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Sea Level Rise: Evaluating Adaptation Strategies and Options

Bello, 2016.

Introduction

As average temperature of the earth's surface rises due to global warming, glacial ice in high altitude regions is melting. This increases the volume of water in the earth's oceans and seas, and raises the average sea level from which heights and depths are measured.

Study Objective

- To comparatively analyse the strategies for adapting to sea level rise.
- To highlight the criteria that may be used to evaluate alternative adaption options.

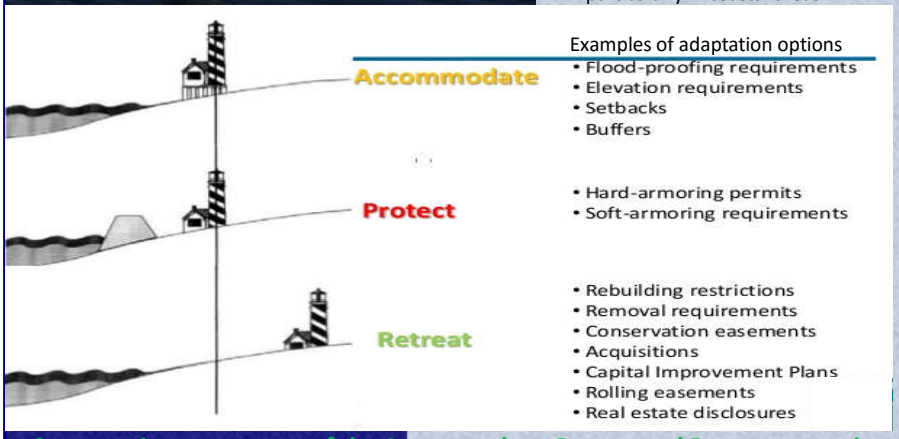
Methodology

The study draws upon a wide range of existing literature to provide a comparative assessment of sea level rise adaption strategies and an appraisal of the criteria for evaluating alternative options.**

Results and discussion

Why adapt to sea level rise?

- Sea level rise could cause more frequent storm surges, flooding, erosion, salt water intrusion, among other impacts; potentially leading to damage of human lives, plant and animal habitats, ecosystems and other natural and man-made resources.
- Without adaptation, there will considerable loss of social, economic and environmental values, particularly in coastal areas.



Strategies for adapting to sea level rise

For coastal populations, there are mainly three strategies to adapt to sea level rise. They are:

- **Accommodate**: refers to continued use of impact-prone areas, but with current designs modified to reduce exposure to impacts.
- **Protect**: involves building a structure that prevents sea level rise impact from taking place at all.
- **Retreat**: involves withdrawal from coast, to seek refuge behind natural ecological defenses.

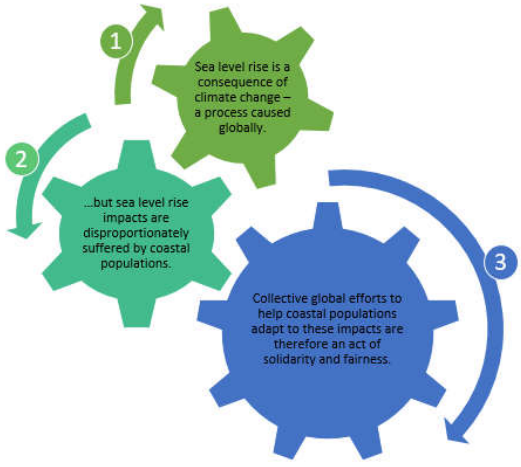
Criteria to evaluate adaptation options

- Effectiveness
- Efficiency
- Performance under uncertainty
- Technical and institutional sustainability
- Equity

Comparative assessment of the Accommodate, Protect and Retreat strategies

	Accommodate	Protect	Retreat
Mode of Operation	Improves resilience of coastal populations by increasing their ability to cope with impact.	Reduces vulnerability to impact by decreasing probability of impact occurrence.	Reduces vulnerability to impact by limiting damage caused.
Key requirement	Ability and willingness to effect lifestyle changes.	High levels of technology, in most cases.	Availability of spare land or host communities to retreat into.
Economic implications	Potential compensatory economic benefits as inundated land may be used for new income-generating purposes.	Economic benefits include prevention of physical damage to properties, loss of income, land and other natural resources.	Loss of lives prevented is invaluable.
	Economic costs include those incurred in implementing land use changes, buildings modifications, and setting up reliable warning infrastructure.	Costs of building and maintaining protective structures, plus revenue lost to any cultural, social and environmental changes could be considerable.	Withdrawing populous communities from highly productive agricultural lands, or valuable coastal investments may prove very costly.
Effects on Coastal Ecosystems	Allows coastal ecosystems to adapt naturally.	Could lead to a loss of coastal ecosystems through "coastal squeeze".	Allows coastal ecosystems to adapt naturally.
Socio-cultural impacts	Accommodating change may lead to living conditions becoming less desirable or may require lifestyles changes that are challenging to implement.	Protection measures may cause negative externalities in neighbouring coastal areas unprotected by the protection structures.	Could create community-wide social instability for retreating population. Increased pressure on infrastructure and services in host community may also cause disgruntlement among the hosts.

Relevance to "Solidarity and fair resource use"



Conclusion

With rising sea levels, sea level rise impacts will become increasingly damaging. Coastal populations may choose to retreat from, protect against or accommodate these impacts. Within these strategies, the options available for adaptation are many, as are the factors to consider before a choice is made. Successful adaptation will require careful planning and consideration.

***A bibliography of literature consulted is included in the 4-page version of this study that will be submitted for publication on the Tropentag website.*