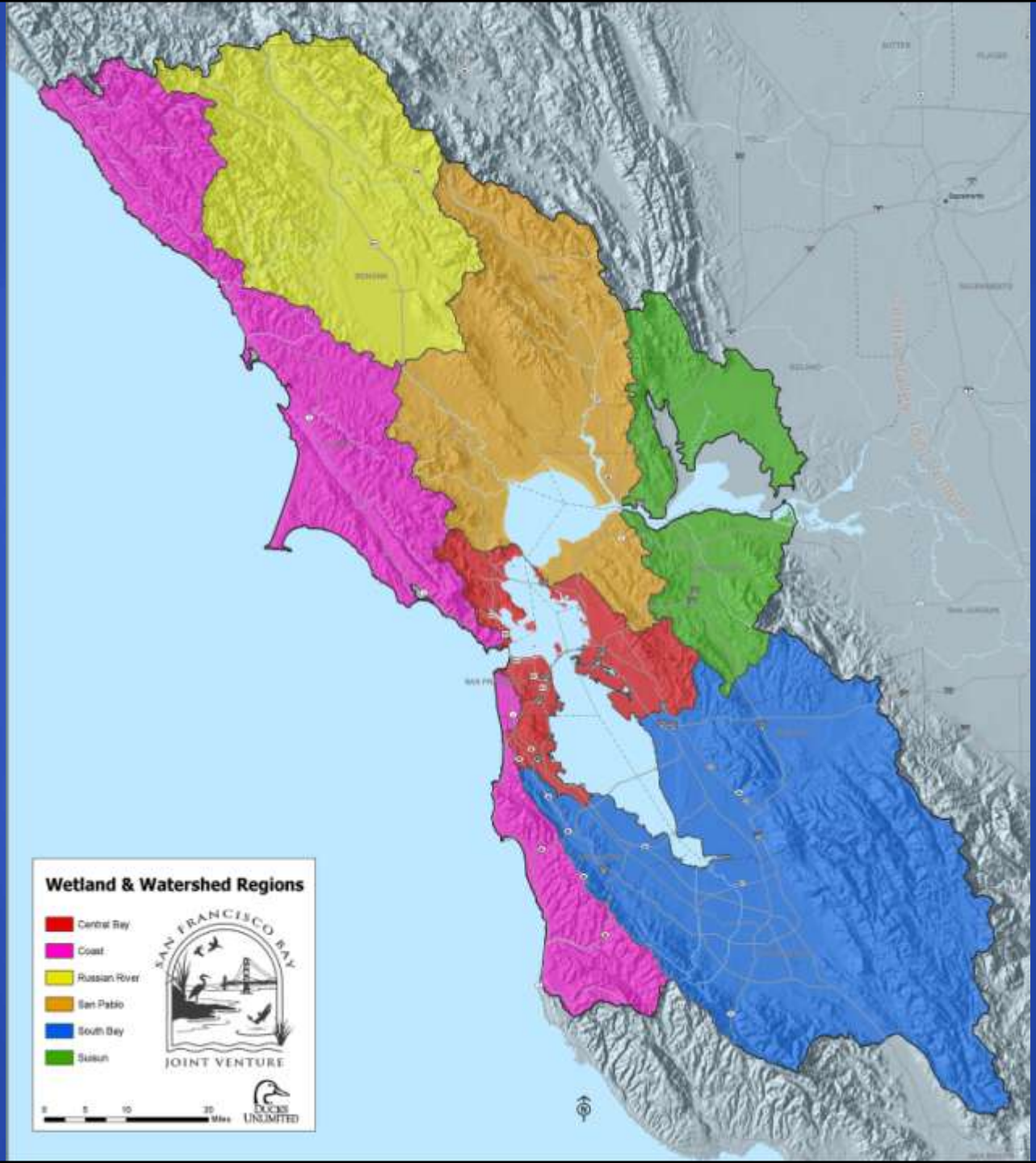
San Francisco Bay Joint Venture

Manager Concerns, Needs & Information Gaps regarding Sea Level Rise (SLR) Impacts on Estuaries

Focal Region of the San Francisco Bay Joint Venture

- North Bay
- Central Bay
- South Bay
- Suisun/Delta
- Coastal watersheds
- Russian River




