

# A study on the effects of sea level rise across the world

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## Abstract

*This study examines the impacts of sea level rise on coastal communities around the world. The research will assess the effects of sea level rise on economic, social and environmental aspects, as well as the preparedness of the coastal communities and their adaptive capacity. This study will use a combination of qualitative and quantitative methods, including interviews, surveys, and literature reviews. The results of this study will provide important insights into the potential effects of sea level rise on coastal communities and the strategies they can use to mitigate the impacts of climate change.*

## Keywords

*Sea level rise, global effects, climate change, coastal flooding, shoreline erosion, ocean acidification, extreme weather, biodiversity loss, food insecurity.*

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## INTRODUCTION

Sea level rise is a phenomenon that is increasingly becoming an issue of global concern. Predictions by the United Nations Intergovernmental Panel on Climate Change (IPCC) suggest that global sea levels could rise by as much as one meter by 2100, with greater increases predicted in later centuries. This rise in sea levels has wide-reaching implications for coastal communities and populations around the world, as well as for global climate, habitats, and ecosystems. To better understand how rising sea levels could affect different regions of the world, this study will examine the potential impacts of sea level rise in various areas and draw conclusions about the global implications of this phenomenon. The primary objective of this study is to assess the effects of sea level rise on different regions of the world, and to identify potential strategies for mitigating the impacts of this phenomenon.

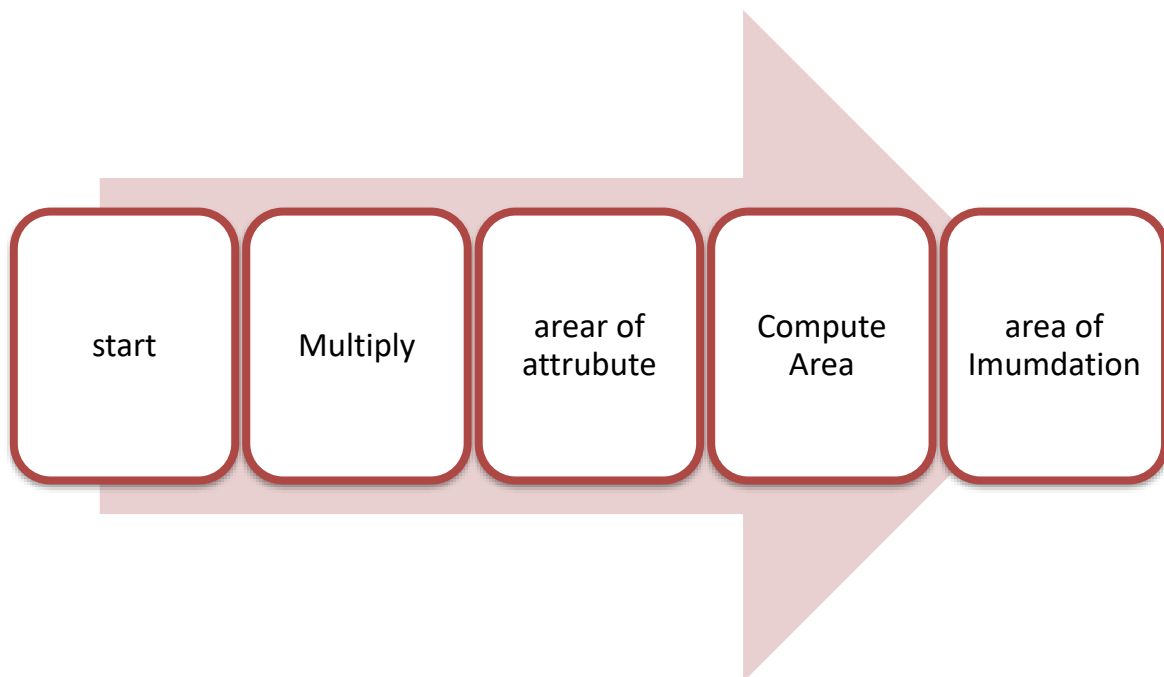
As sea levels continue to rise due to global warming, it is important to understand the humans and the environment. This study will examine the effects of sea level rise across the world and the potential implications for humanity. The study will focus on the effects of sea level rise on coastal communities, ecosystems, and infrastructure. The implications for humans and the environment will be discussed to provide an understanding of the potential impacts of sea level rise.

