Taking action against ocean acidification

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Taking Action Against Ocean Acidification: A Review of Management and Policy Options

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POLICY BRIEF

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Ocean acidification - what can we do?

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CAUSES AND CONSEQUENCES OF OCEAN ACIDIFICATION

The oceans have absorbed about one third of anthropogenic carbon dioxide (CO_2) emissions during the past five decades. This massive input of CO_2 generates sweeping changes in the chemistry of seawater, especially on the carbonate system. These changes are collectively referred to as "ocean acidification" because increased CO_2 lowers seawater pH (i.e., increases its acidity).

The basic chemistry of ocean acidification being well understood, future projections are quite straightforward for the surface open ocean for a given atmospheric CO_2 trajectory. Those based on the International Panel on Climate Change (IPCC) scenarios give reductions in average global surface pH of between 0.14 and 0.35 units over the 21st century, which means surface pH may reach 7.8[1] in the year 2100 (Orr, 2011)—compared to 8.18 prior to the industrial era and 8.10 at present. Furthermore, impacts related to ocean acidification will continue to aggravate for centuries even if emissions are stopped (Joos *et al.*, 2011).

1. On the total scale.

1. Can ocean acidification bring opportunities / open new leeway in on-going climate change talks?

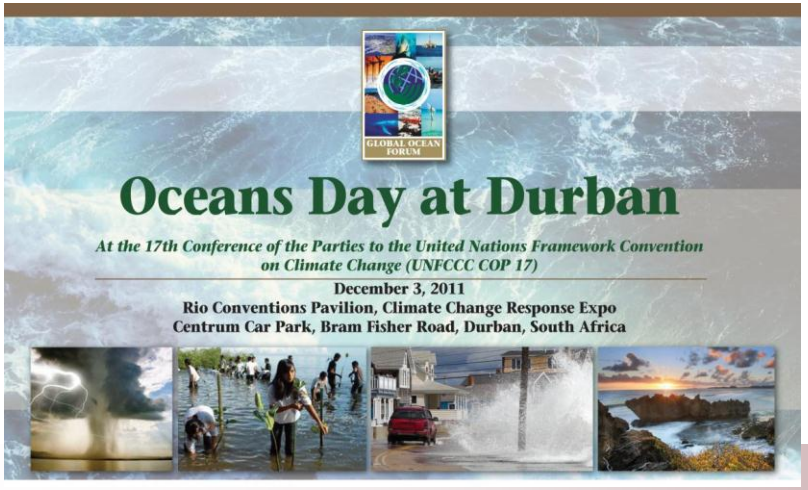
New balance of powers?

Different nature of discussions?

Integrate non-thermal effects of GHGs?

New alliances?

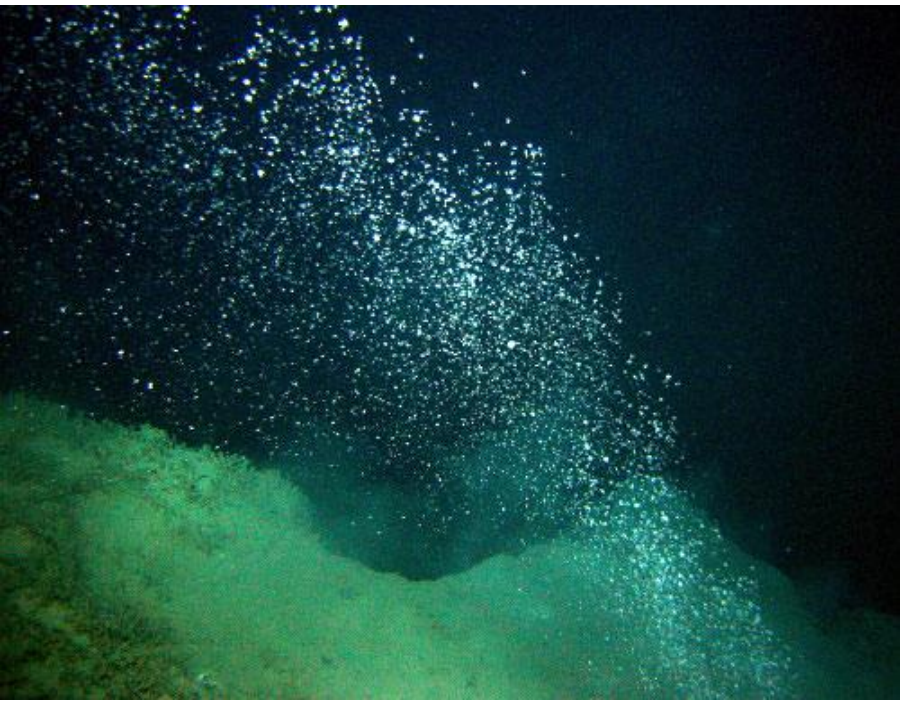
Under which conditions? Timing?



Or can ocean acidification be addressed under another MEA?

Or does it require a new, specific MEA?

2. Is there more to addressing ocean acidification than "just" reducing CO_2 emissions?



POLICYFORUM

OCEANS

Mitigating Local Causes of Ocean Acidification with Existing Laws

Even as global and national efforts struggle to mitigate CO_2 emissions, local and state governments have policy tools to address "hot spots" of ocean acidification.

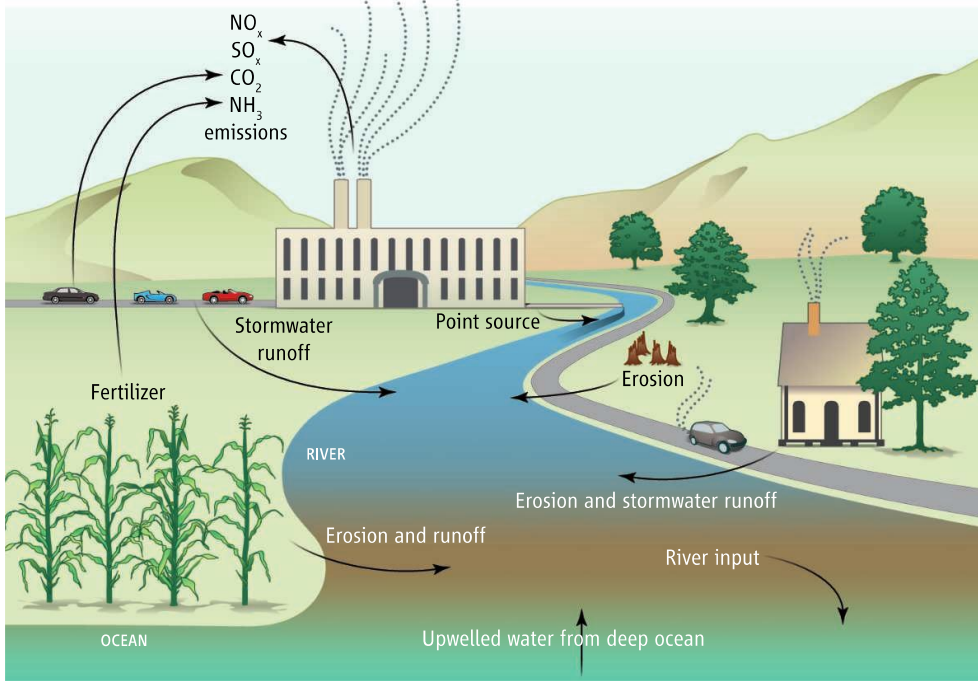
R. P. Kelly,[1]*† M. M. Foley,[1]* W. S. Fisher,[2] R. A. Feely,[3] B. S. Halpern,[4] G. G. Waldbusser,[5] M. R. Caldwell[1]

As the level of atmospheric carbon dioxide (CO_2) continues to rise, so too does the amount of CO_2 in the ocean (*1*, *2*), which increases the ocean's acidity. This affects marine ecosystems on a global scale in ways we are only beginning to understand: for example, impairing the ability of organisms to form shells or skeletons, altering food webs, and negatively affecting economies dependent on services ranging from coral reef tourism to shellfish harvests

