

# Incorporating Climate Change into Integrated Regional Water Management Plans

Project Partners  
**USEPA Region 9**  
**DWR, USACE,**  
**Resources Legacy Fund**

Presented by

**CDM**

IRWM Roundtable Webinar

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# Background



- New DWR IRWMP Guidelines require climate change considerations
- IRWMP Climate Change Handbook under development
  - ▣ Project partners include: EPA Region 9, DWR, USACE & Resources Legacy Fund
  - ▣ CDM contractor preparing Handbook
- Progress to Date
  - ▣ Literature Review
  - ▣ Decision-Support Framework
  - ▣ Draft outline of Handbook

# Our Goal for Today



- Present to IRWMP practitioners
  - ▣ Preliminary Decision-Support Framework
  - ▣ Draft outline of Handbook
- Obtain feedback to make the handbook truly useful to practitioners
  - ▣ Understand range of data availability, resources and water management strategies
  - ▣ Handbook may also be useful as a guide for watershed plans outside California

# Questions the Handbook should Answer

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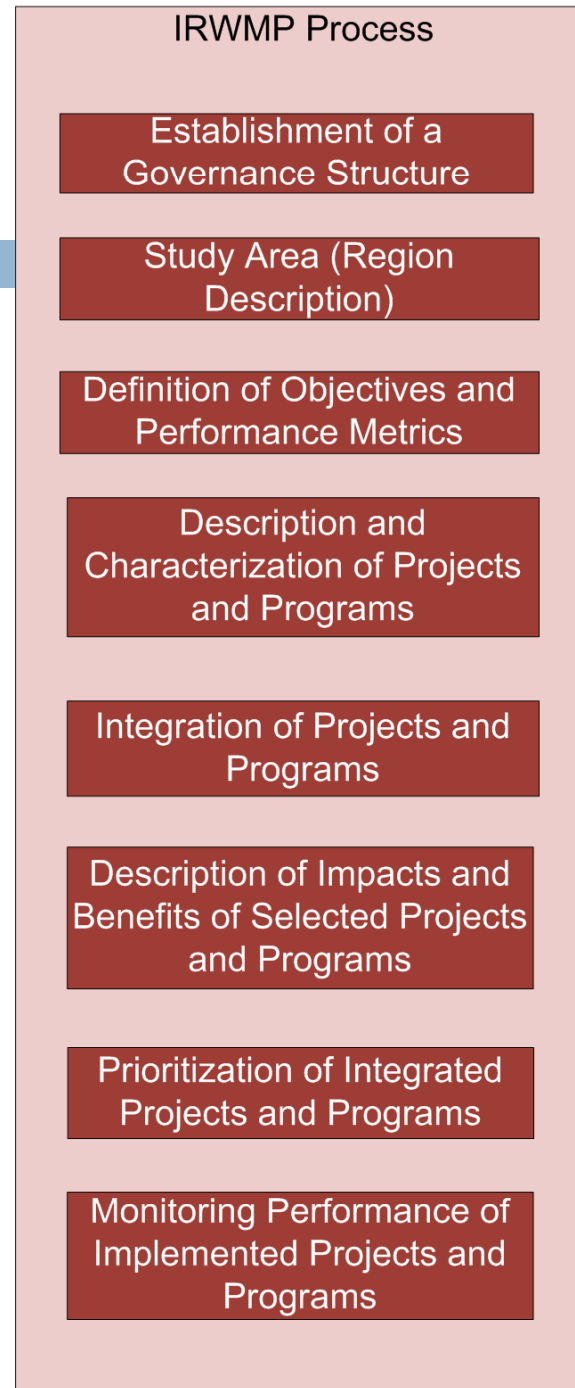
- How do I incorporate CC into my planning standards?
- How do I include CC into my IRWMP project integration?
- How do I handle uncertainty as it relates to CC?
- What tools/resources are available in my region for assessing/evaluating CC?