It affects the world in many ways, from flooding coastal areas to altering ecosystems and water supply sources. This study aims to analyse the effects of sea level rise across the

world, primarily focusing on the economic, environmental, and social impacts. The study will explore the current and predicted future effects of sea level rise in different regions and countries, as well as how local governments could better prepare for and mitigate the impacts of sea level rise. In addition, this study will examine the current and anticipated economic and social costs associated with sea level rise, and how these can be reduced in the future. Finally, the study will analyse the potential strategies and policies that governments and citizens can implement in order to better prepare.

## POTENTIAL IMPACTS OF SEA LEVEL RISE ON COASTAL CITIES AND COMMUNITIES

This study would investigate how rising sea levels could affect coastal cities and communities around the world. It would look at the potential impacts that could arise from increased flooding, erosion, and storm surge, with a focus on the economic, social, and environmental consequences. The study would also explore possible adaptation strategies and solutions that could be implemented to help mitigate the potential impacts of sea level rise [1]. Additionally, the study would analyse the potential scenarios of sea level rise in the future and their potential impacts on coastal cities and communities. This could include a look at the projected costs and benefits of adapting to sea level rise, as well as the capacity of coastal cities and communities to respond and adapt. Finally, the study would examine the potential for increased collaboration between governments and other stakeholders in order to address the global impacts of sea level rise.



**Figure 1:** processing of identifying Inundation  
(Source: made by the author)

This study would explore how sea level rise could potentially impact coastal cities and communities across the world. It would analyze the potential environmental, social, and economic effects of sea level rise on different coastal areas [9]. It would also focus on the different adaptations and strategies that could be implemented to mitigate the damage from rise. Additionally, it would explore the potential ways to reduce the risk of flooding from rising sea levels and assess potential risks to certain areas and populations. Finally, the study would assess the possible economic and social costs and identify any potential benefits.

The research would focus on the physical effects of sea level rise, such as increased flooding, erosion, and saltwater intrusion, as well as the social and economic impacts of displacement, relocation, and other socio-economic consequences of sea level rise. The study would also investigate the potential for adaptation and mitigation strategies, such as coastal protection and relocation, to reduce the effects of sea level rise on coastal communities. The research would analyse the effects of sea level rise on coastal cities and communities in different parts of the world, as well as the potential for adaptation and mitigation strategies to reduce the impacts of sea level rise [2]. Finally, the study would identify the most effective strategies for responding to sea level rise and mitigating its effects, and evaluate the effectiveness of proposed solutions.

The main potential impacts of sea level growth on coastal cities and communities include increased flooding, erosion, and storm surge risk, as well as salinization of freshwater sources, destruction of infrastructure and habitats, increased risk of infectious disease, and displacement of populations. In addition, sea level rise may increase the intensity and frequency of extreme weather events such as hurricanes,

leading to further destruction and displacement [8]. On an economic level, sea level rise can lead to reduced tourism, higher coastal insurance premiums, and costly damage to infrastructure such as roads, bridges, and ports. All of these potential impacts can be particularly severe in low-income areas, where resources for adaptation are often limited or non-existent. In order to mitigate the effects of sea level rise, cities and communities must develop strategies to reduce greenhouse gas emissions and increase resilience to climate change. These strategies can include restrictions on coastal development, improved flood protection infrastructure, and coastal wetland restoration.

