



Responding to the Challenge of Climate Change: NPS Strategies



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Bear Glacier 2005
Kenai Fjords National Park



Climate change is often perceived as a long-term issue – difficult to address in the



***“Long term, I’m worried about global warming –
Short term, about freezing my ass off.”***

Climate Change Response



Resource management decisions must be based on future expectations...



While some impacts from climate change are already measurable...



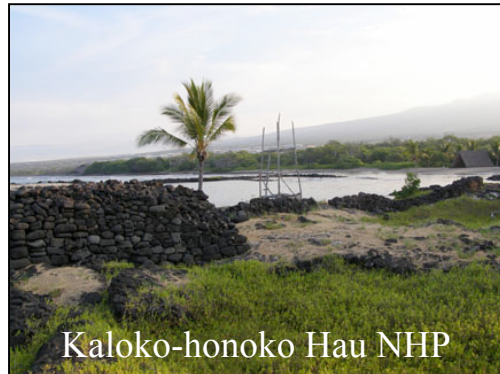
Climate Change Response



Long range effects of climate disruption...



on park resources,



infrastructure,



& visitor experience

...are just beginning to be understood.



Of potentially even greater concern...



... are potential impacts that cannot yet be recognized or anticipated.



How can land managers respond to the challenge of a changing climate?



Need to build capacity to cope with rapid climate change

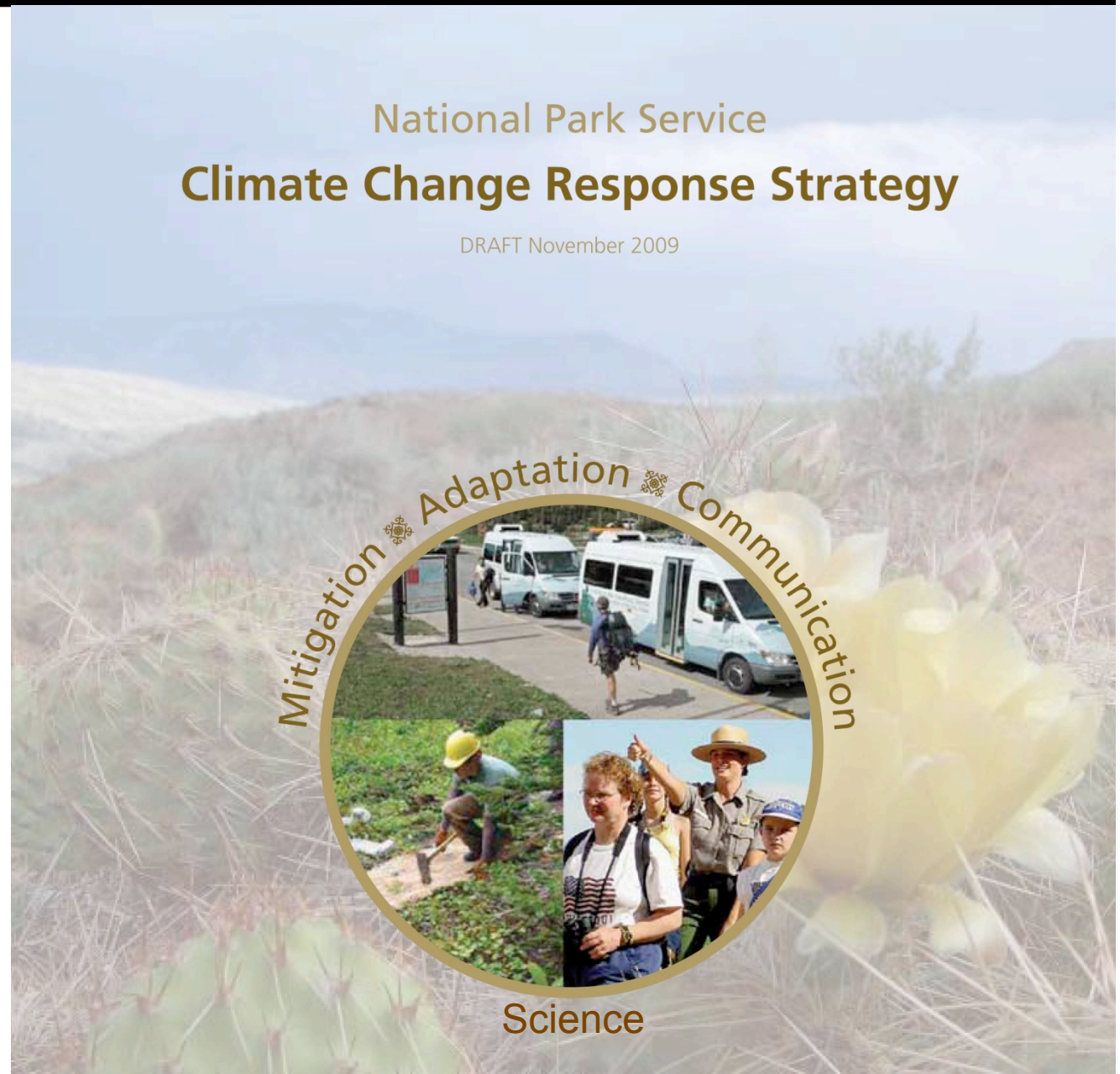
By empowering managers to

- think about climate change in a systems context
- develop, implement, and sustain mitigation and adaptation strategies
- work in interdisciplinary team involving all Directorates and Divisions in the NPS
- engage strategically with partner organizations to promote multi-agency collaboration and planning



4 Key Components

- Science
- Mitigation
- Adaptation
- Communication





Science is critical for effective management response → emerging information needs



- Accessibility of data
- Downscaled models at management-relevant scales
- Forecasts/scenarios
- Resource vulnerability assessments
- Long-term monitoring
- Science syntheses
- On-the-ground relationships for
 - decision support
 - understanding the science as it changes



