

Yale Framework Matrix (<http://yale.databasin.org>). Six key climate change adaptation approaches for conservation planning at three levels of ecological analysis. The cells within the table list the kinds of scientific assessment needed to support adaptation planning and action.

Ecological Level			
Adaptation Approach	Species & Population	Ecosystem	Landscape
<b>A. Strengthen current conservation efforts</b>			
<b>1) Protect current patterns of biodiversity</b>	<ul style="list-style-type: none"> <li>Assess population sizes, viability, conservation status, and phenological trends</li> <li>Map species occurrences</li> </ul>	<ul style="list-style-type: none"> <li>Map terrestrial and aquatic ecosystems and their associated services</li> </ul>	<ul style="list-style-type: none"> <li>Map genetic pattern across the landscape</li> <li>Map beta and gamma diversity</li> <li>Map biodiversity hotspots</li> </ul>
<b>2) Protect large, intact, natural landscapes</b>	<ul style="list-style-type: none"> <li>Forecast climate change effect on species viability</li> <li>Forecast climate change effects on pests, diseases, or invasive species</li> </ul>	<ul style="list-style-type: none"> <li>Map potential future patterns of fire, hydrology, carbon sequestration, and ecological integrity</li> <li>Map locations where ecosystem services operate and provide human value</li> </ul>	<ul style="list-style-type: none"> <li>Analyze projected trends in climatic variables (precipitation, temperature, etc.)</li> <li>Map factors related to ecological integrity (e.g., fragmentation, distance from disturbance)</li> </ul>
<b>3) Protect the geophysical setting</b>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Map areas of high ecological integrity</li> <li>Map land facets in relation to current climate patterns</li> <li>Map areas of high topographic complexity</li> </ul>	
<b>B. Anticipating and responding to future conditions</b>			
<b>4) Identify and appropriately manage areas that will provide future climate space for species expected to be displaced by climate change.</b>	<ul style="list-style-type: none"> <li>Forecast species and rare community vulnerability to climate change based on their capacity to adapt biologically</li> <li>Map future range distributions of species</li> </ul>	<ul style="list-style-type: none"> <li>Forecast ecosystem vulnerability to climate change</li> <li>Map locations that would support shifts in vegetation types and biomes</li> </ul>	<ul style="list-style-type: none"> <li>Forecast land use change</li> <li>Project sea level rise</li> <li>Project climate change</li> <li>Map future biodiversity hotspots</li> </ul>
<b>5) Identify and protect climate refugia</b>	<ul style="list-style-type: none"> <li>Identify areas that would harbor current species into the future</li> <li>Identify where species populations remain stable or increase with climate change</li> </ul>	<ul style="list-style-type: none"> <li>Map habitats with high natural resilience to climate change (e.g. spring-fed streams)</li> <li>Map areas projected to experience little change in vegetation</li> </ul>	<ul style="list-style-type: none"> <li>Map drought refugia</li> <li>Map areas projected to maintain stable climate</li> </ul>
<b>6) Maintain and restore ecological connectivity</b>	<ul style="list-style-type: none"> <li>Identify areas critical to species movements in a changing climate</li> <li>Map movement corridors for species life-history and migration</li> </ul>	<ul style="list-style-type: none"> <li>Map connections between current and projected future locations</li> <li>Anticipate species invasions along planned corridors</li> </ul>	<ul style="list-style-type: none"> <li>Map connections between land facets, ecological land units, refugia or areas of high ecological integrity</li> </ul>