#### **CHANGES TO COASTAL ECOSYSTEMS AND BIODIVERSITY**

Sea level rise is a global phenomenon that is affecting coastal ecosystems and the biodiversity that inhabit them. As sea levels rise, habitats are being lost and species are being forced to migrate due to their inability to keep up with the rising water levels. This can lead to a decrease in species diversity, as well as the disruption of existing food webs and the destruction of essential breeding grounds. The effects of sea level rise can vary depending on the region [3]. In areas near the equator, the additional influx of water can lead to salt water intrusion and the destruction of mangrove forests, threatening the livelihoods and food security of local communities. In temperate regions, rising sea levels can lead to beach erosion and the destruction of important breeding grounds for marine species. In polar regions, the melting of sea ice can lead to the displacement of polar bear populations and the disruption of essential food sources, such as krill and cod. Sea level rise can also affect the ocean's chemistry. As the water levels rise, the concentration of carbon dioxide in

the ocean increases, leading to ocean acidification. This can have an adverse effect on the health of coral reefs, as well as other marine organisms such as shellfish and phytoplankton.

Sea level rise has had a significant impact on coastal ecosystems and biodiversity around the world. As sea levels rise, coastal habitats, such as coral reefs and salt marshes, are exposed to higher levels of salinity and ocean acidification, which can disrupt delicate ecosystems [7]. Additionally, as the ocean encroaches further inland, habitats are lost, and species are forced to relocate to new areas, leading to a decrease in biodiversity in some areas. In addition to the effects on species diversity, sea level rise can also lead to increased erosion of coastal land, leading to the destruction of beaches, dunes, and other coastal features. This can lead to the displacement of habitats and species, as well as decreased access to resources, particularly for species that rely on coastal habitats for their survival.

Furthermore, hurricanes and typhoons, which can cause significant damage to coastal ecosystems, leading to a decrease in species diversity and disruption of habitats [4]. Additionally, flooding caused by sea level rise can also lead to the spread of disease and damage to infrastructure in coastal regions. In order to mitigate the effects of sea level rise on coastal ecosystems, it is important to ensure that coastal zones are managed sustainably, taking into account the needs of both humans and wildlife. Additionally, it is essential to reduce emissions of greenhouse gases, which are the primary cause of sea level rise.

As low-lying coasts become increasingly vulnerable to flooding, while coastal habitats are destroyed or altered due to the encroachment of saltwater. This can have direct impacts on marine species, as well as on the human activities that depend on these coastal ecosystems [5]. At the same time, sea level rise can cause changes to ocean circulation, salinity, and temperature—all of which can affect the abundance and diversity of marine species. As sea levels continue to rise, the loss of habitats and changes to ocean conditions can put many species at risk of extinction.

Widespread loss of biodiversity can also disrupt food webs and other important ecological processes, leading to further environmental impacts. In addition, sea level rise can have indirect effects on coastal communities. As the shoreline recedes, coastal infrastructure, such as roads, ports, and homes, may be destroyed or submerged. This can have severe economic and social consequences, especially in areas that are heavily dependent on coastal resources. In summary, sea level rise can cause a variety of direct and indirect impacts on coastal ecosystems and biodiversity [6]. These changes can have serious consequences for both ecosystems and human societies, and they should be taken into consideration when formulating strategies to mitigate and adapt to climate change.

## FLOODING, SALINITY INTRUSION, AND COASTAL EROSION

This would involve looking at how sea level rise affects coastal communities, ecosystems, and infrastructure [11]. Additionally, the study would include an assessment of potential adaptation and mitigation strategies that could be implemented to reduce the impacts of sea level rise. Finally, the study would also discuss the potential legal implications of sea level rise, such as property rights and international agreements.

Flooding is one of the most obvious and immediate effects of sea level rise. With sea levels rising, coastal areas are increasingly prone to flooding from storm surges, high tides, and heavy rainfall. As the amount of land available for coastal development decreases, the risk of flooding increases [19]. Floods can cause extensive damage to infrastructure, homes, and businesses, as well as disrupt vital economic activities. Saltwater intrusion is another major consequence of rising sea levels. Because of its density, saltwater is more difficult to move than freshwater, so when sea levels rise, saltwater can penetrate further into rivers and aquifers, disrupting the freshwater supply. This can have devastating effects on agriculture, drinking water, and other industries that rely on freshwater. Finally, coastal erosion is becoming an ever-increasing problem due to sea level rise [12]. As the sea level rises, waves become stronger and more frequent, eroding away at beaches and other coastal areas. This can lead to the displacement of communities, loss of habitats, and damage to infrastructure.