NPS Vital Signs Monitoring Networks

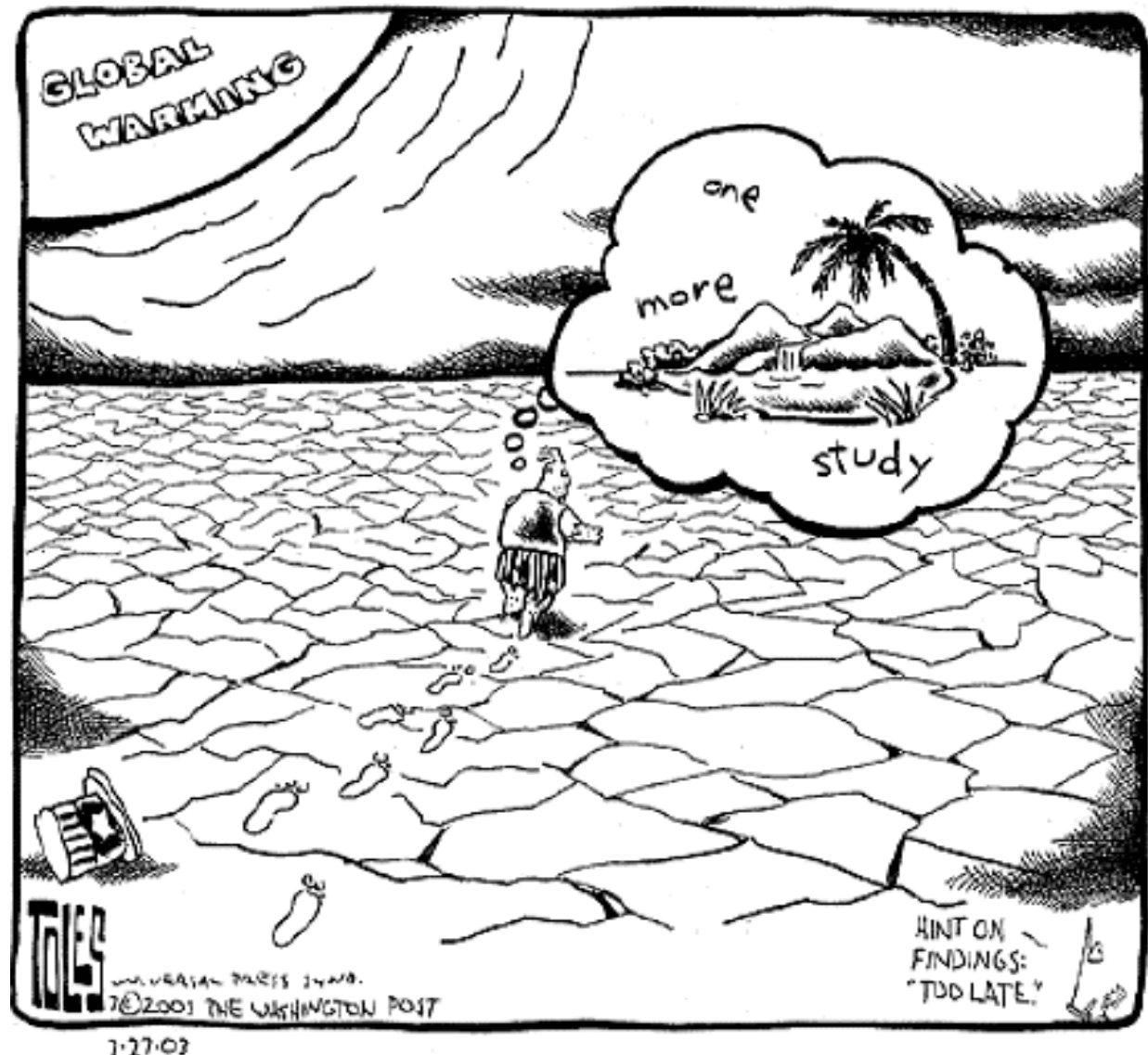


enhanced monitoring for climate change focusing on critical systems and data sharing and synthesis



Acquiring more information is not enough

While we need to better understand the complex interactions that can lead to various futures.....





Mitigation: Leadership by Example

Ongoing efforts to reduce emissions of park and concessions operations and develop sustainable, green practices



- “Climate Leadership In Parks” (CLIP) tool → web-based emissions inventory tool
- Promote transportation alternatives
- Embrace green programs and standards
- LEED certification for buildings includes plant salvage during pre-construction
- Carbon management



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Mitigation is essential !



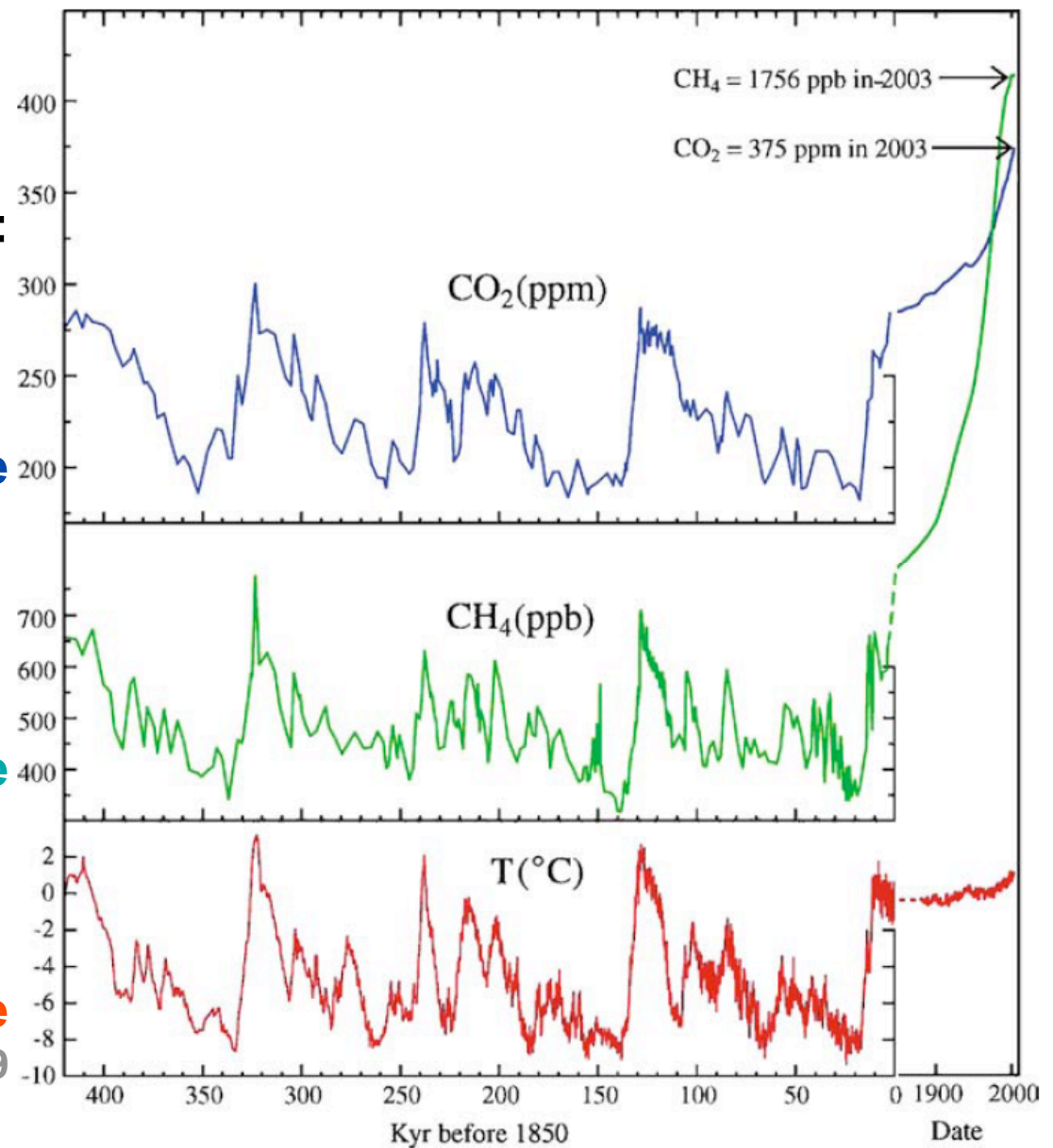
442,000 years of:

Carbon Dioxide

Methane

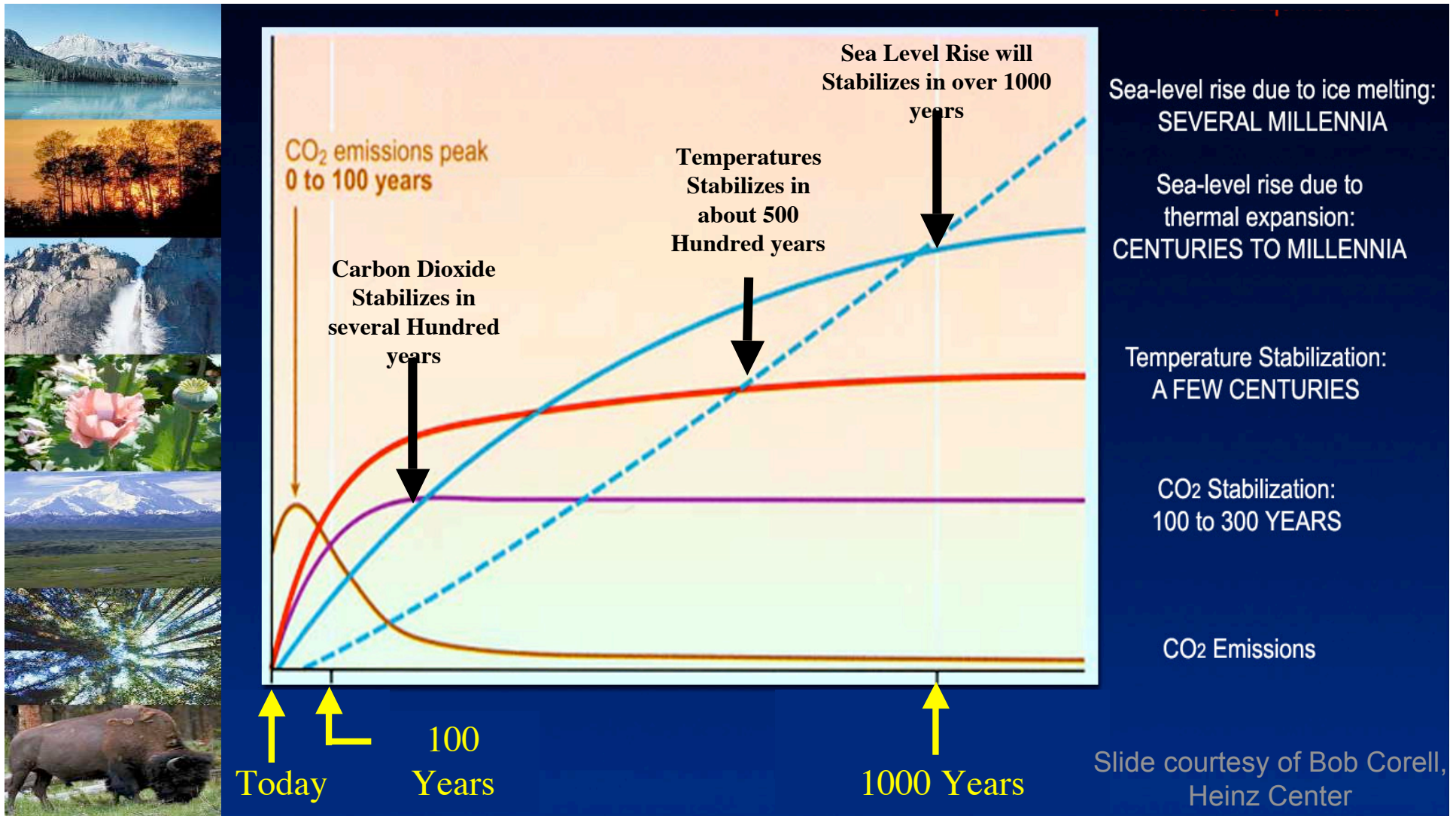
Temperature

0 = 1880-1899





Once emissions stop, it still takes time for Earth's systems and processes to stabilize





Adaptation: 3 “arms”

1. Promoting Ecosystem Resilience



3. Protecting Facilities and Infrastructure



2. Preserving Cultural and Ethnographic Resources





Adaptation Strategies

- *Require:*
- **Science** – What is known and what is uncertain?
- **Policy** – What are our boundary conditions?
- **Planning** – What is our context?
- **Leadership** – What guidance do we have? Will we be supported as we move into unknown territory?

Planning for change will challenge us to question some of our basic assumptions



The Isle of CALIFORNIA
New MEXICO. LOUISIANE
The River MISISSIPI. and
the Lakes of CANADA.

Herman Moll Fecit.

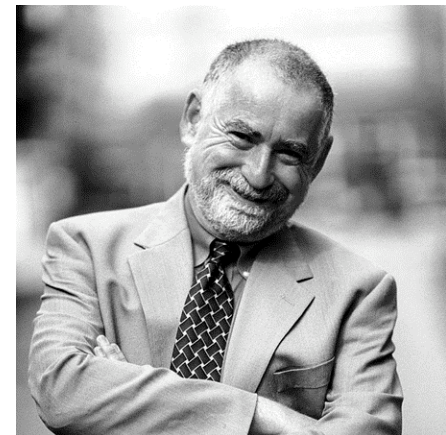




Scenarios Defined



“Scenarios are a tool for helping us take a long view in a world of great uncertainty. They are stories about the ways the world might turn out tomorrow that can help us recognize and adapt to changing aspects of our current environment”