San Francisco Bay
Joint Venture
Active
Habitat Projects
2011
February Edition
Joint Venture Regions
(Index to project names on reverse side of map)
Project Locations
Wetland, Tier 1
Wetland, Tier 2
Wetland, Other Active
Creek, Tier 1
Creek, Tier 2
Creek, Other Active
Baylands Extent
Protected Lands (above baylands)
Urban or Developed Land
Credits
- Projects from JV Tracking System supported by Ducks Unlimited.
Active Project Query Date: February 20, 2011
- Other data sources: baylands from SFEI EcoAtlas, other protected
lands from the Bay Area Open Space Council and GreenInfo Network.
0
10
20 Miles
Russian River
Coast
North Bay
Suisun Marsh in the Central Valley JV
Central Bay
Suisun
Coast
South Bay
629-643
LAKE
SONOMA
NAPA
YOLO
SOLANO
MARIN
CONTRA COSTA
SAN JOAQUIN
ALAMEDA
SAN MATEO
SANTA CLARA
STANISLAUS
SANTA CRUZ

JV SLR Concerns

- PAST – Fate of restoration investment
- PRESENT – Vulnerability assessments & adaptation strategies for target ecosystems & species
- FUTURE – Climate-smart restoration & management

Tidal Marsh Vulnerability to SLR Manager Needs

- Understand localized SLR rates (i.e. SF Bay regions vs. Tomales Bay)
  - need accurate models depicting water levels over time under various conditions;
- Know tidal marsh vulnerability to SLR given current topography and current sediment loading rates in respective watersheds
  - i.e. Storm events at high-tides, influence of levee structures, etc.
- Determine vulnerability of future marsh in subsided baylands
  - Can we expect the marsh to form in our anticipated 20-year timeframe and will it keep pace with sea level rise?

Tidal Marsh Vulnerability to SLR Manager Needs

- Understand potential for marshes to migrate inland in response to SLR
  - taking into consideration topographic and infrastructure constraints
- Understanding of what factors will be most important in the ability of coastal marshes to mitigate sea level rise
  - i.e. Will organic matter accumulation be more important than sedimentation in allowing marshes to respond to increases in sea level?
- Understanding the fate of the habitat itself, and also the fate of all the plant and wildlife species utilizing it
- Need to have information on local trends on climate, hydrology, and geology
  - to be able to make informed management decisions

Impacts of Most Concern

- Conversion of habitats (tidal marsh to mudflat or subtidal) and related loss of restoration investment
- Primarily losing mid and upper marsh zones to lower marsh and open Bay water habitat.
- Changes in salinity regime & related impacts on fauna & flora
- Associated storm events as they are least predictable and can occur far more quickly than actual sea level rise

Urgency for Vulnerability Assessments

- Need to complete vulnerability assessments as soon as possible
  - BUT important to have the best information available to inform these efforts !
- Urgency for having information on localized trends in climate, hydrology, and geology
- The sooner the better! We are moving forward now.
- *Yesterday has passed already, so, sometime in the near future!*

SLR Vulnerability Analysis Main Concerns

- Information will be used to make decisions that are not truly reflective of changes that might occur in our region
- Mainly that the science is not advanced enough to accurately predict what will happen. We don't really know:
  - how much sediment is out there
  - when and how fast sea level will rise

  "The benefit of unrefined maps is outweighed by the alarm they raise."
- Whether we'll have enough quantity and quality of refugia habitat to provide for the species entrusted by the public to our agency
- Results will tell us that there isn't much we can actively do and our previous work is lost

Main Information Gaps

- Site specific height and rate of sea level rise and sediment availability
- No good current modeling for potential changes along the California coast
- Perceived gaps in the exchange of information among those organizations (scientists!) collecting, analyzing, and conveying the info