Sea level rise is a major environmental concern, as it can have drastic effects across the world. Flooding, salinity intrusion and coastal erosion are some of the most concerning impacts of sea level rise. Flooding is a major risk due to sea level rise as it can cause damage to infrastructure and disrupt the lives of people living along the coast [18]. Additionally, it can cause coastal habitats to be destroyed and the species that rely on them to be displaced. Salinity intrusion is another issue caused by sea level rise as saltwater can move further inland due to increased sea levels. This can cause damage to freshwater ecosystems and agricultural land, as saltwater is not suitable for growing crops. Lastly, coastal erosion is another issue caused by sea level rise as it can erode away the land, leaving behind unstable cliffs and bluffs that could collapse. This can cause damage to properties in the immediate area, as well as disrupt the lives of those living there. Sea level rise is a major environmental concern and its effects must be taken into account to minimize its impacts across the world.

Temperature (C)	Total sea level rise after 2000 years	
	Median	Range
1	2.3	1-4.5
2	4.8	2.5-7.2
3	6.6	3.6-9.7
4	8	5.6-12.2

**Table 1:** Total sea level rise after 2000 years  
(Source: made by the author)

### **IMPACTS ON HUMAN HEALTH, LIVELIHOODS, AND INFRASTRUCTURE**

Several vulnerable coastal communities are already facing the consequences of sea level rise, which include increased flooding, storm surges, and saltwater intrusion [13]. These impacts can have serious consequences on human health, livelihoods, and infrastructure. Higher sea levels can lead to more regular flooding, which can contaminate drinking water, leading to the spread of waterborne illnesses. Flooding can also damage homes and infrastructure, reducing the availability of essential services such as health care and education. Saltwater intrusion can lead to the loss of arable land, which can reduce food security and lead to economic losses for local communities. Sea level rise can also increase the risk of storm surges, which can lead to significant destruction of coastal infrastructure. These impacts can have devastating consequences, particularly for vulnerable populations.

Sea level rise has a wide range of impacts on infrastructure across the world [17]. As sea levels rise, coastal areas are increasingly vulnerable to flooding, storm surges, and other extreme weather events that can lead to loss of life, destruction of property, and displacement of communities. In addition, saltwater intrusion and contamination of fresh water sources affects public health, particularly for those living in low-lying areas. The destruction of ecosystems and habitats can lead to changes in the availability and distribution of food, water, and other resources, causing economic hardship and displacement. Rising sea levels also increase the risk of flooding and erosion to infrastructure, leading to increased maintenance costs, damage to infrastructure, and disruption of services.

Its effects are wide-reaching, with major impacts on human health, livelihoods, and infrastructure [14]. Rising sea levels can cause flooding and coastal erosion, leading to displacement of local populations, economic losses and damage to infrastructure. Furthermore, increased salinity of coastal waters and flooding can lead to contamination of drinking water sources and an increased risk of water-borne diseases. In addition, flooding can damage roads and other transportation infrastructure, making it more difficult to access resources and services. Finally, extreme weather events such as tropical storms, storm surges, hurricanes, and tsunamis are more likely to occur with sea level rise, further exacerbating the impacts [16]. All of these effects pose a serious threat to human health, livelihoods, and infrastructure, particularly in coastal regions.