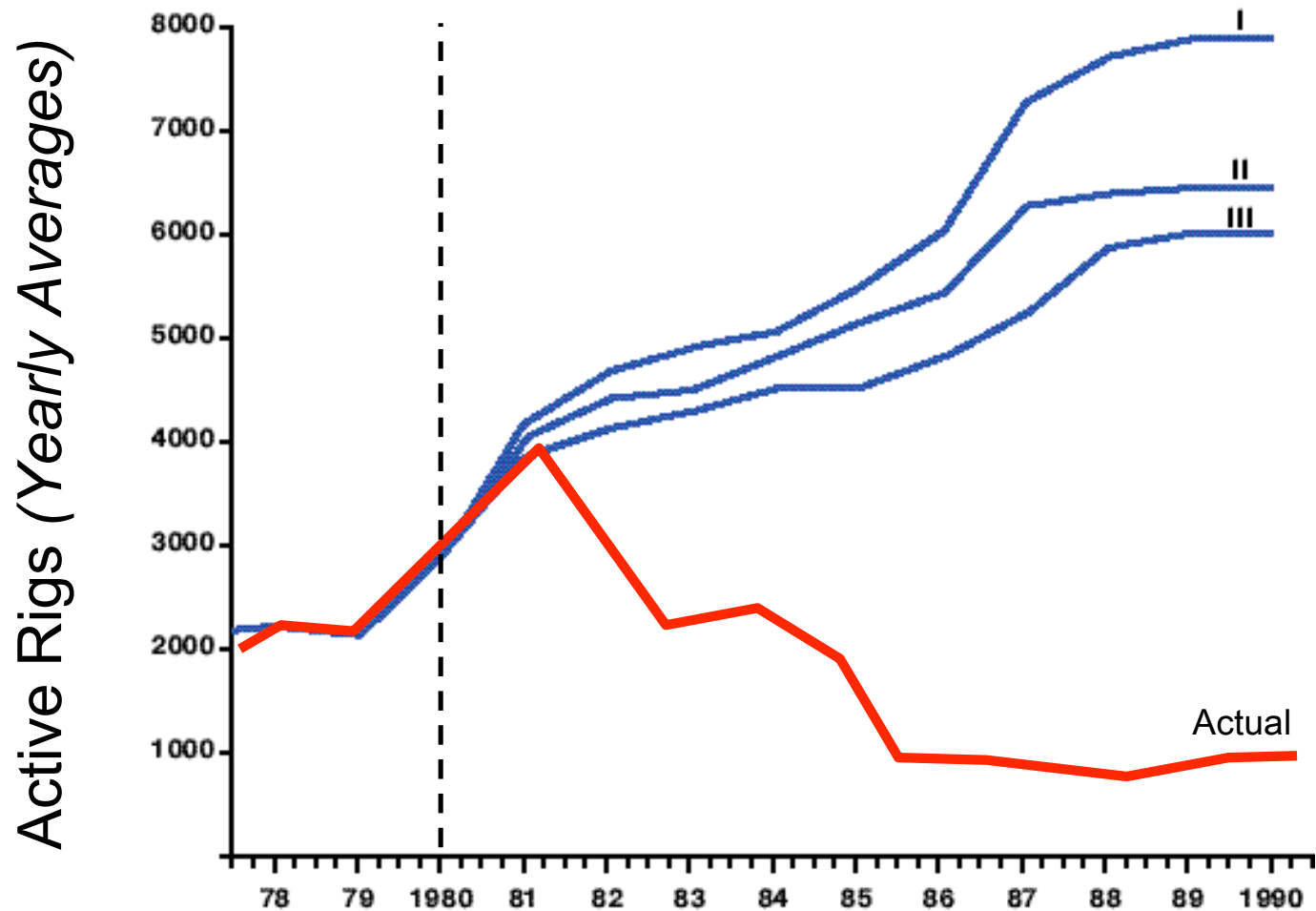


—Peter Schwartz: The Art of the Long View

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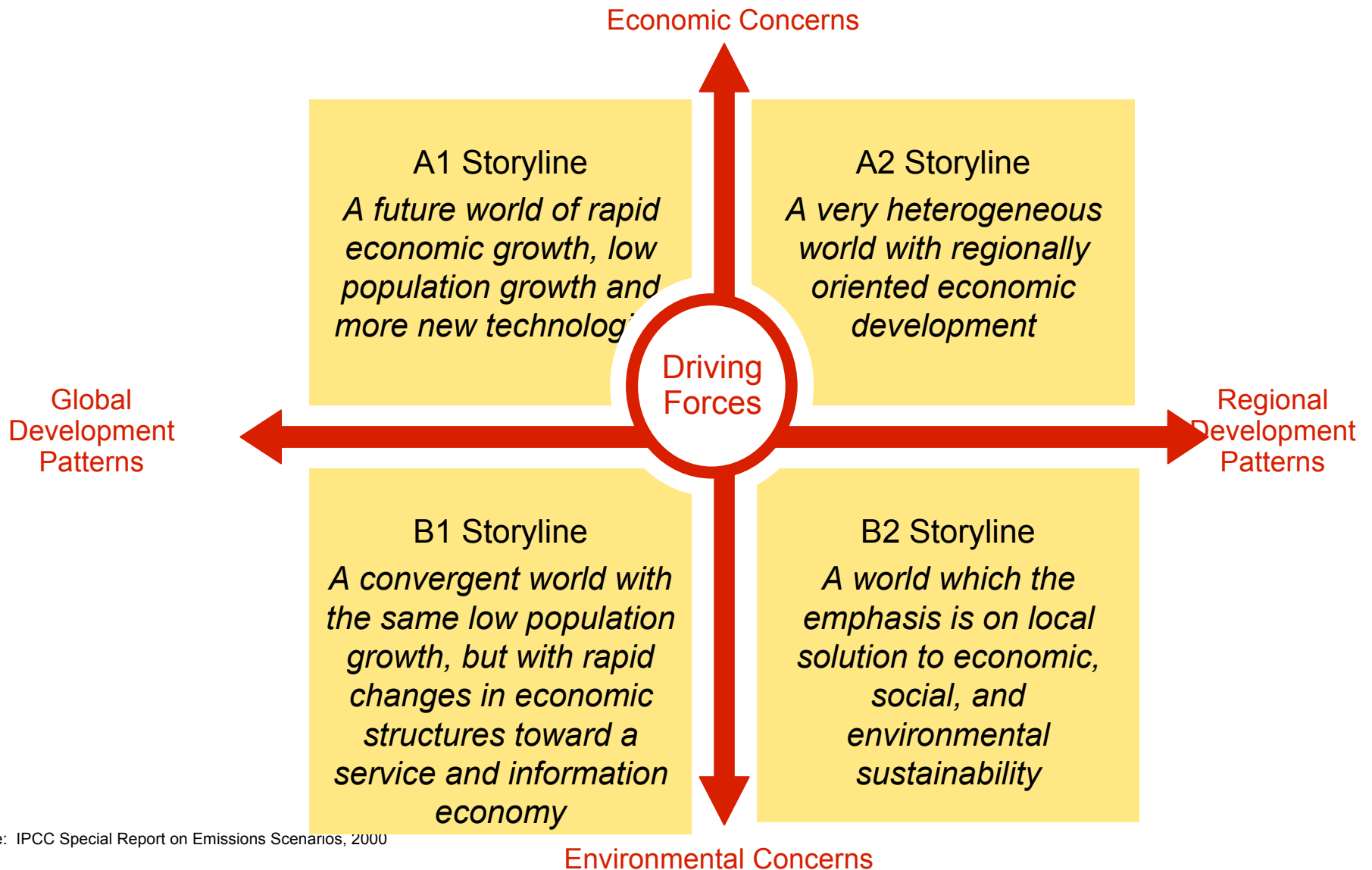
Multiple Forecasts of Oil Drilling: 1980–90



Forecasts by Major Oilfield Equipment Group

Climate Change Scenarios: IPCC

“A scenario is a coherent, internally consistent and plausible description of a possible future state of the world. It is not a forecast; rather, each scenario is one alternative image of how the future can unfold.” — IPCC, 2006





NPS High-Level Scenario Framework

➤ We asked:

What will be the social and political landscape around climate change over the next 25 years?