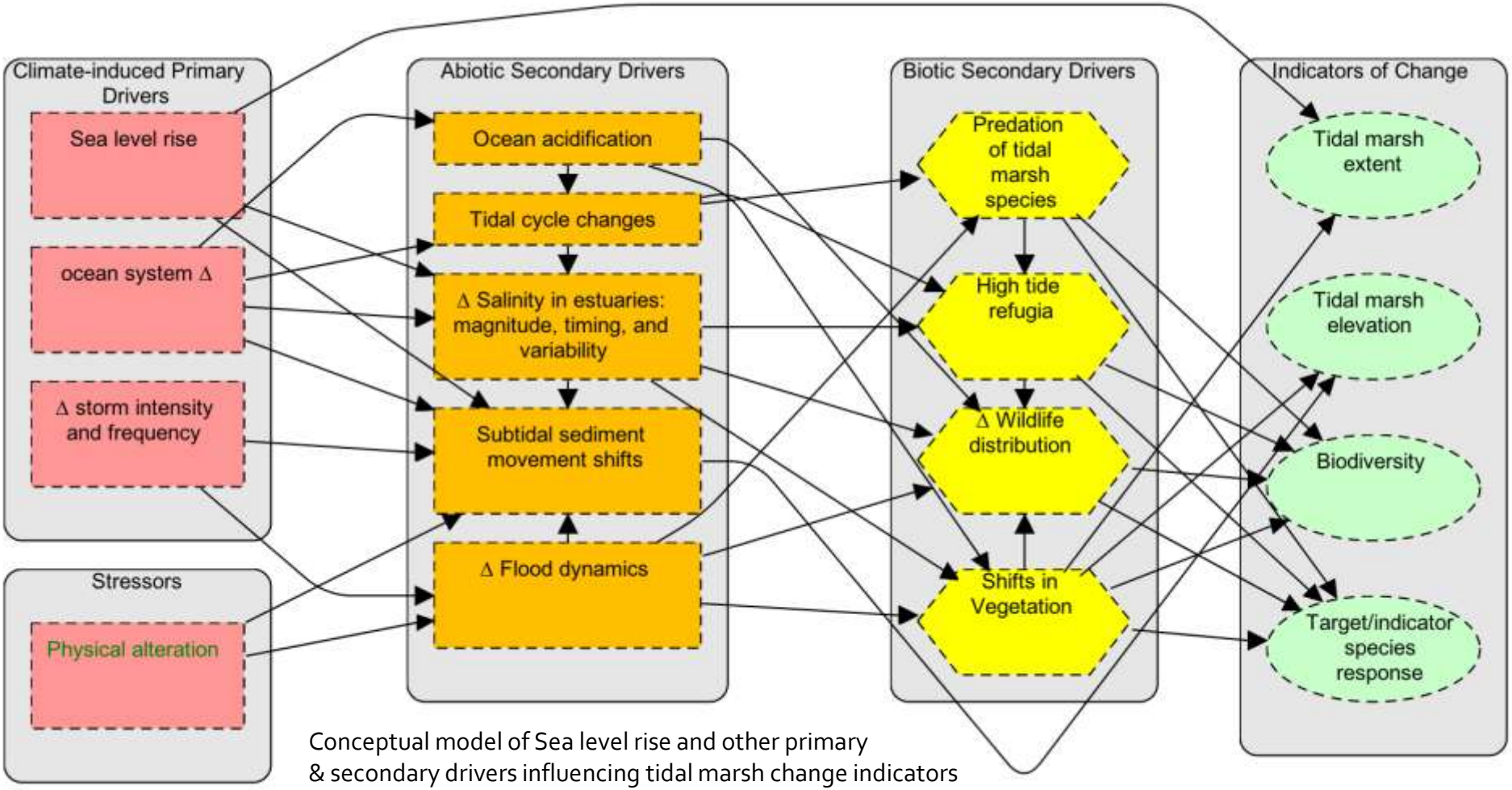
Priority Research Needs

- SLR impacts on habitat evolution- can passive marsh accretion keep up with SLR?
- Vulnerability assessments for tidal marsh ecosystems and key indicator species
  - Site specific rate of SLR & sediment availability
- High tide refugia distribution & associated predation risk
- Projected storm severity & frequency in conjunction with SLR impacts on key species
- Effects of changing salinity & ocean – estuary linkages

Priority Monitoring Needs

- SLR in conjunction with salinity Δ, storm frequency
- Tidal water & extreme event surface elevations & rates of Δ at local scale
- Impacts on marsh fauna, flora, special status species
  - Indicators developed via SFEP-DWR effort