Sea level rise is a major global issue that affects the health, livelihoods, and infrastructure of people around the world. As the ocean continues to warm, sea levels are rising, leading to increased coastal flooding, saltwater intrusion into freshwater sources, and extreme weather events. In coastal communities, this causes erosion, loss of homes and businesses, and displacement of people. Additionally, the flooding of coastal areas leads to water-borne diseases, such as cholera, typhoid, and dengue fever, and can contaminate drinking water

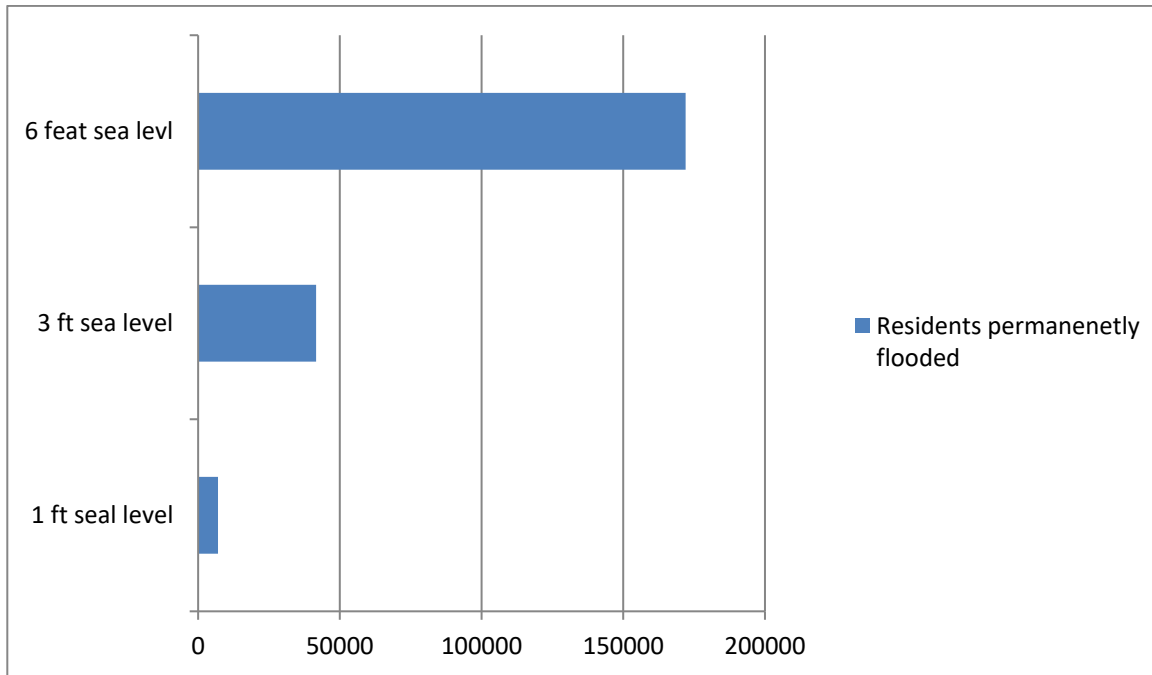
sources. The destruction of infrastructure can also lead to loss of jobs and economic hardship, as well as disruption to travel and transportation. It is clear that sea level rise is having a major impact on human health, livelihoods, and infrastructure in coastal communities around the world.

### **CHANGES TO OCEAN CIRCULATION, CURRENTS, AND GLOBAL CLIMATE**

Sea level rise is a global environmental issue that is expected to have a dramatic and long-term effect on the world's oceans and climate [16]. As sea levels rise, the water that currently lies along coastal areas will expand further inland, flooding many of these areas and damaging natural habitats. Furthermore, sea level rise disrupts the global ocean circulation system, which is the engine of our climate system. As the ocean circulation system changes, the amount of heat and moisture that the ocean is able to store and redistribute will also be altered. This will have a direct effect on global climate, as increased ocean temperatures and greater levels of moisture in the atmosphere will both contribute to a warmer world. Sea level rise will also cause coastal areas to be more vulnerable to storms and other natural disasters, which will further contribute to the destruction of habitats and loss of life [15]. Overall, sea level rise is a serious global environmental issue that will have a long-term effect on the world's oceans and climate.