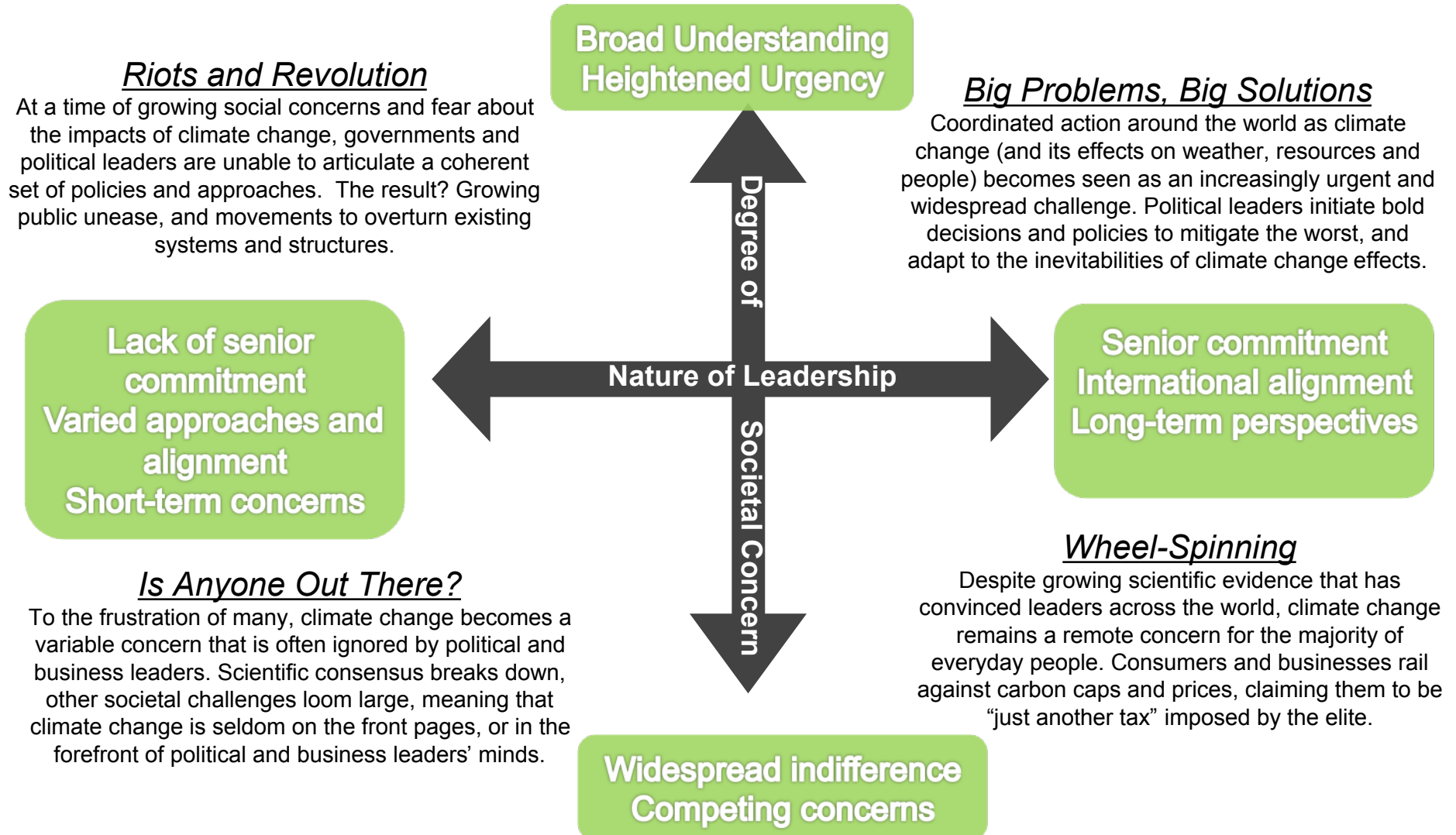
Forces marked in red were deemed to be the most important, and most uncertain, in shaping the future social and political landscape

- 1.rate and magnitude of GHG emissions
- 2.mood / position of administration
- 3.intensity of impacts on average American citizen
- 4.political stability of oil-producing and quickly-developing nations
- 5.population growth and development and energy demand
- 6.regional population shifts and consequent development
- 7.public perception of federal lands and their purpose
- 8.leadership
- 9.budgets (for funding science and management)
- 10.degrees of cooperation between agencies, sectors, etc.
- 11.energy availability and cost
- 12.levels of global conflict
- 13.public reaction to rate of temperature and sea level change
- 14.media portrayal
- 15.sense of public ability to make a difference
- 16.degree to which CC is a partisan issue
- 17.economic prosperity
- 18.knowledge of CC
- 19.threshold changes and wildcards
- 20.federal agriculture policies
- 21.urban planning policies
- 22.sequestration and technology developments
- 23.power of carbon tax / cap and trade / Kyoto
- 24.concern of / in society about natural systems
- 25.social and environmental movements / renaissance
- 26.resource availability / scarcity (water, lithium, etc.)
- 27.global health concerns / epidemics / disease



High-Level Scenario Framework

4 different pictures for the future social and political landscape around climate change