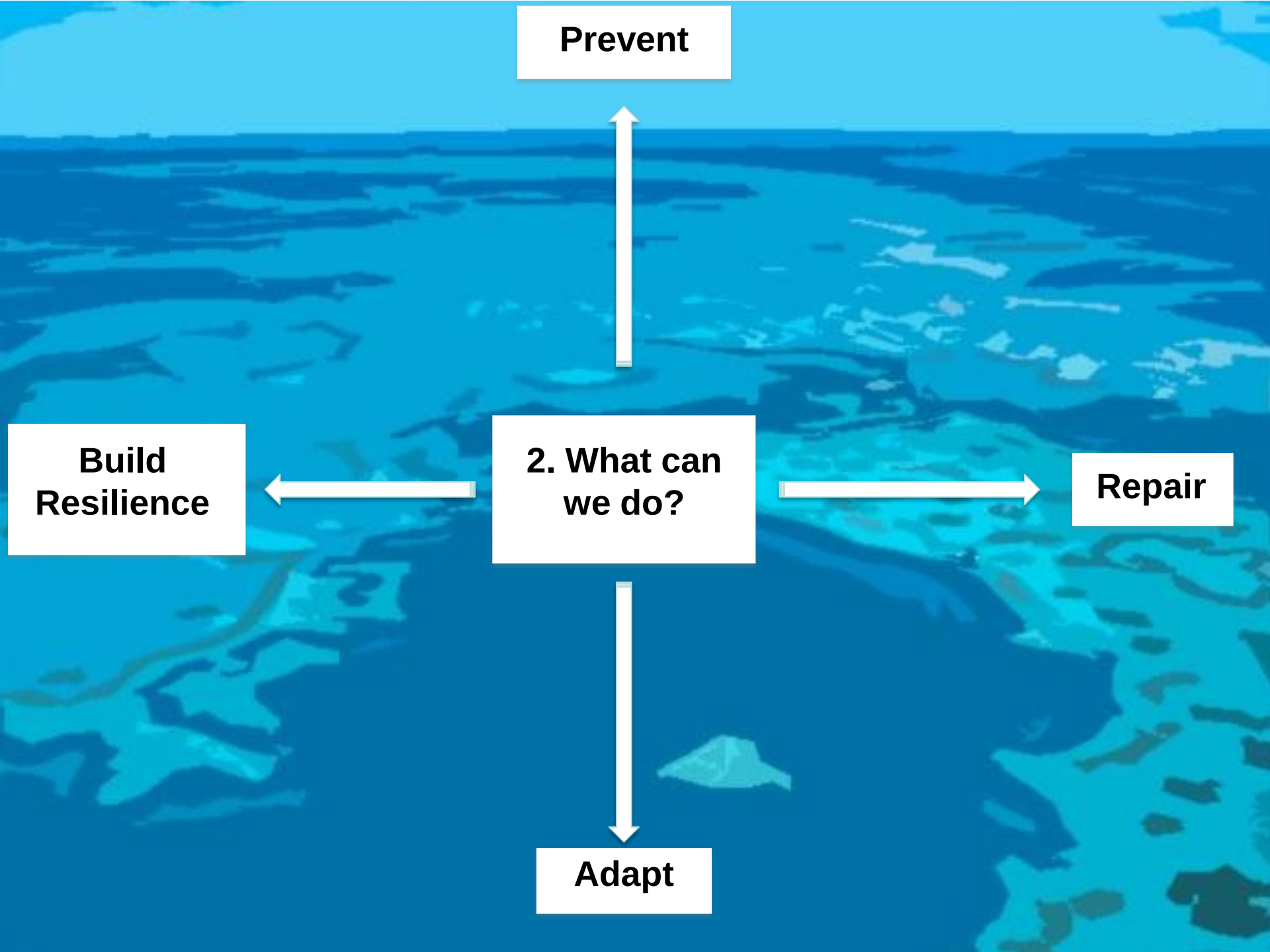
upwelling events that bring low-pH water to nearshore areas (*1*, *2*). Additional local phenomena—such as sulfur dioxide precipitation (*12*), hypoxia (*13*), eutrophication (*10*, *14*), and both emissions and runoff from acidic fertilizers (*15*)—can intensify these localized hot spots. These impacts are likely to be magnified when combined with other stressors in the coastal ocean, including overfishing, habitat destruction, temperature increases, and nonacidifying pollution (*16*).

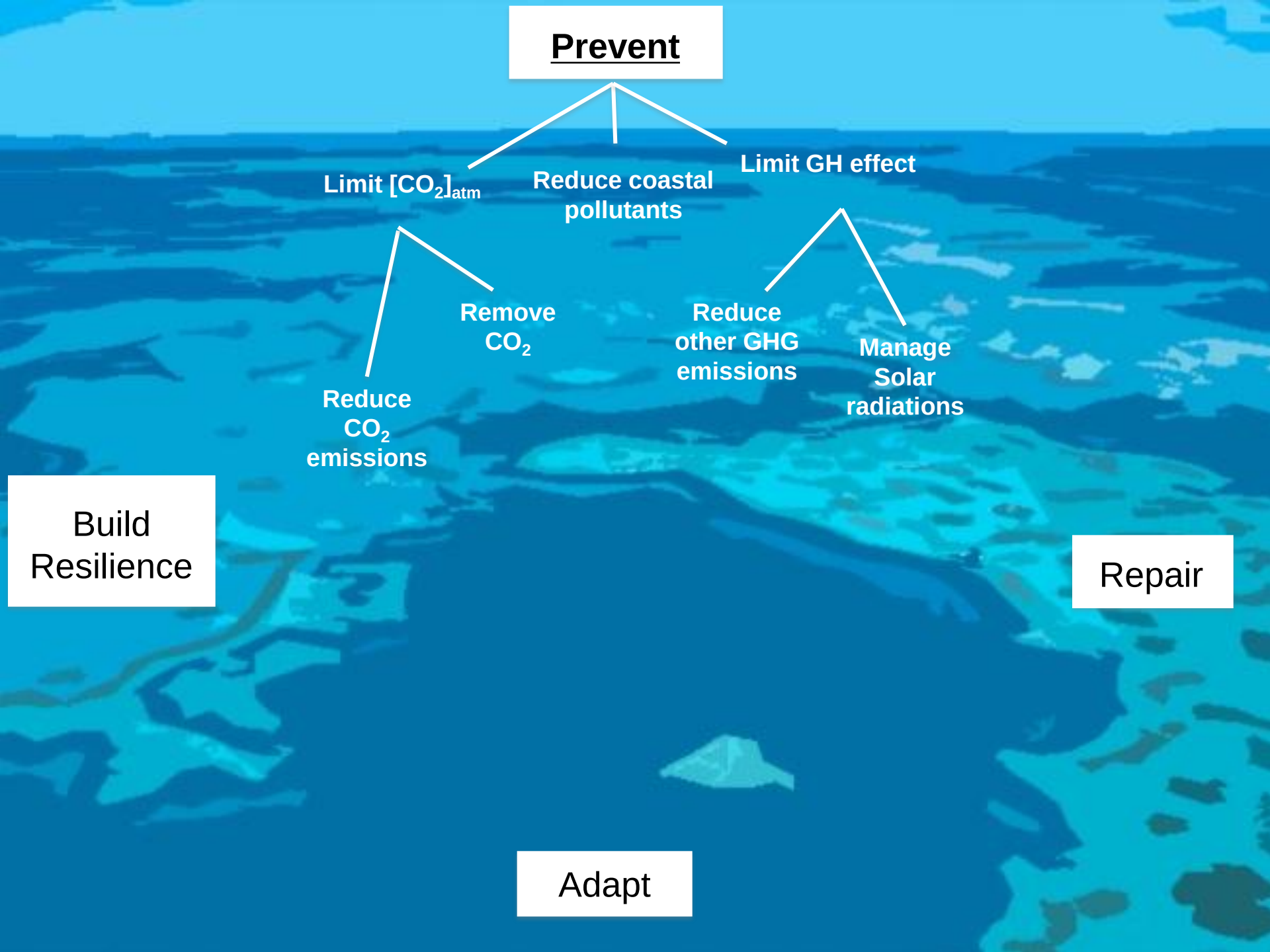
nate coastal waters as "impaired" because of a decline in pH by 0.2 units from baseline levels, as required under the federal Clean Water Act (*22*). Despite the lack of substantive reform of the National Water Quality Standard for marine pH (*19*, *20*) owing to insufficient data, the EPA highlighted the seriousness of acidification's impacts on ocean life and encouraged states to list pH-impaired waters where data are available (*19*). A focus on data collection could lead to future regulatory revisions that

ly 6, 2011



Contributors to ocean acidification. In addition to global atmospheric CO_2, this figure depicts the majo
local (within 100 km) sources contributing to coastal ocean acidification.