Sea level rise is a major consequence of global climate change, posing a serious threat to coastal communities across the world. As sea levels rise, ocean circulation patterns are disrupted, which can change the temperature, salinity, and nutrient content of the ocean. This can, in turn, alter the movement of major ocean currents, such as the Gulf Stream, which has a direct impact on global climate. Sea level rise can also affect the frequency and intensity of extreme weather events. Rising waters can inundate coastal cities and towns, increase the risk of coastal erosion, and threaten the habitats of many marine species [30]. To mitigate the effects of sea level rise, it is essential for countries to invest in coastal protection measures, such as sea walls and systems for draining floodwaters.

As sea levels increase, the density of the ocean water changes, which can alter the way currents flow and redistribute heat around the world. This can lead to shifts in the patterns of global climate, with some regions becoming warmer or cooler than they were previously [29]. Additionally, rising sea levels can cause coastal flooding, which can affect both human populations and diverse ecosystems. As saltwater floods coastal regions, it can damage agricultural land, contaminate drinking water, and impact the livelihoods of those living in these areas. In addition, sea level rise can impact marine species, as their habitats and food sources may be contaminated or destroyed by saltwater intrusion. As the effects of sea level rise continue to intensify, it is crucial to take steps to mitigate its effects and protect vulnerable populations and ecosystems.



**Figure 2:** residents permanently flooded due to sea level rise  
(Source: made by the author)

### ECONOMIC AND SOCIAL CONSEQUENCES OF SEA LEVEL RISE

Rising sea levels are threatening coastal cities, industries, and ecosystems, creating economic and social consequences that have far-reaching implications [28]. Coastal communities are particularly vulnerable to floods, storm surges, and other disasters associated with sea level rise, which can lead to infrastructure damage and displacement of people. Low-lying areas such as Bangladesh, the Maldives, and other small island nations are particularly vulnerable to the effects of sea level rise, as they lack the resources and infrastructure to adequately protect themselves against the rising waters. In addition to the physical damage, sea level rise can also disrupt industries and ecosystems, leading to loss of livelihoods, decreased food security, and decreased access to clean drinking water [27]. Furthermore, the rising waters can also lead to increased salinization of coastal areas, leading to further degradation of the environment and further impacting the lives of those who rely on it.

Sea level Rising can cause coastal flooding, erosion, and saltwater contamination of freshwater sources, threatening coastal populations and their livelihoods [21]. In addition, rising sea levels can cause an increase in extreme weather events, resulting in further economic disruption and displacement. Furthermore, rising sea levels can bring about the displacement of people living in the coastal areas, including those who have relied on the ocean for their livelihoods. This can have far-reaching implications for the social and economic life of a region, including disruption to food supply, access to healthcare and education, and access to employment. Additionally, rising sea levels can also threaten the ecosystems of coastal areas, resulting in the loss of biodiversity and habitats. As a result, it is essential that

countries and communities take urgent steps to address the issue of sea level rise and its potential impacts.

Sea level rise is a phenomenon that is expected to have serious consequences on economies and societies the world over [22]. As the sea level rises, coastal areas are increasingly at risk of flooding and erosion, leading to displacement of communities, destruction of homes and businesses, and a disruption of coastal ecosystems. Furthermore, salt water intrusion can contaminate drinking water sources and damage agricultural land, leading to potential food insecurity. Sea level rise can also increase the severity and frequency of extreme weather events, such as hurricanes and tropical storms, and can damage infrastructure such as ports and airports. Finally, it can lead to a variety of psychological and health-related issues, such as anxiety and stress, as people are forced to confront the displacement, destruction, and uncertainty of climate change. In sum, sea level rise is a global issue that has far-reaching implications for economies and societies around the world.

