. 4). This road circumnavigates the coastline and is important to the island economically and in terms of disaster response. While the road is elevated relative to surrounding land and predicted to be safe from SLR until mid-century, portions of the road will be eventually inundated under both RCPs. Inundation in the low-lying areas around this road can cause flooding during storm events and prevent regular maintenance due to the road not being designed to act as a bridge. For agriculture, coconut farms are going to be disproportionately impacted comparatively to other agricultural land due to their proximity to island water sources. Our models also do not take into account other concerns with SLR that affect farms such as salt water intrusion, which could occur long before the farmland itself is inundated and affect the overall quality of life of island inhabitants, with concerns ranging from economic stability to nutritional deficits if the land is no longer arable.

Finally, losses of homes will drive human displacement. The analysis indicates that between 200 and 300 people will be displaced by mid-century and thousands more by 2100. Most of this displacement will occur on the northern and eastern portions of the island, which could translate to migration to the western areas of the island where inundation is comparatively less. Before people are forced to move, plans for the associated changes in waste, food distribution, and jobs will need to be developed (Stapleton et al 2017).

Mo'orea will need to take steps to prepare for flooding and human displacement. As rivers represent one of the prominent modes of inundation, the installation of barriers or flood control structures at river mouths may considerably reduce the amount of inundation that occurs. Other steps will involve supporting the eastern part of the island as damages occur and preparing the western part of the island for potential population movements, including establishing new entry points to the island that are in areas not predicted to be inundated. The western part of the island is less developed than the eastern half and moving hospitals, schools, and homes will take time and preparation. Portions of the main road that circumscribes the island is projected to be impacted by SLR inundation. As this road was designed to act as a road on dry land, and not as a bridge, it will require adaptations in order to allow for the movement of goods and relief to other impacted areas of the island. Development of the islands interior may provide space for movement away from coastlines.

Adjusting to the economic shocks will present a challenge as much of the island's economy is centered on agricultural products that will be heavily impacted by SLR. This may be difficult to mitigate as the mountainous nature of the island limits potential conversion to arable land. Measures to support people who lose jobs should be an important facet of the island's climate mitigation policy.

5. Conclusions

Using SLR models based on RCPs 4.5 and 8.5, we have shown inundation has the potential to impact hundreds of hectares of land, thousands of buildings, and thousands of people. As sea level is predicted to rise twice as high under RCP 8.5 compared to RCP 4.5, it is in the overall benefit for Mo’orea that the global community push for policies that will limit global emissions so that SLR will track more closely to the latter. We show that while land inundation will occur within the next decade, land will mostly be flooded after 2070. Infrastructural inundation similarly starts in 2020, but notable impacts will not be seen until 2050. Our study shows that hospitals, schools and farms will all be heavily impacted resulting in increased hazards for the people who live on the island. Relocating schools and highly vulnerable buildings and providing structural reinforcements early to prevent flood inundation from storm events will be necessary to mitigate the worst of SLR impacts. Furthermore, the buildings nearest the coast are not necessarily the first buildings to be inundated and understanding how water will intrude inland will be key to preventing and mitigating inundation. As houses are inundated, people will be displaced. As the western coast of Mo’orea is projected to be the least impacted, an emigration of people from the northern and eastern sides to the west is possible. It is our hope that these results can be used as a guide for government and policy makers to plan for future SLR and mitigate its impacts

Acknowledgements

Airborne LIDAR bathymetry data collection and processing was supported by the National Science Foundation LTER program (OCE-1637396) and Physical Oceanography program (OCE-1435133). Regional sea level data from IPCC AR5 were provided by the Integrated Climate Data Center (ICDC, icdc.cen.uni-hamburg.de) University of Hamburg, Hamburg, Germany. Land use data were kindly provided by the Service de l’Urbanisme in Papeete, French Polynesia. We thank Dr. Neil Davies for facilitating data access. This research was completed under permits issued by the French Polynesian Government (Délégation à la Recherche) and the Haut-commissariat de la République en Polynésie Francaise. Maps and figures shown in this paper were made using ArcGIS® software by Esri. ArcGIS® and ArcMap™ are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved.

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