Prevent
Build Resilience
2. What can we do?
Repair
Adapt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Manage Solar radiations
Build Resilience
Repair
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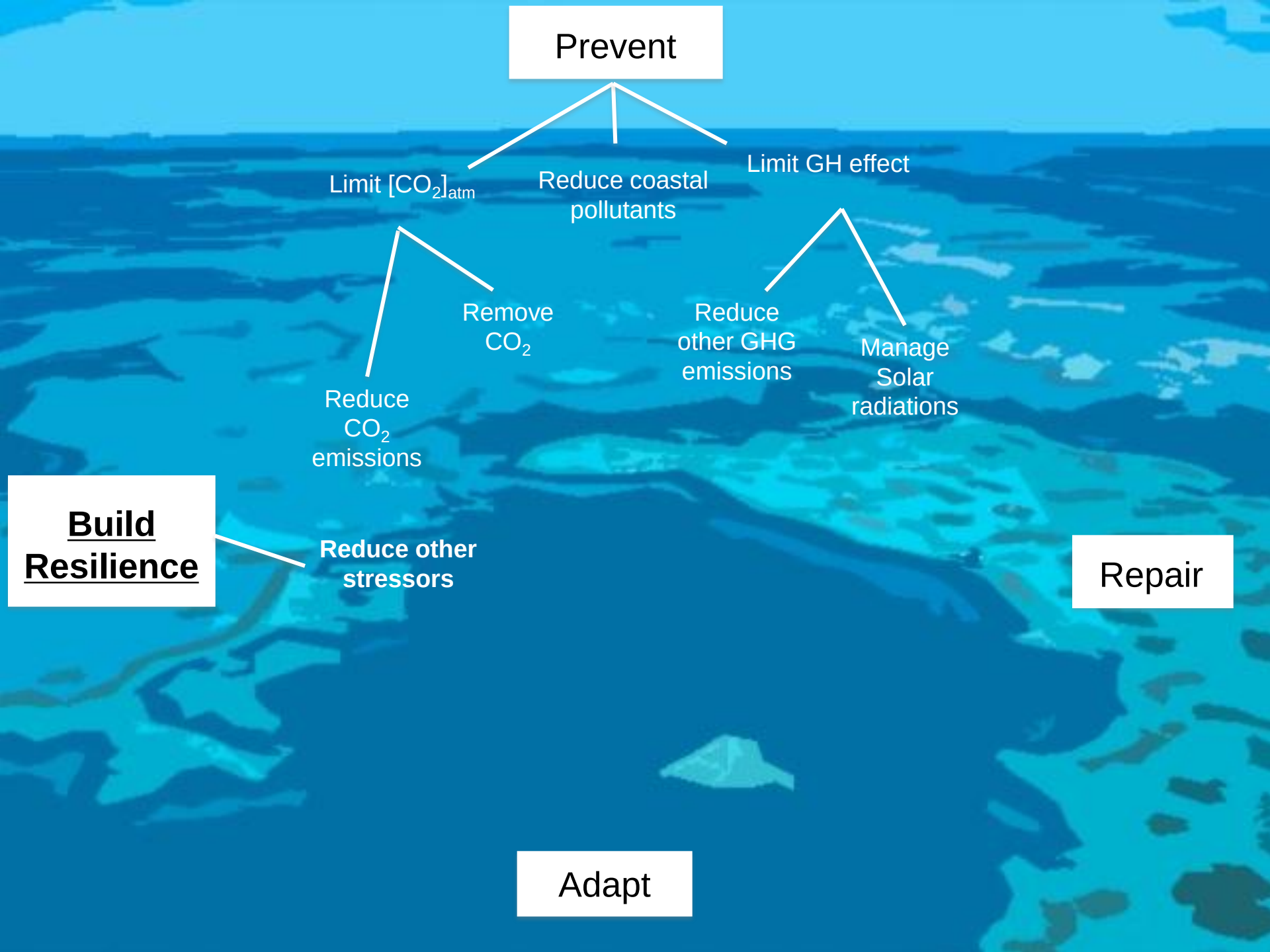
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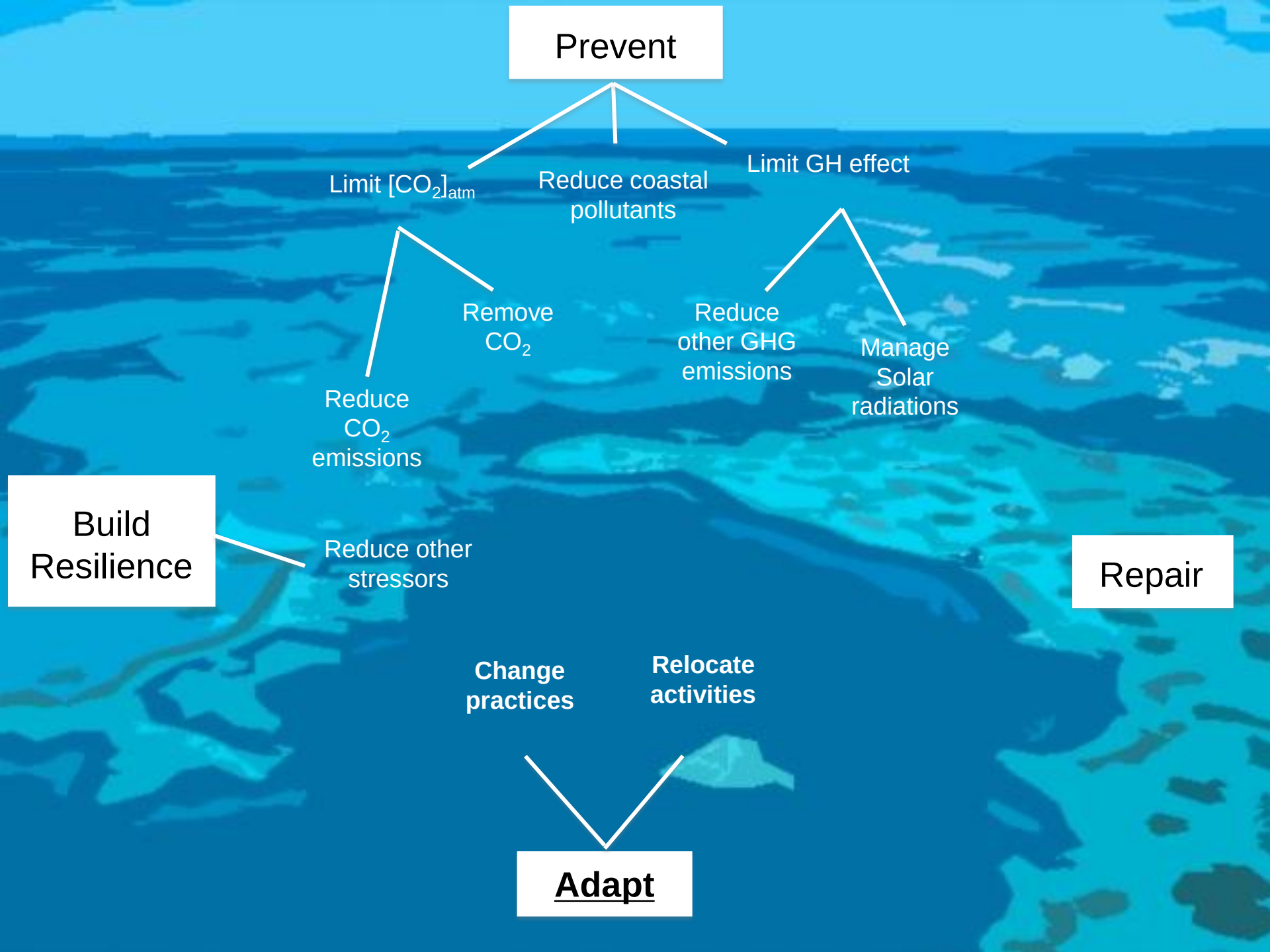