Sea level rise is one of the most devastating effects of climate change, with potentially devastating implications for coastal communities, economies, and ecosystems around the world. Rising sea levels can cause coastal flooding, erode beaches, increase the risk of storm surge, and contaminate drinking water supplies [23]. In addition to the physical damage caused by rising sea levels, there are significant economic and social consequences. Coastal flooding can displace people from their homes and lead to large-scale relocations, leading to economic losses for local communities. In areas where large-scale relocations are not possible, people may be forced to remain in coastal areas and bear the costs of increased flooding and storm damage. Additionally, areas that rely heavily on tourism and fishing,

such as the Caribbean and South Pacific, are likely to experience significant economic losses due to the effects of sea level rise. Finally, sea level rise can lead to increased salinity in coastal areas, threatening important ecosystems and the species that rely on them [26]. Thus, sea level rise has the potential to cause significant economic and social disruption around the world, with potentially devastating consequences

Year	NOAA Int-Low (feet)	NOAA Intermediate (feet)	NOAA High (Feet)
2000	0	0	0
2030	0.52	0.76	1.26
2040	0.71	1.07	1.66
2050	0.92	1.42	2.59

**Table 2:** growth of sea level  
(Source: made by the author)

### EFFECTS ON FISHERIES AND MARINE RESOURCES

Rising sea levels are already having a significant impact on fisheries and marine resources, especially in coastal and low-lying areas. As sea levels rise, coastal areas become inundated, destroying fish habitats and spawning grounds, as well as disrupting the food chain [27]. In addition, it can lead to an increase in the salinity of coastal waters, which can damage marine ecosystems and lead to a decrease in the populations of many species of fish. Furthermore, higher water temperatures due to climate change can also have a major impact on fisheries, as many species of fish have specific temperature requirements for spawning and successful development. It is likely that the effects of sea level rise on fisheries and marine resources will become increasingly severe in the future, as sea levels continue to rise.

Sea level rise will bring saltwater into estuaries, lagoons, and other areas where freshwater fish species are found, threatening the livelihoods of millions of people who depend on those resources. Furthermore, ocean acidification caused by rising levels of carbon dioxide in the atmosphere will affect the ability of species to reproduce, grow, and survive. Ocean acidification, combined with the warming of ocean waters, will also cause coral reefs and other marine ecosystems to suffer, resulting in massive losses of vital habitat for marine species. Finally, sea level rise will also increase the intensity of storms, leading to increased flooding, erosion, and destruction of vital coastal and marine habitats.

As sea levels rise, fisheries and marine resources across the world are affected in a variety of ways. Higher temperatures, changes in salinity, and strong currents are all associated with sea level rise, and these factors can all have a significant impact on the health and abundance of fish and other marine resources. In addition to these direct effects, rising sea levels can also lead to changes in the distribution, migration, and

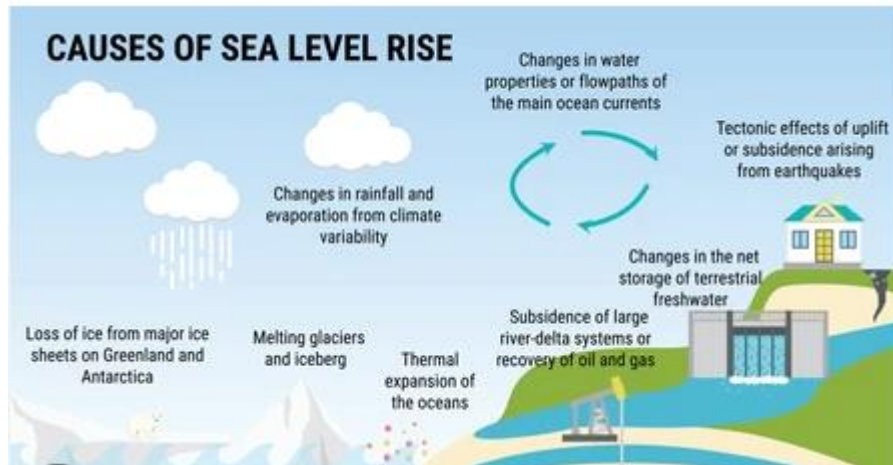
availability of fish and other marine species [25]. Warmer waters, for instance, can cause fish to move to different areas, and this can disrupt the local fishing industry. Higher sea levels can also lead to the destruction of coastal habitats, such as coral reefs, and this can result in the loss of essential breeding and feeding grounds for many fish species. In some areas, rising sea levels can also lead to increased flooding, which can lead to the contamination of vital fish spawning and nursery habitats. As sea levels continue to rise, the effects on fisheries and marine resources will likely become more pronounced and significant.