Conceptual Model



Conceptual model of Sea level rise and other primary & secondary drivers influencing tidal marsh change indicators

Figure 1: Framework for developing Climate Change Adaptation Strategies (*Source: Glick et al. 2011a).*

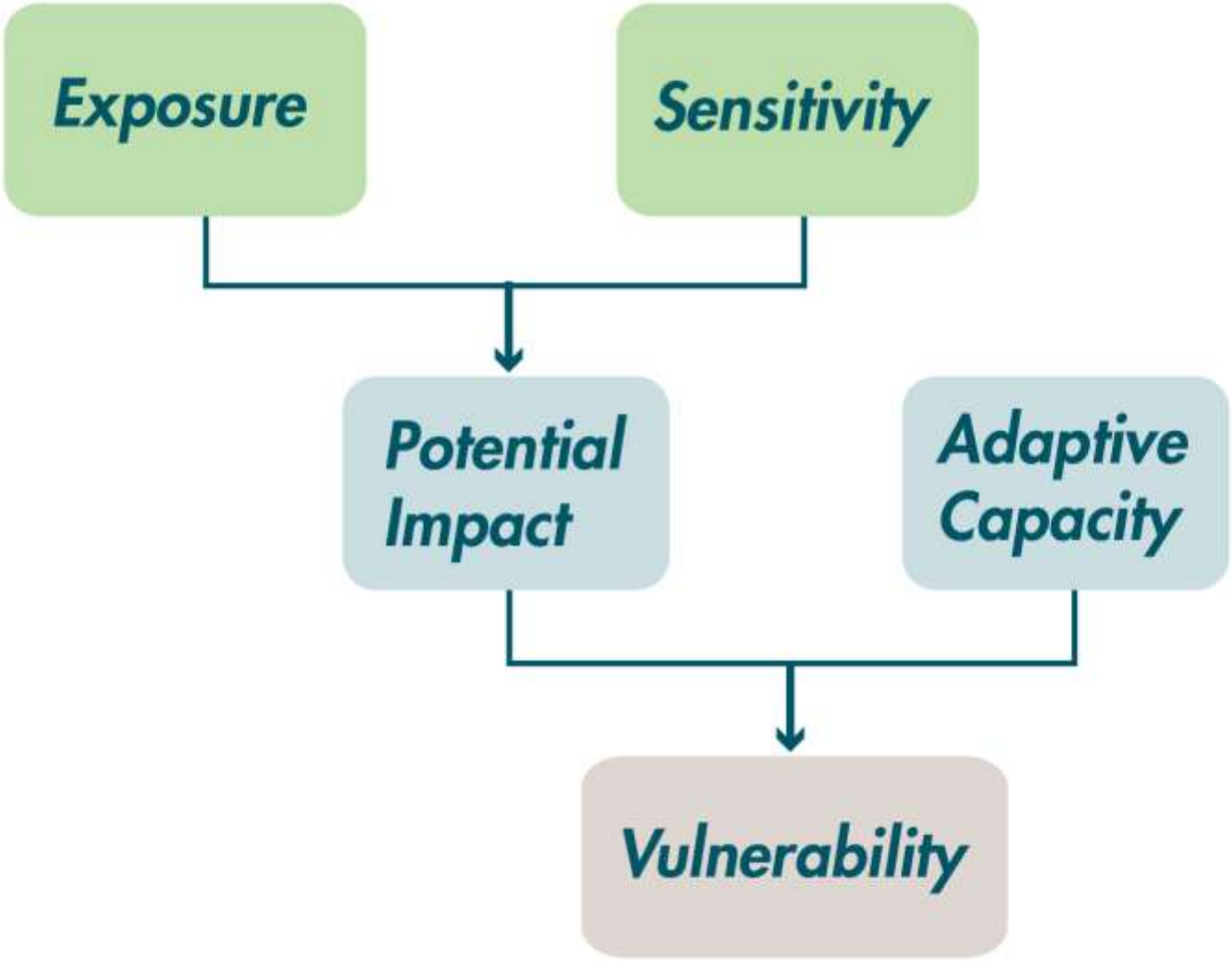


Figure 3: Key components of vulnerability, illustrating the relationship among exposure, sensitivity, and adaptive capacity (*from: Glick et al. 2011a*)