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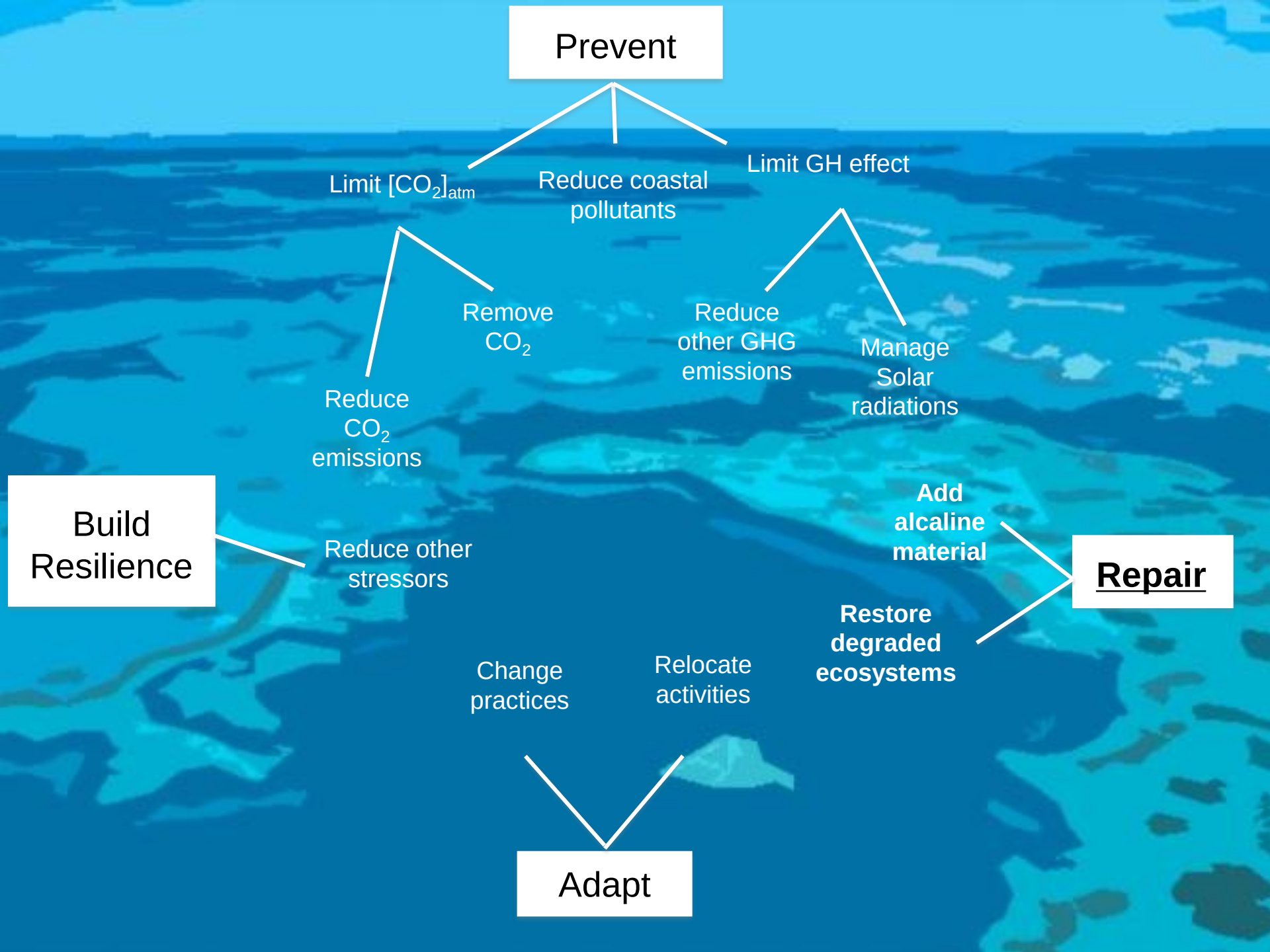
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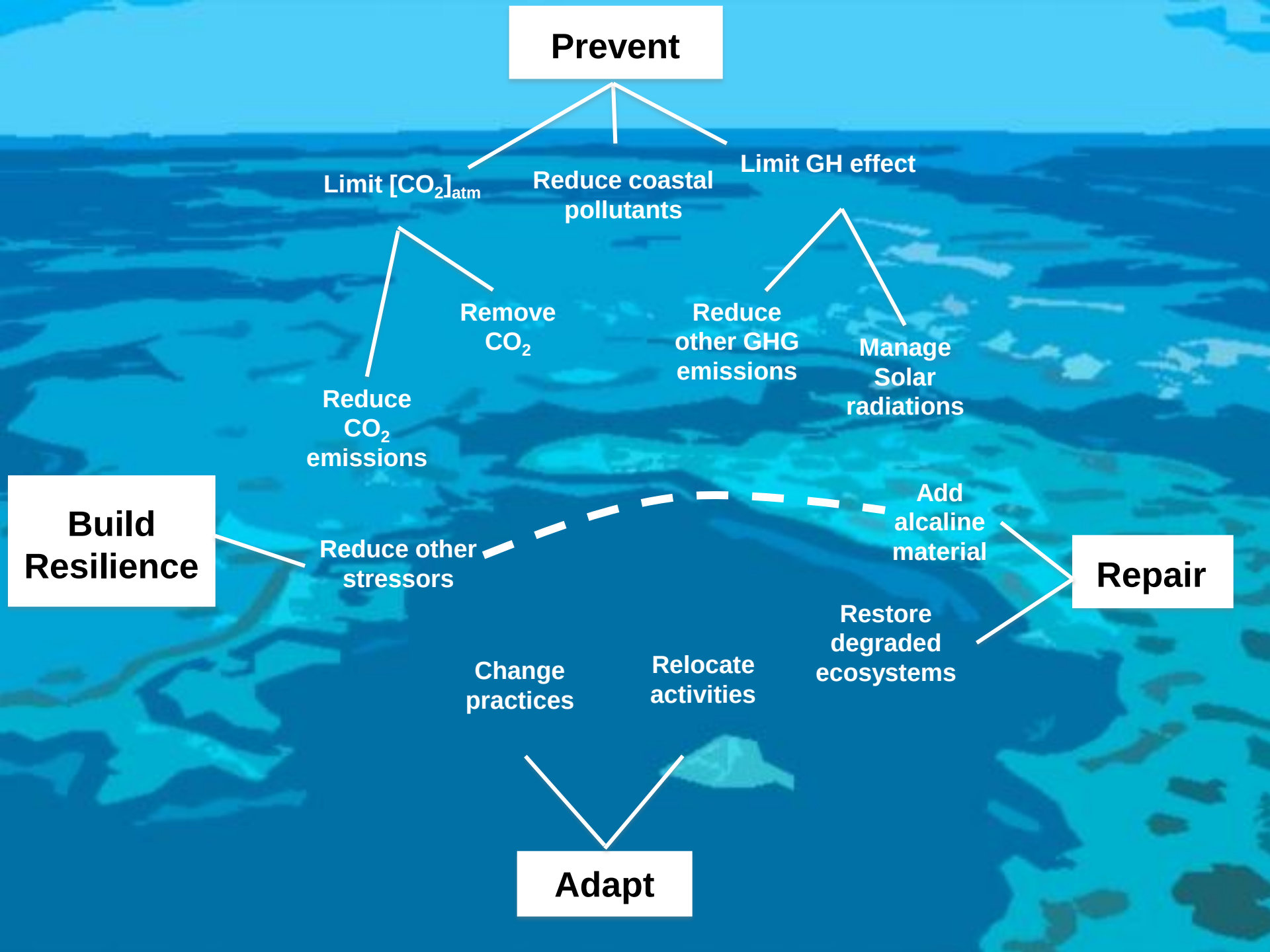
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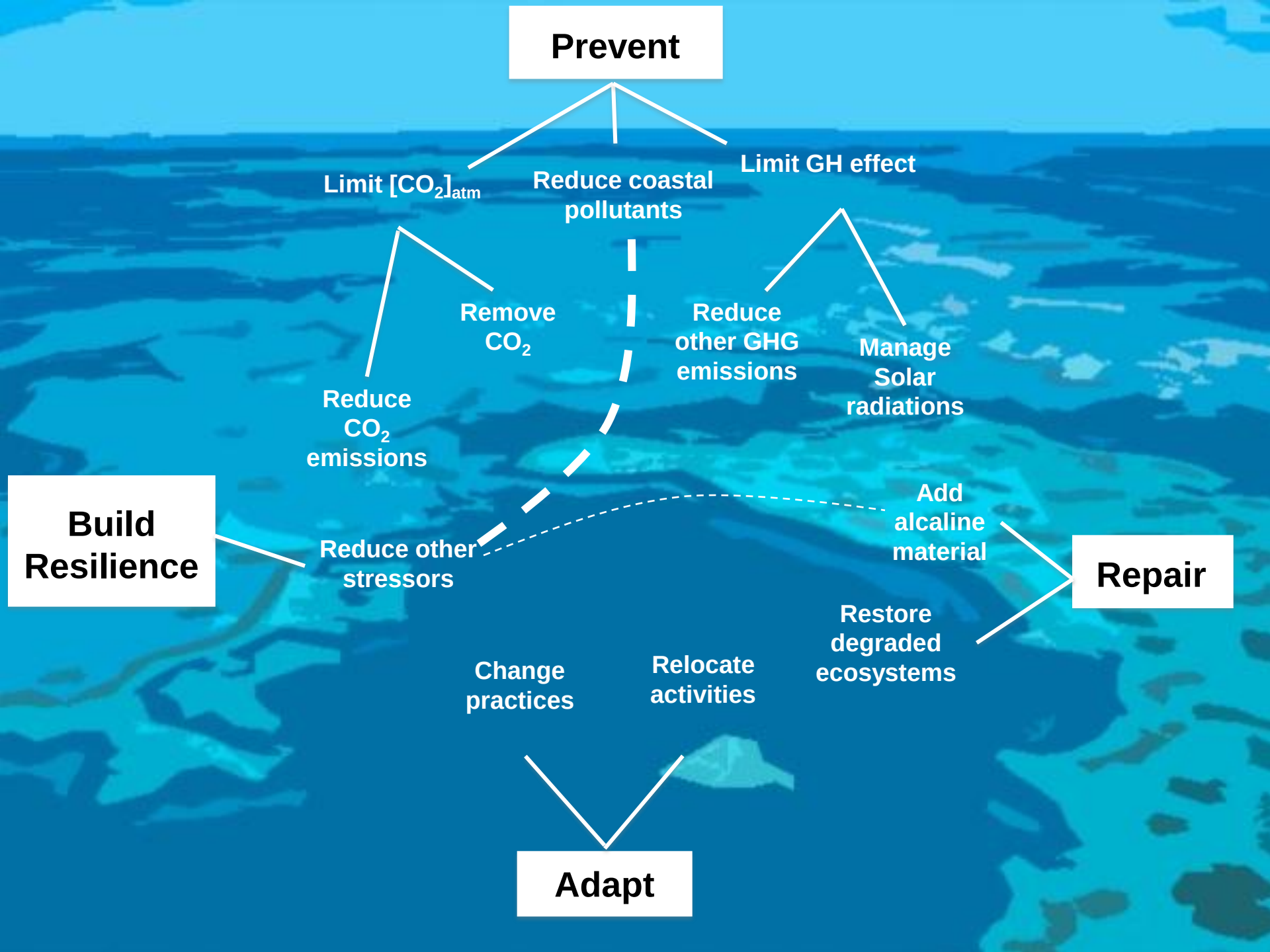