Sea level rise is having a significant and detrimental impact on the world's fisheries and marine resources. It is estimated that the majority of the world's fisheries are located in coastal areas, and as the sea level rises, these fisheries are being inundated with salt water, causing them to become unviable. This is leading to a decrease in the productivity of these fisheries, resulting in decreased catches, leading to a decrease in revenue. In addition, the salt water is also impacting the habitats of numerous species of fish, leading to a decrease in the abundance of certain species. Some species are even becoming threatened with extinction due to the impacts of sea level rise.

In addition, the increased salinity of the water is causing an increase in the number of invasive species, which can further disrupt the local marine ecosystems and threaten the livelihoods of local fishermen [24]. Moreover, the rise in the sea level is also impacting the coral reefs, which serve as important habitats for numerous species of fish and other marine life. As the sea level rises, it is resulting in the destruction of these reefs, leading to a decrease in the abundance of fish and other marine organisms that depend on these habitats. Therefore, the effects of sea level rise are having a significant and negative impact on the world's fisheries and marine resources.

### ADAPTATION STRATEGIES TO PREPARE FOR AND MITIGATE THE IMPACTS OF SEA LEVEL RISE

In order to prepare for and mitigate the impacts of sea level rise, it is important to develop adaptation strategies. These strategies can include improving coastal infrastructure to protect against flooding, restoring coastal marshes and wetlands, and relocating or elevating existing buildings, roads, and other infrastructure. Additionally, improving land use and development practices, such as limiting coastal development and managing urban runoff, can help reduce the impact of flooding and erosion. Finally, increasing public education and awareness about the risks of sea level rise can help people become more prepared and more resilient when faced with the impacts of climate change. By implementing these strategies, we can reduce the risk of sea level rise and protect our coastal communities.



**Figure 3:** Causes of sea level rise  
(Source: Zanna et al. 2019 [13])

In order to prepare for and mitigate the effects of sea level rise, a variety of adaptation strategies can be employed. Coastal communities can use a combination of structural, non-structural, and nature-based approaches. Structural strategies may involve constructing or elevating coastal defences such as seawalls, dykes and levees, or building artificial reefs to reduce wave energy. Non-structural strategies may involve relocating vulnerable infrastructure and community's further inland, or implementing regulations such as zoning and land use planning [13]. Nature-based solutions include restoring wetlands and mangroves, which can provide natural buffers against flooding and reduce wave energy. Other strategies include investing in early warning systems, improving emergency response plans, and promoting public awareness campaigns to educate people on the risks associated with sea level rise. Implementing these strategies can help reduce the risk of flooding and other impacts associated with sea level rise.

These include coastal protection measures such as beach nourishment, the construction of seawalls and breakwaters, and the creation of wetland buffers. In addition, coastal communities should develop proactive plans to relocate or protect structures and infrastructure that are threatened by the rising sea level. Furthermore, communities should consider implementing regulations to restrict development in areas that are most vulnerable to sea level rise.

### CONCLUSION

In conclusion, this study has revealed that many coastal areas are likely to experience more frequent flooding, increased erosion, and other negative effects. Furthermore, the study has also made clear that these effects will disproportionately affect the most vulnerable populations, who are often least able to cope with the associated risks. Finally, the study has highlighted the importance of taking action now to mitigate the risks posed by sea level rise. In doing so, we can help ensure that future generations do not experience the full effects of this global challenge.

The study of sea level rise has revealed a number of potential impacts to communities across the world. In

particular, coastal areas are most vulnerable to the threat of rising sea levels, which can lead to a variety of negative impacts ranging from flooding and coastal erosion to the displacement of people and destruction of habitats. Higher sea levels could also have significant implications on the global economy, including increased costs for coastal protection, infrastructure damage, and decreased agricultural production.

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