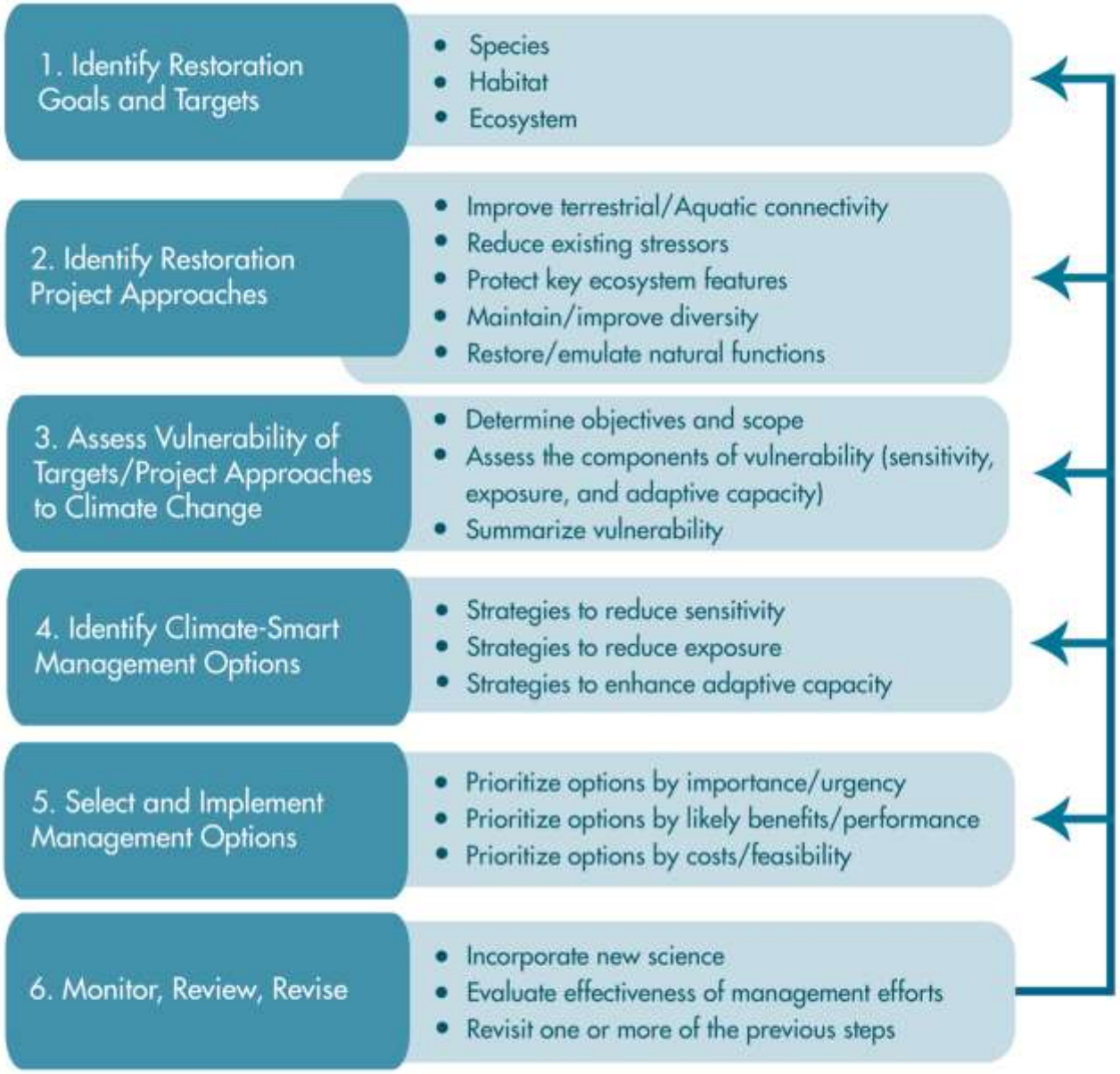


Figure 2: Framework for developing climate-smart restoration programs (*source: Glick et al. 2011b*)