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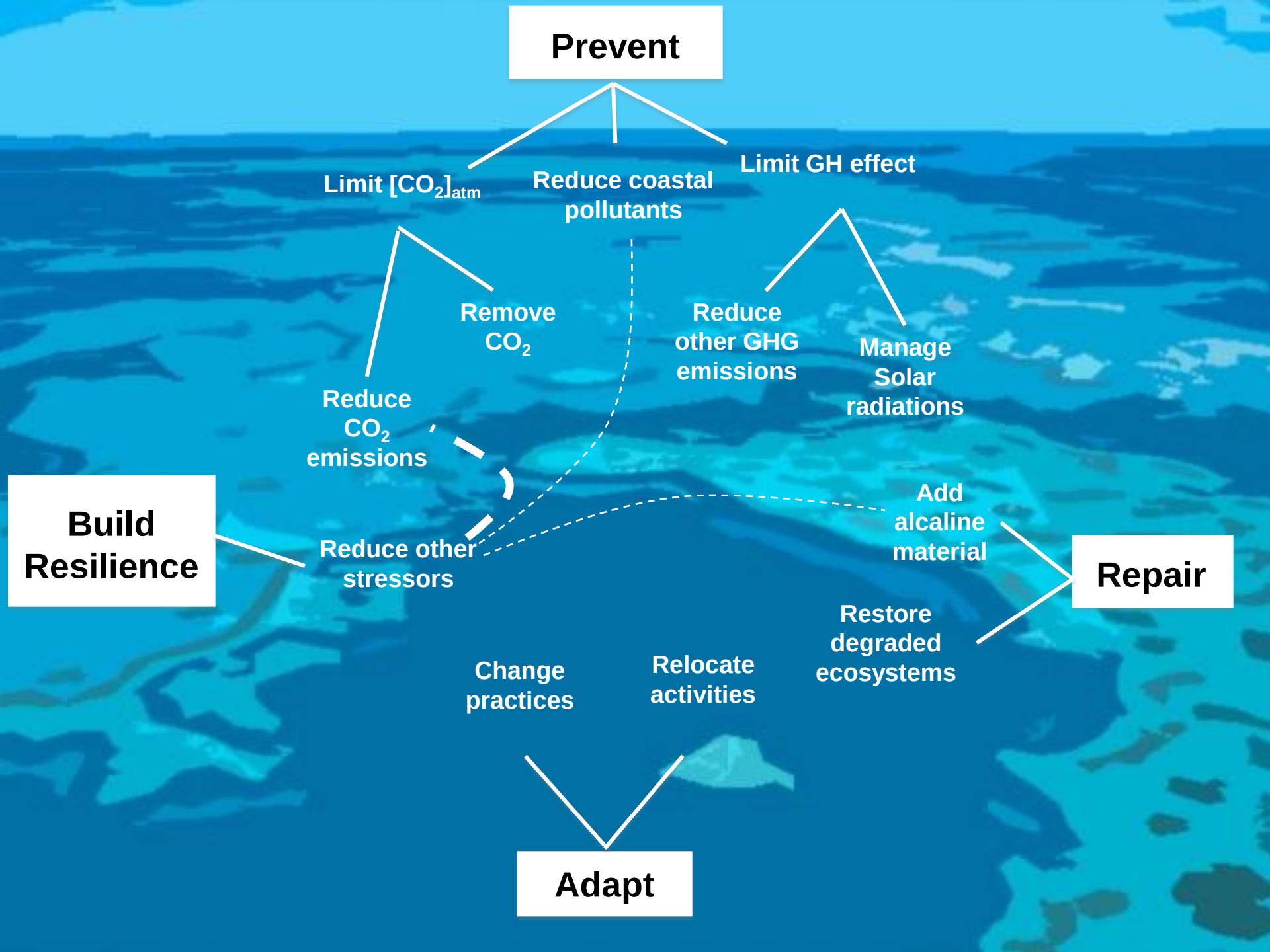
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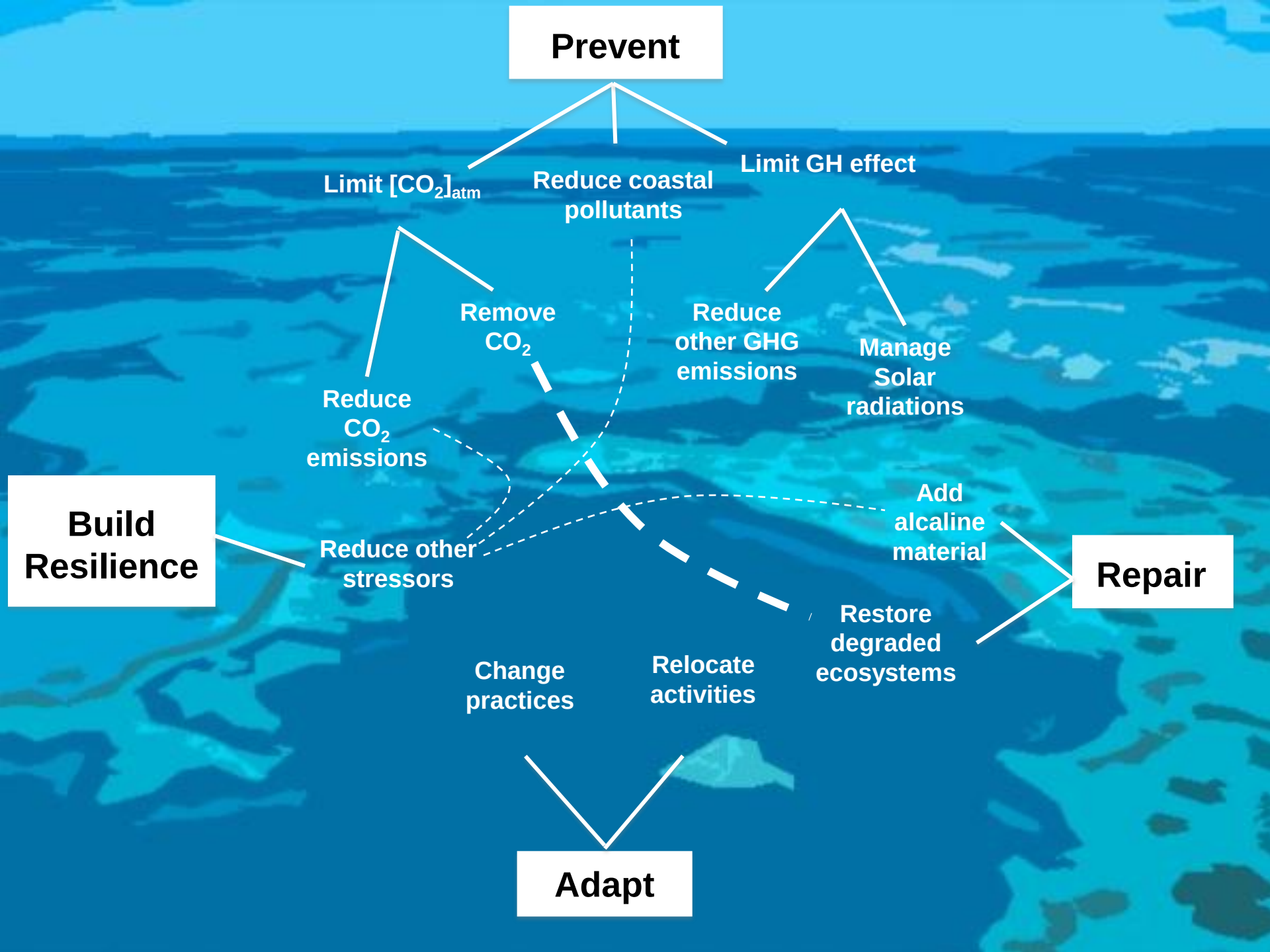
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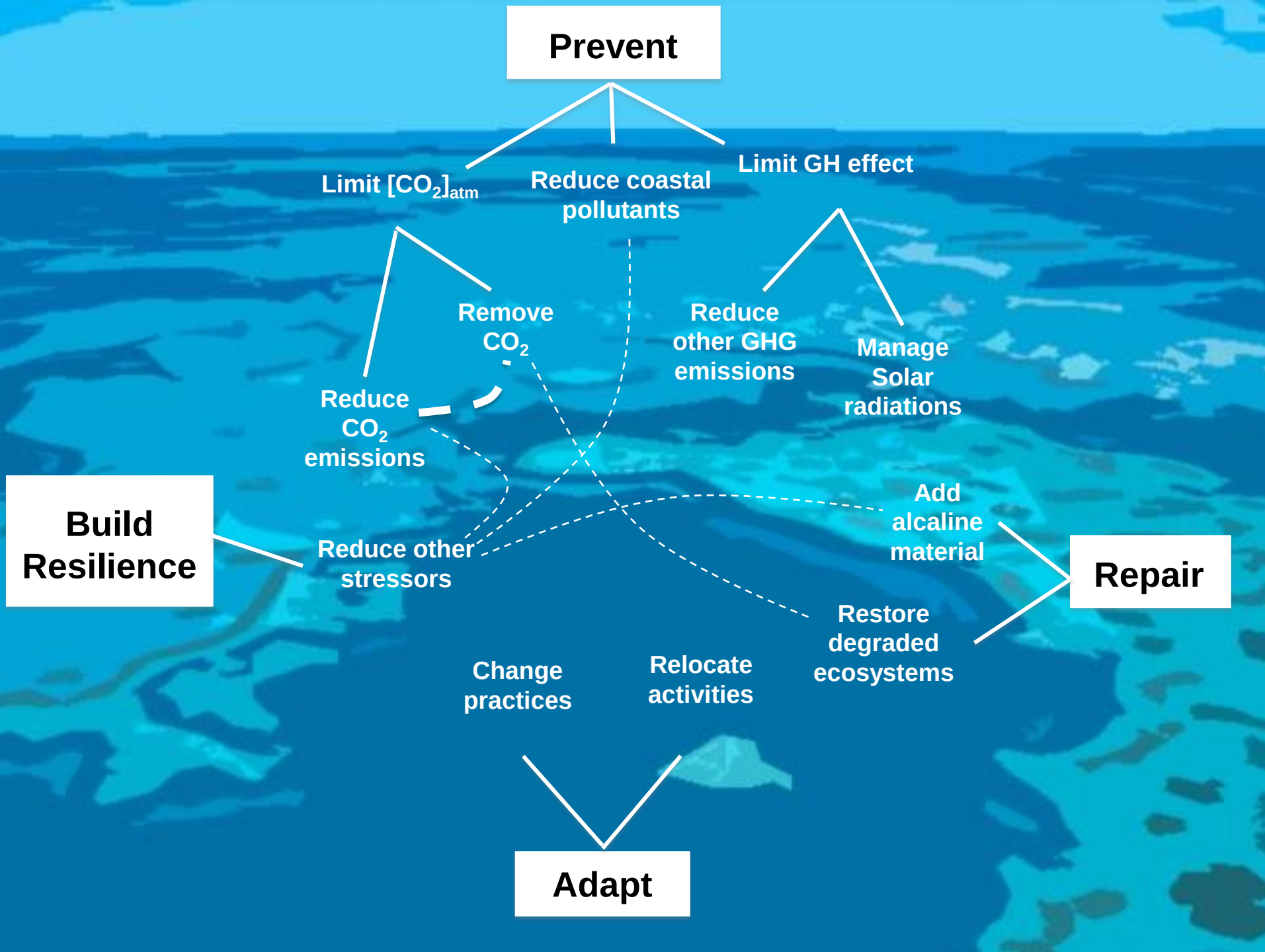
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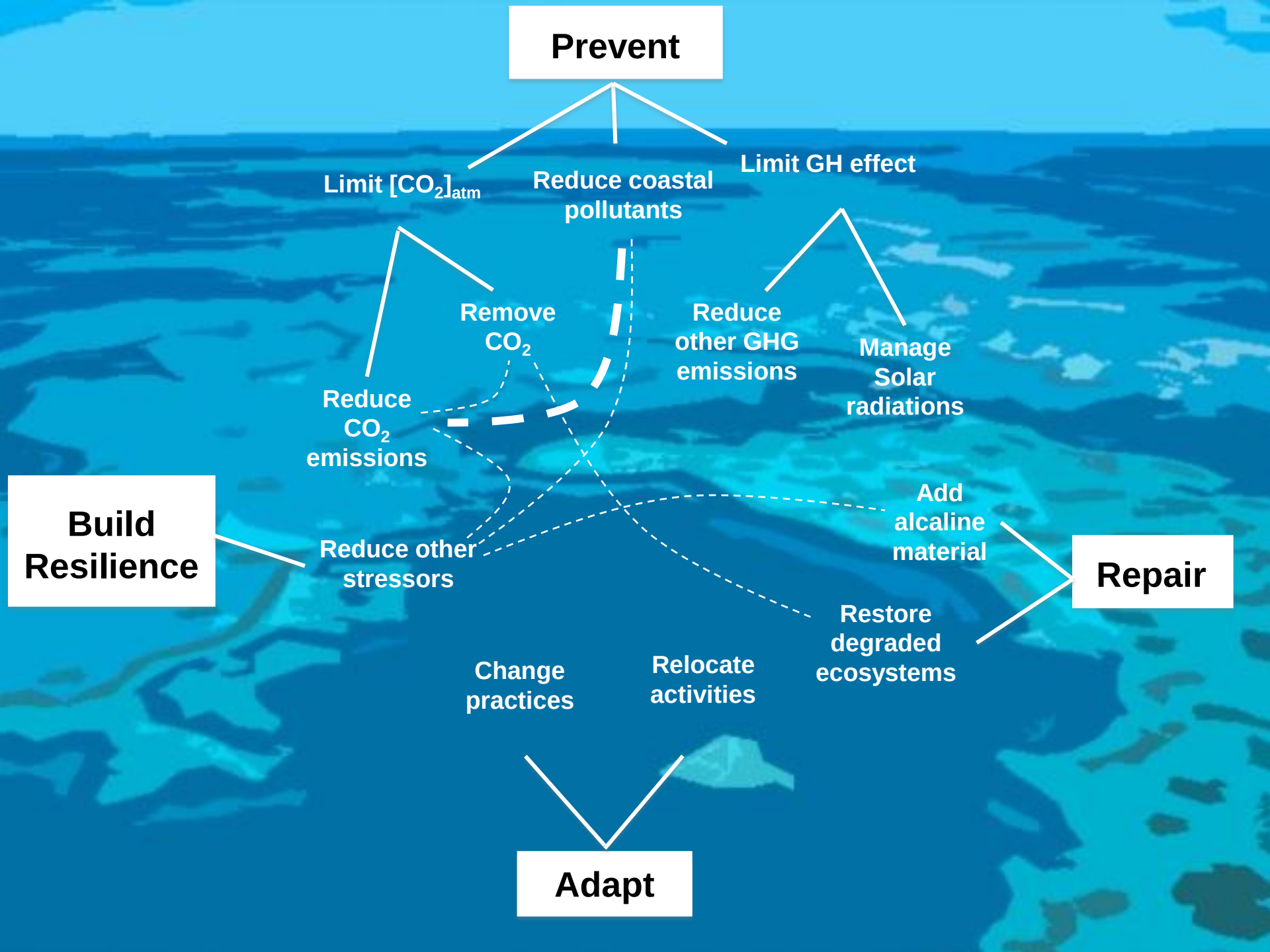