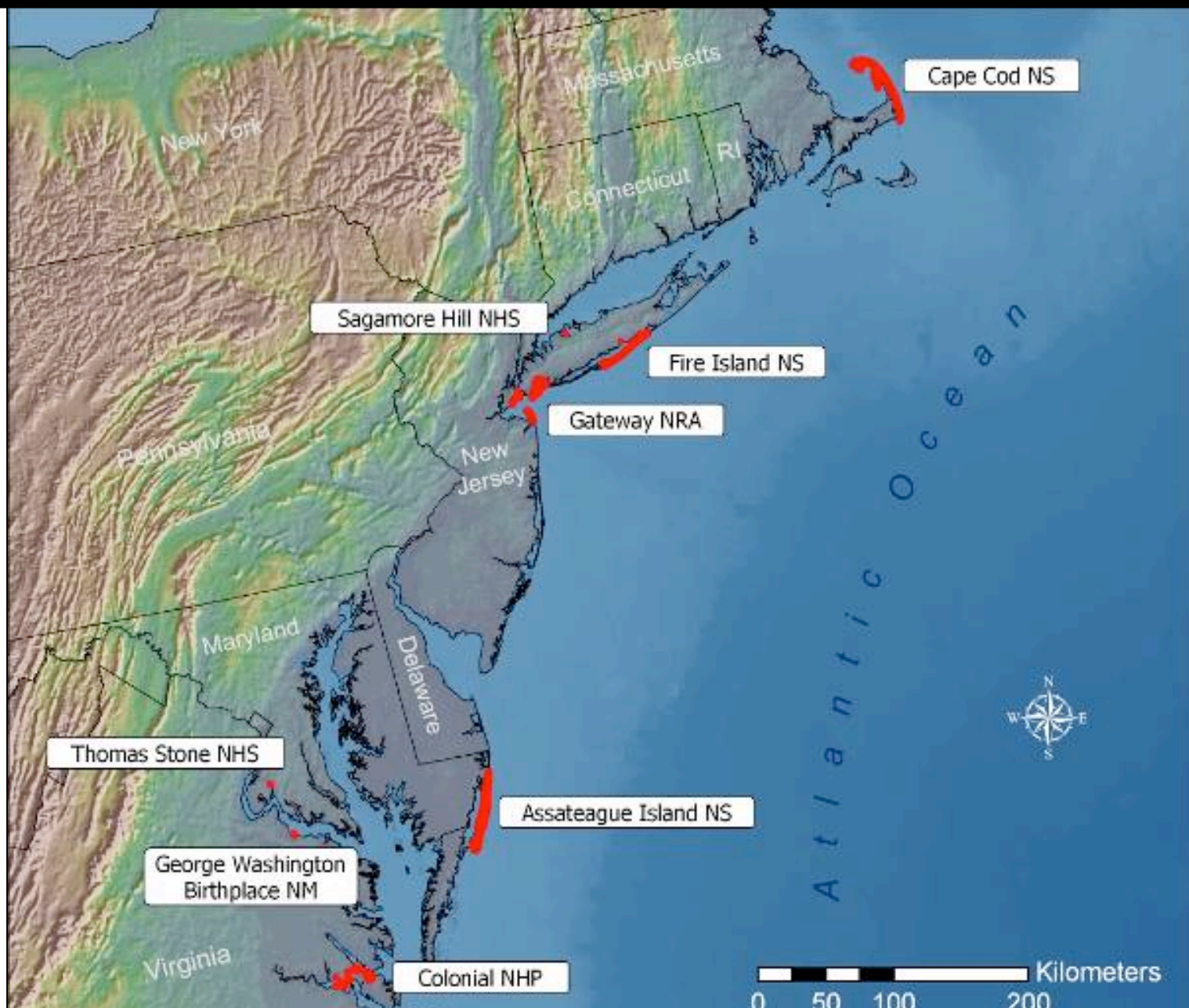
Assateague Island National Seashore

Established in 1965

...to preserve the outstanding Mid-Atlantic coastal resources and natural ecosystem conditions and processes upon which they depend while providing high quality resource-compatible recreational opportunities.



U.S. Department of the Interior
National Park Service
Assateague Island National Seashore





Assateague Island

- 57 km long; varies from less than 1 km to nearly 4 km wide
- Approximately 19,700 hectares
 - 7,000 hectares land
 - 12,700 hectares water
- Three agencies with differing missions manage parts of Assateague Island
 - National Park Service
 - US Fish and Wildlife Service
 - State of Maryland



Case Study 1: Assateague Island National Seashore

National Park Service
US Department of the Interior



The ASIS team identified the key climate change drivers that are likely to impact on the geomorphology, flora and fauna of the park

Climate Variable	General Change Expected	Confidence Level
Temperature	Increase, but not uniform	Virtually certain
Precipitation	Probable decrease in total annual precipitation	Low
Sea Level	Increase	Moderate
Drought	A modest increase in drought frequency in the warm season	Moderate
Snow cover	Increase in snow-free days; decreased snow accumulations	High
Length of growing season	Increase	High
Extreme Events: Temperature	Warm Events Increase / Cold Events Decrease	Moderate to high
Extreme Events: Precipitation	Possible decrease of frequency of heavy rain, but countered by rise in intensity.	Low to moderate
Extreme Events: Cold Season Storms	Increased intensity.	Low to moderate
Extreme Events: Warm Season Storms	Increased intensity; possible decrease in frequency	Low

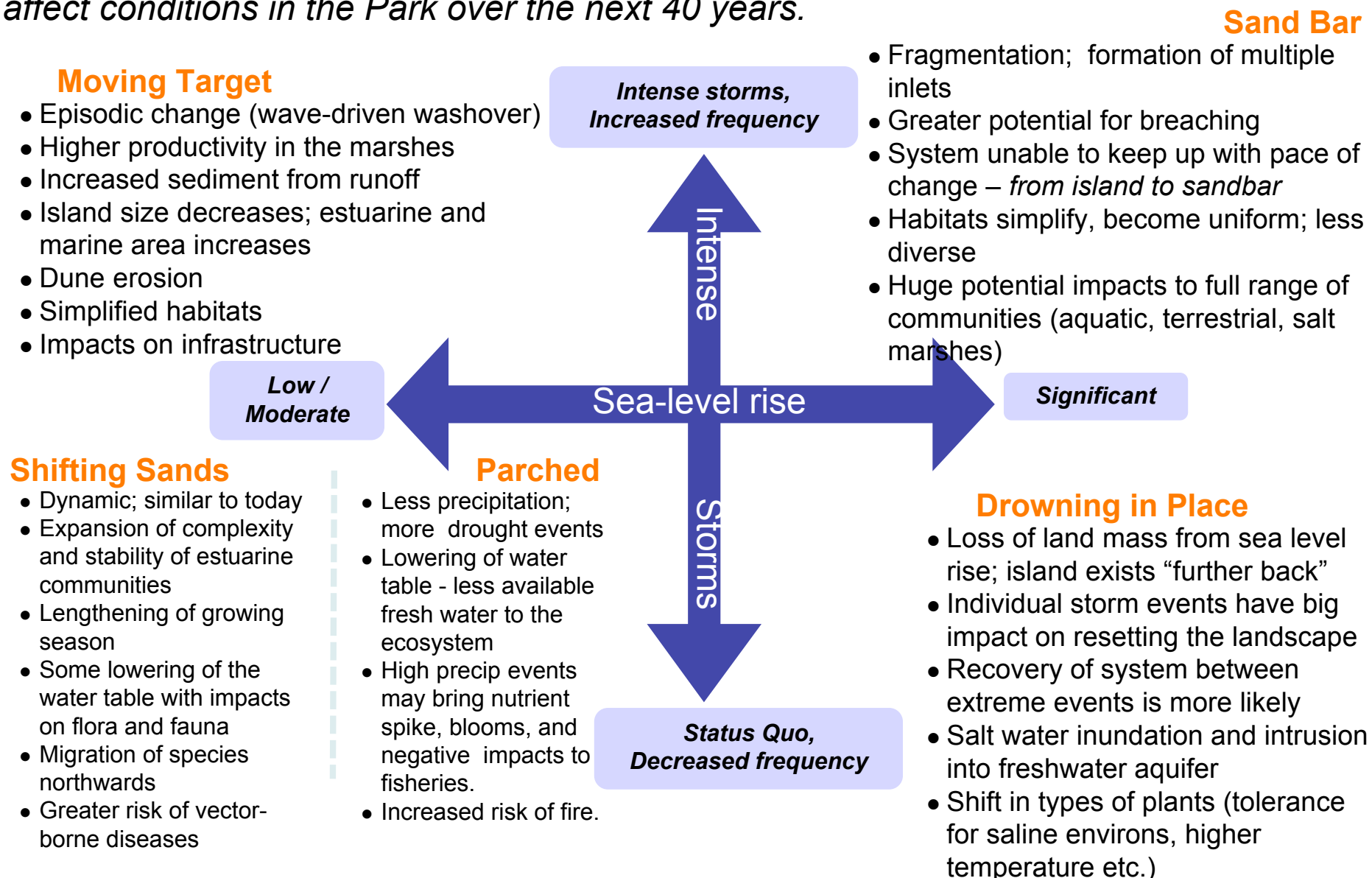
Note: 1. The study also included additional information such as “Range of Change Expected & Reference Period”, “Size of Expected Change Compared to Recent Changes” and “Synoptic Signs”. The complete table can be found in the appendix to this document.