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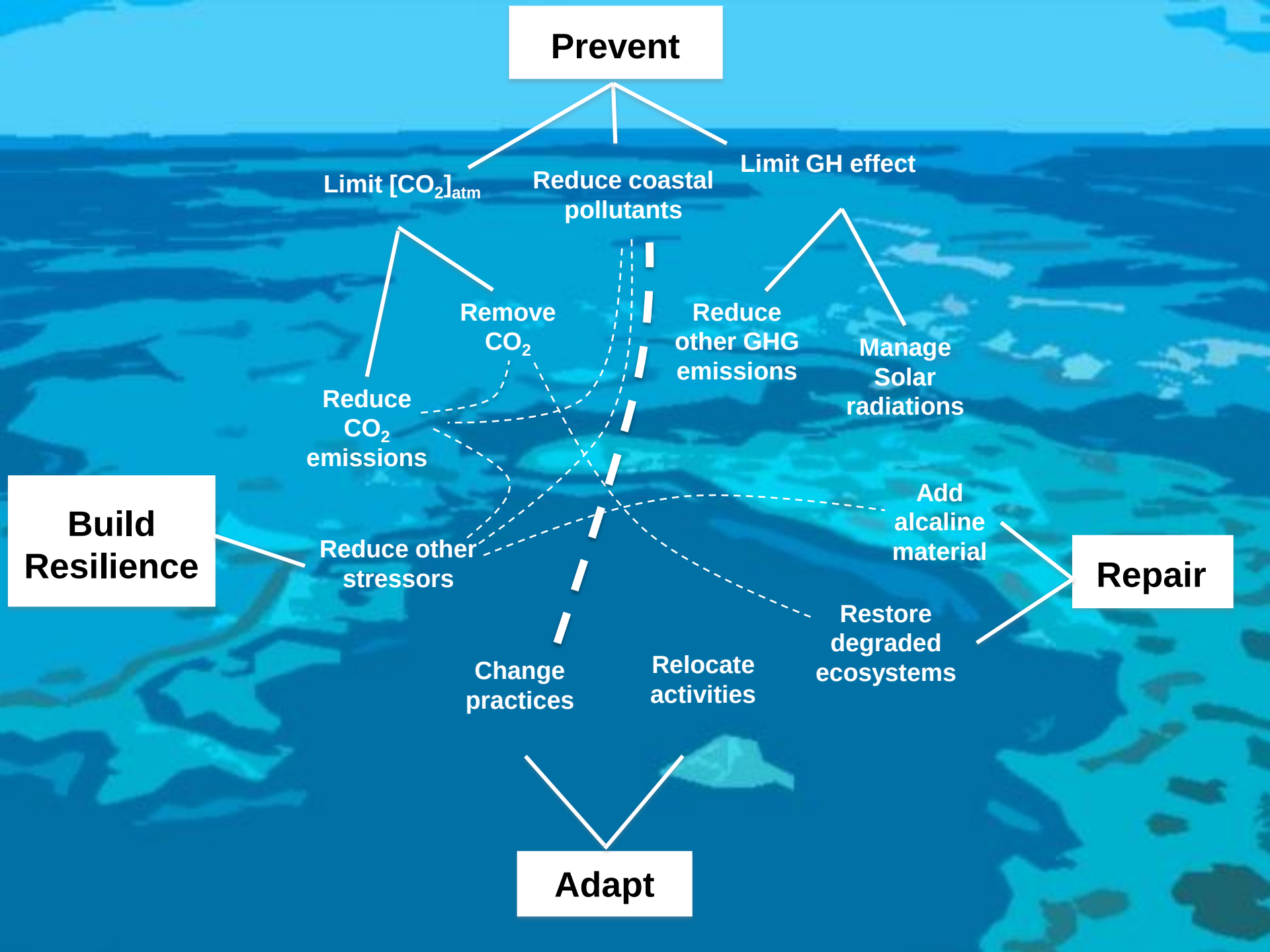
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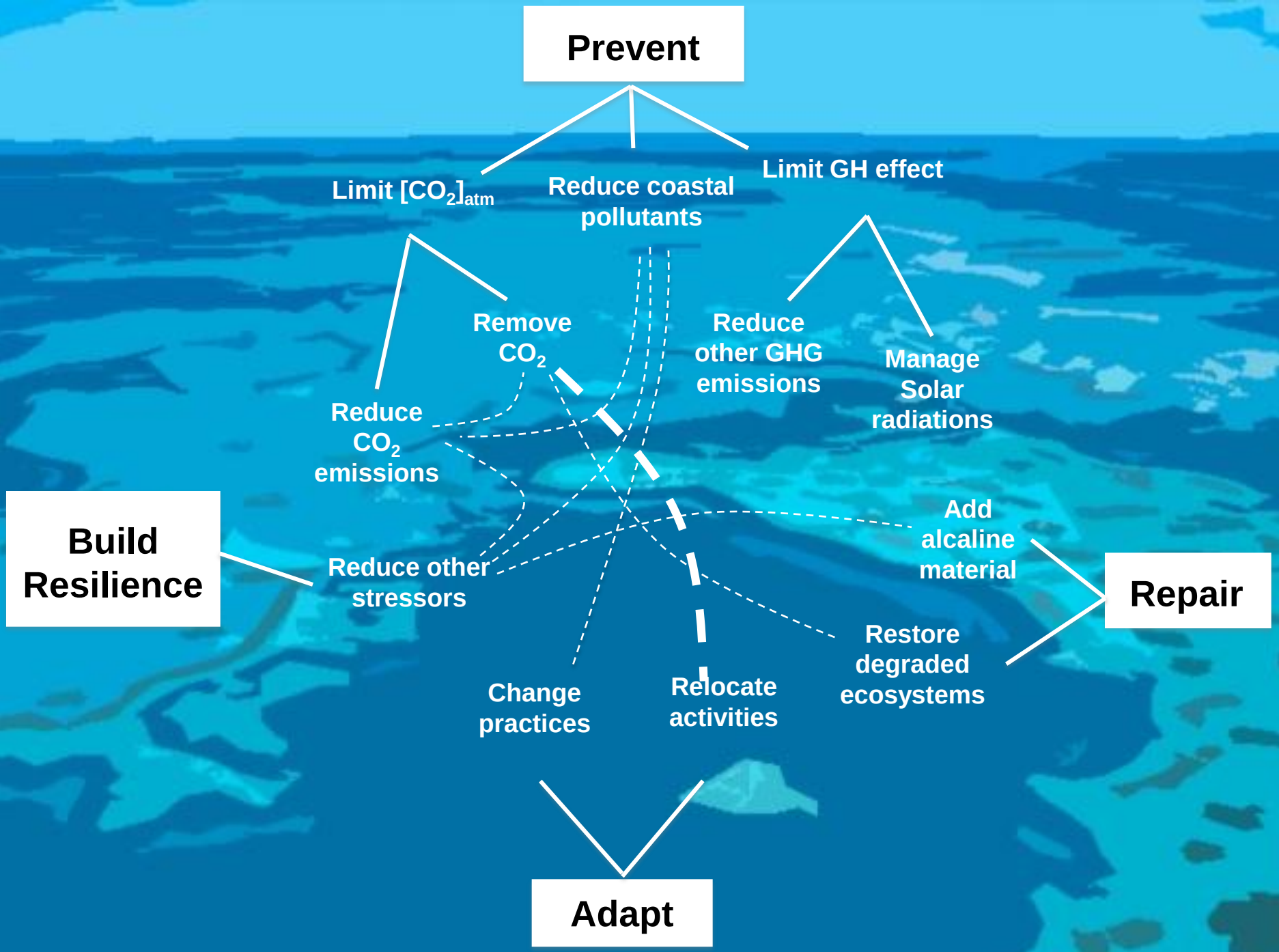
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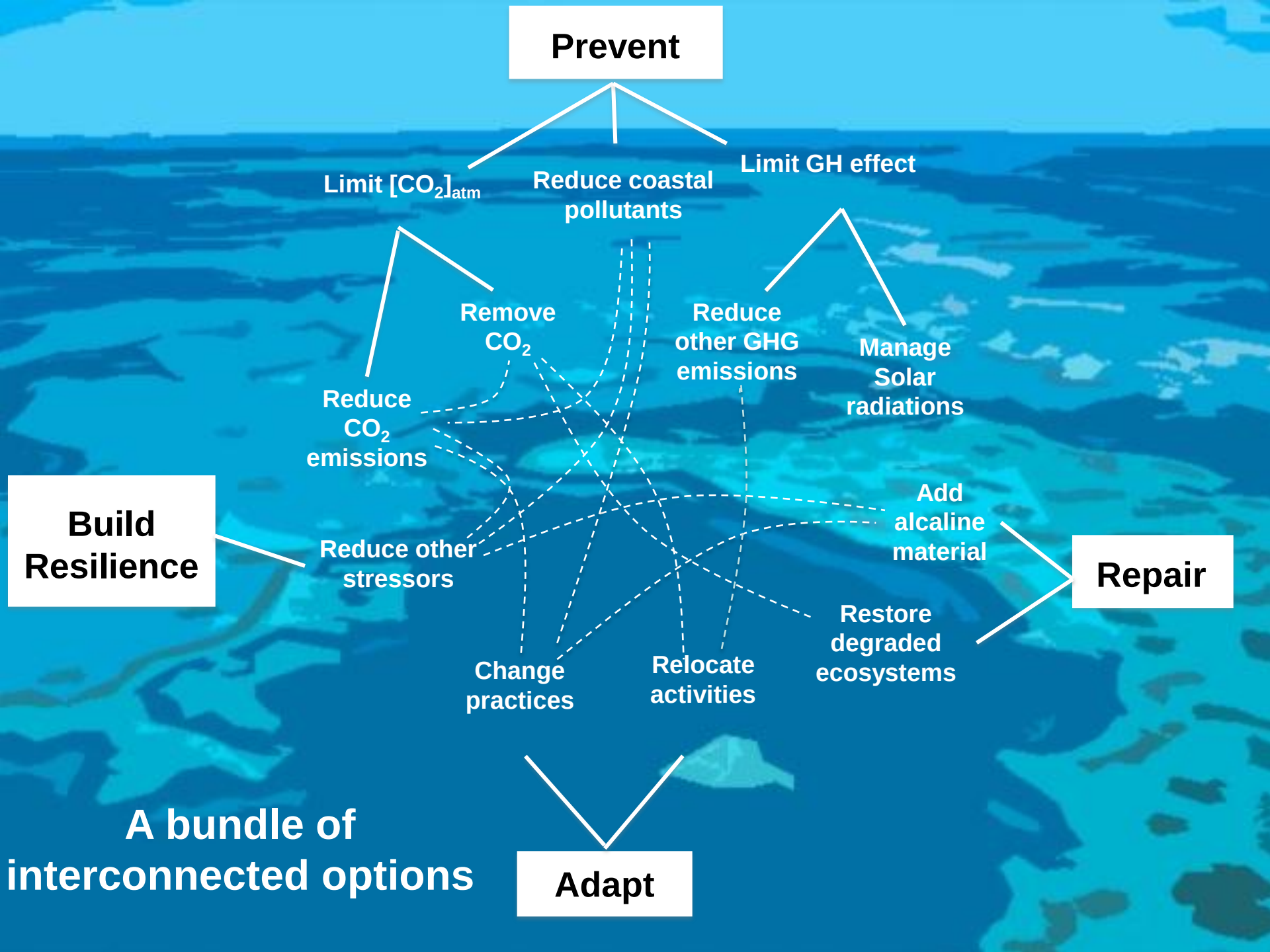