Case Study 1: Assateague Island National Seashore

National Park Service
US Department of the Interior



The ID team identified the most important and most uncertain climate drivers that will affect conditions in the Park over the next 40 years.



Case Study 1: Assateague Island National Seashore

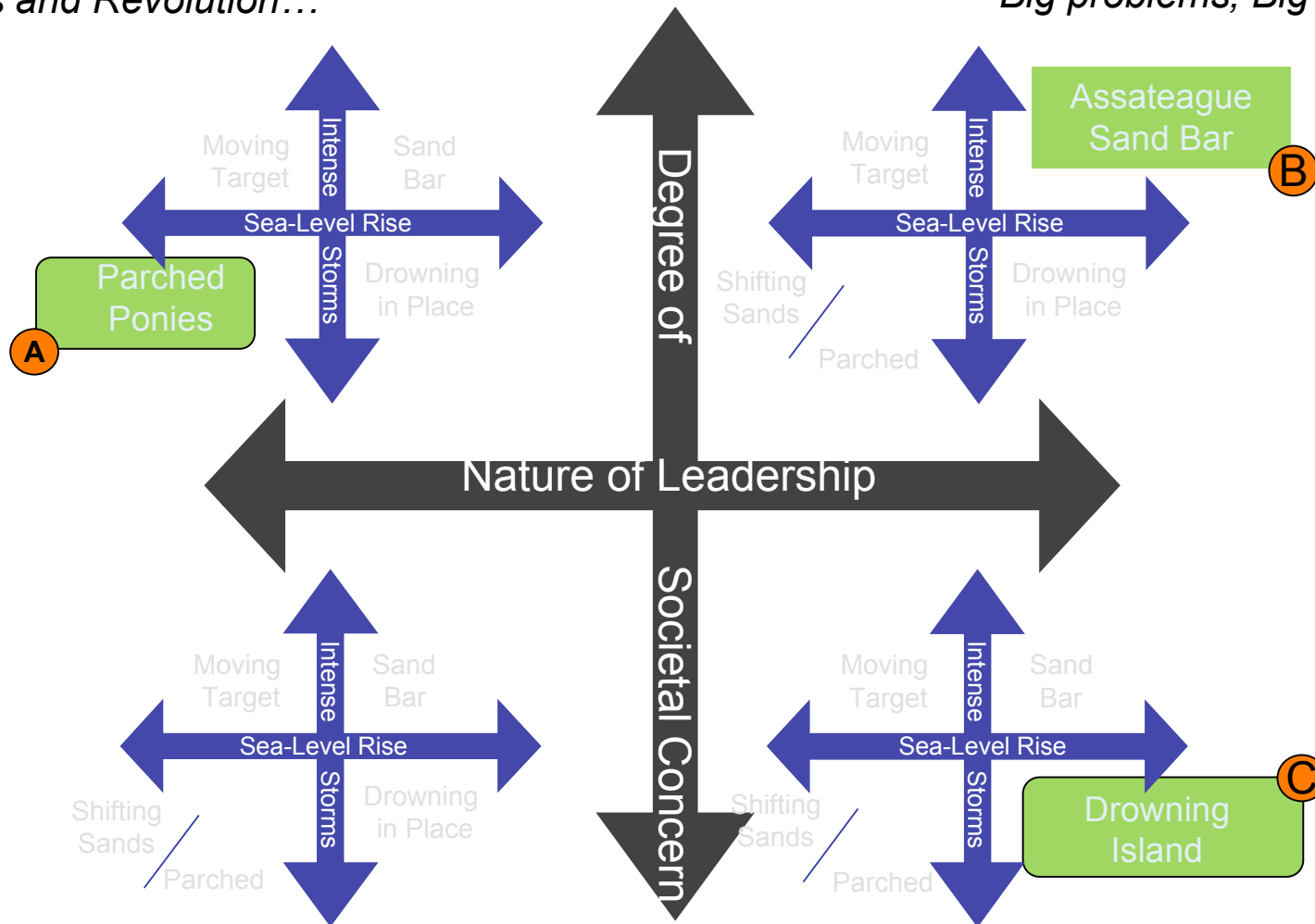
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Combining local and high-level scenario frameworks → “nested scenarios”

Riots and Revolution...

Big problems, Big solutions...



Is Anyone Out There?...

Wheel-Spinning...

Case Study 1: Assateague Island National Seashore

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High-Level Scenario

Riots and Revolution

Local Scenario

Parched

“Parched Ponies” is a world in which societal concerns around climate change are heightened, yet there is little real leadership shown to address challenges at a global or national level. Management response might include more coastal monitoring, reprioritizing access needs, physically maintaining some systems (e.g. shorebird nesting habitat) increased education and outreach, and drawing on partnerships and grass roots support.



Case Study 1: Assateague Island National Seashore

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High-Level Scenario

Big Problems, Big Solutions

Local Scenario

Sand Bar

“Assateague Sand Bar” is a world where climate change concerns are at the forefront of social and political conversations. A greater intensity of storms, coupled with significant rises in sea-level, leads to major changes in land use, resources and visitor experiences. Management response may involve boundary expansion to allow for migration and creation of marshes. Fewer visitor amenities such as maintained roads, bridges, and parking lots – need for portable and cheap infrastructure. Recruitment and training ties in to communication and relationship building; public education is key.



Climate Change Response

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High-Level Scenario

Wheel-Spinning

Local Scenario

Drowning in Place

“Drowning Island” is a world where regulators and leaders pay attention to climate change issues, but where general societal attitudes are mostly indifferent. Main impacts include wetland and saltmarsh species. Land use changes might include possible land exchanges and consolidation, a more sustainable recreation infrastructure, a blurring of the lines between state and federal lands, alternative transportation systems, and a shifting of infrastructure to the mainland. Cooperation with park and local agencies critical.