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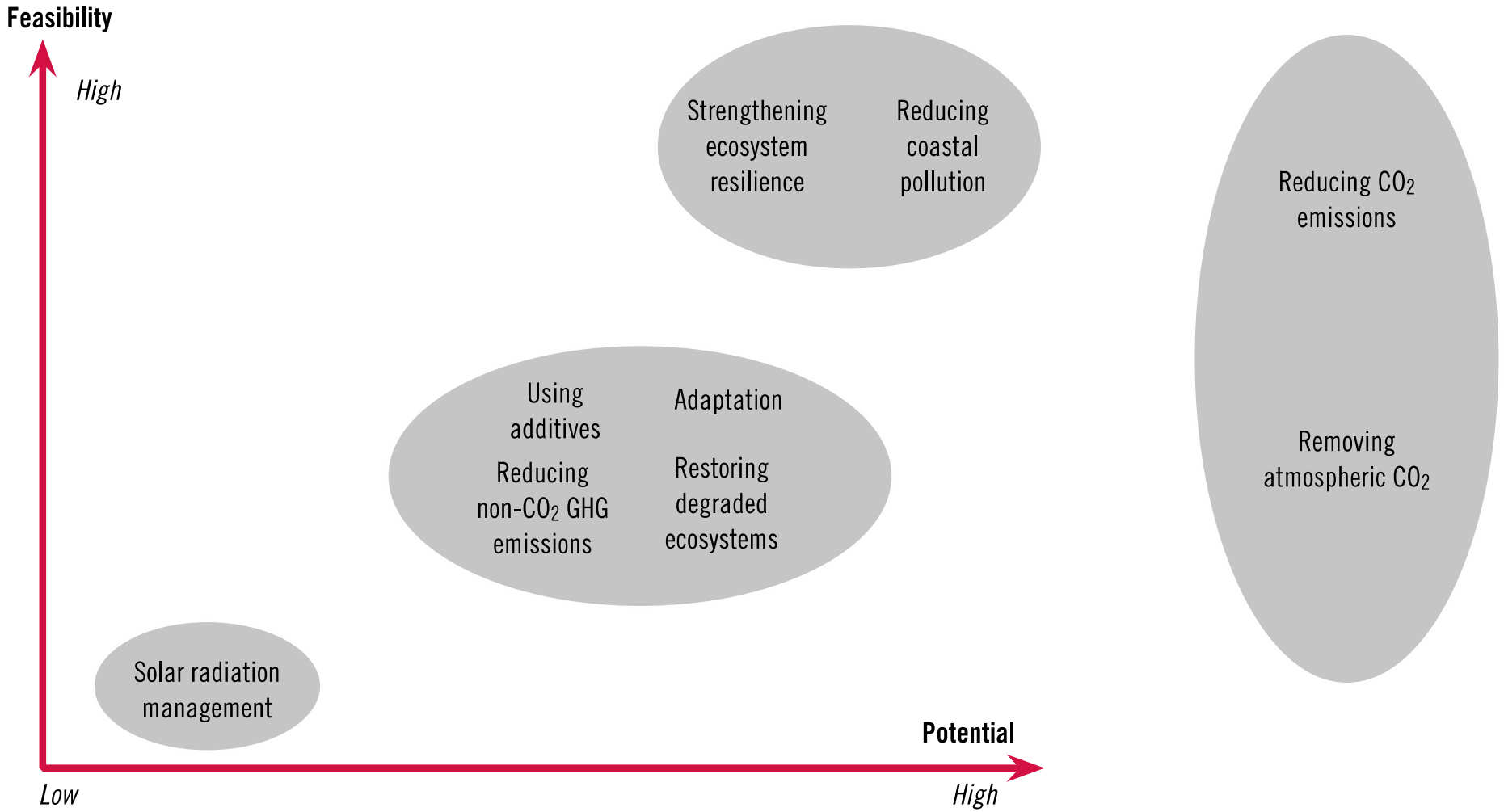
A bundle of interconnected options

An attempt to compare options



Conclusion

Striking discrepency between essentially appropriate legal frameworks and insufficient or inefficient policies

Serious handicaps due to the nature of impacts:

- poorly understood
- invisible
- uneven

Ocean acidification emerges after most options to respond have already been identified and tested to tackle other environmental problems

No easy solution, but a wide range of options to take action… and buy time while keeping the pressure on CO_2 emissions