Communication and Education

Communicating climate change impacts and actions parks are taking to reduce them (audiences = staff, partners, and public)

- Developing a broad strategy aimed at park, regional, and national levels
- Educating employees → monthly webinar series; climate change “state of knowledge” summaries
- Use the communication power of the NPS → create new interpretive programs and products



www.DoYourPartParks.org

An on-line program that helps people reduce their carbon footprint

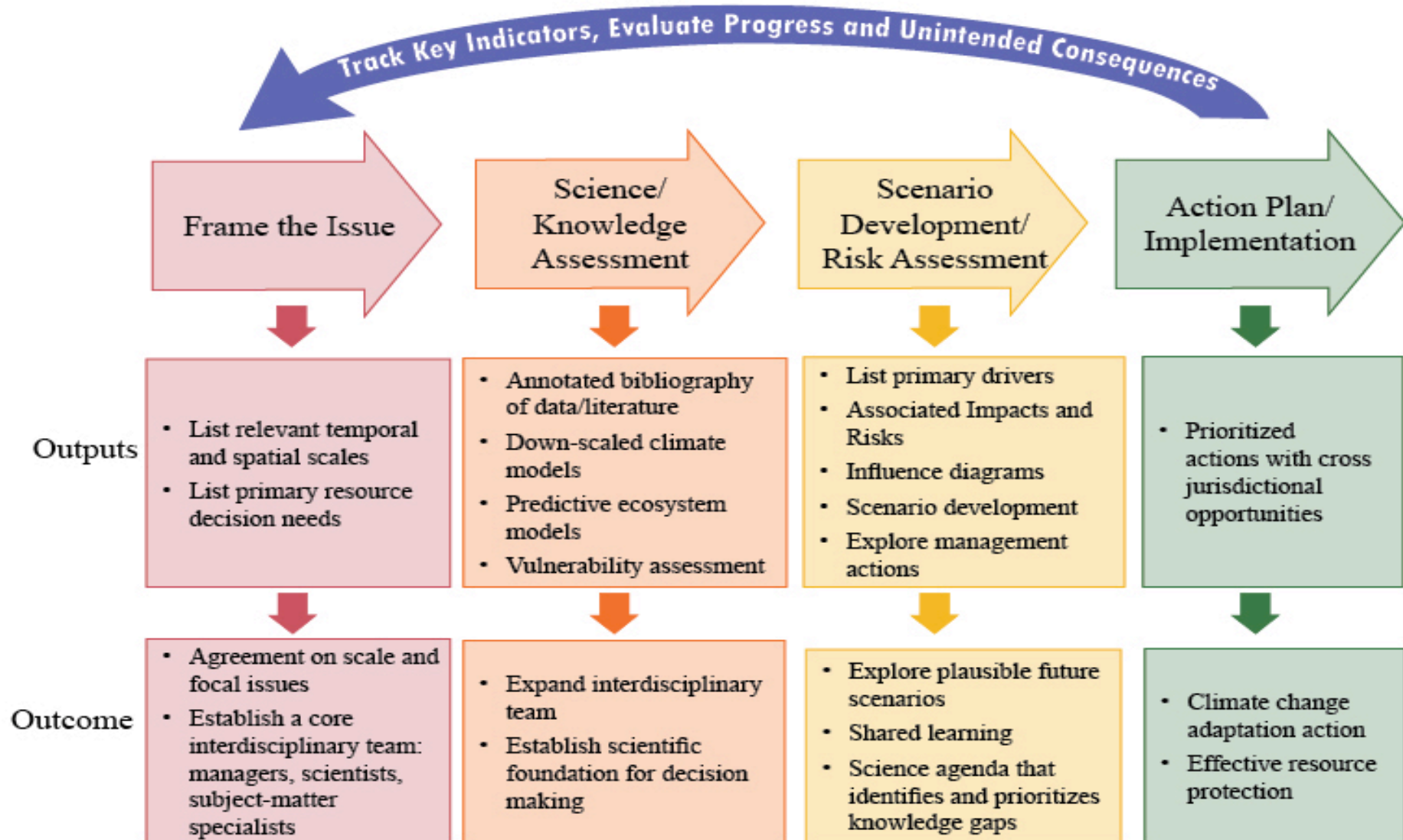


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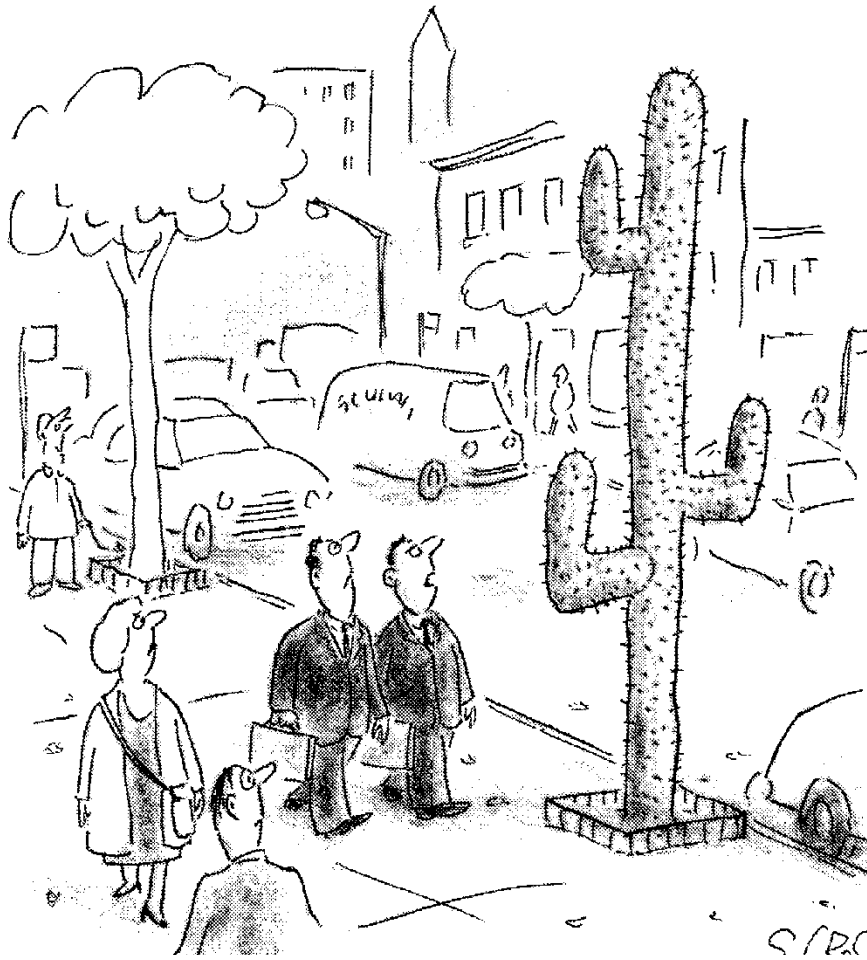


KEY ELEMENTS OF AN ADAPTATION PLANNING FRAMEWORK





The Good News: People are starting to pay attention!



"I'm starting to get concerned about global warming."