# Climate Change Analysis Framework

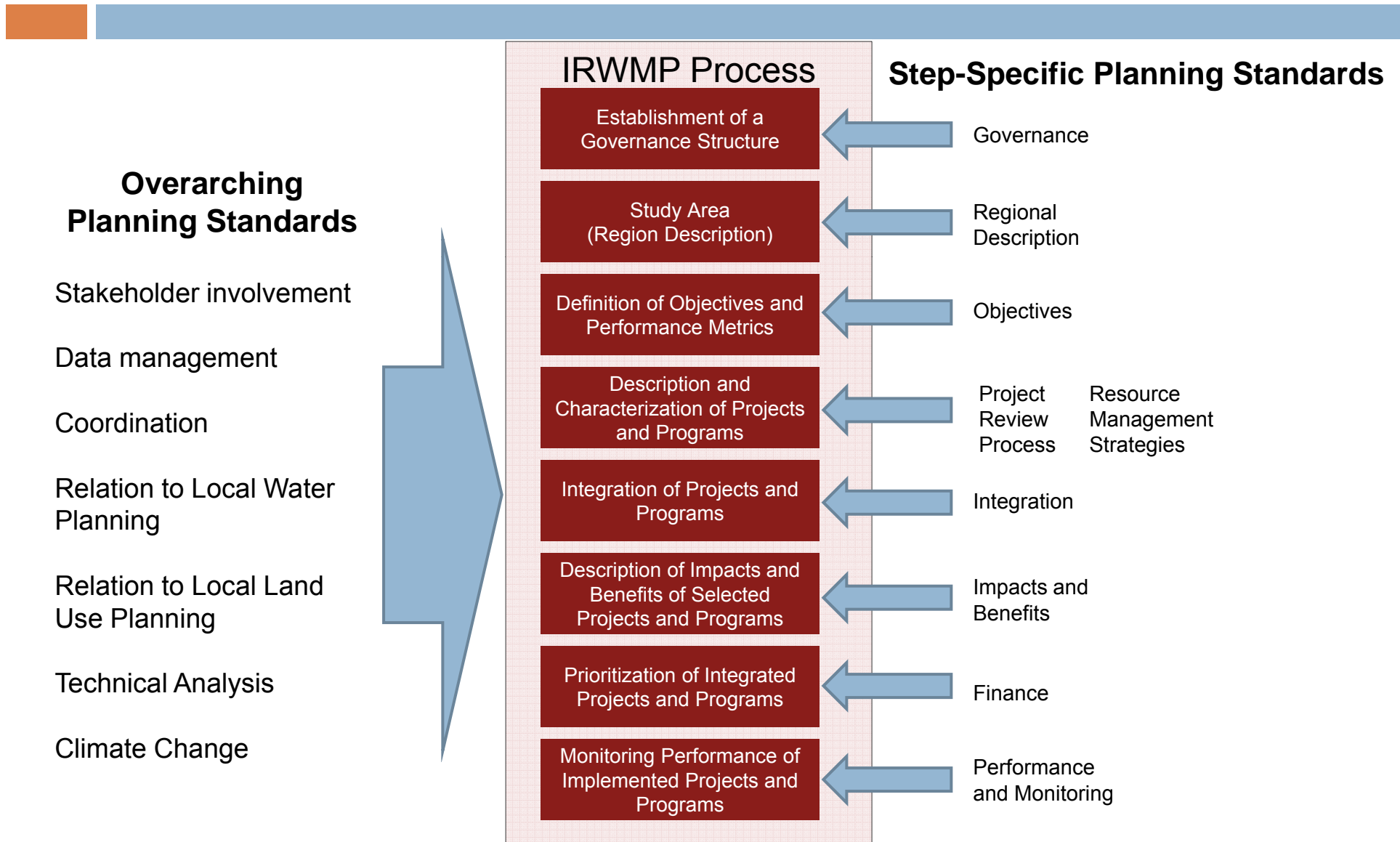


**Challenge:** How to incorporate Climate Change Analysis into the IRWMP process

# Review of the IRWMP Process

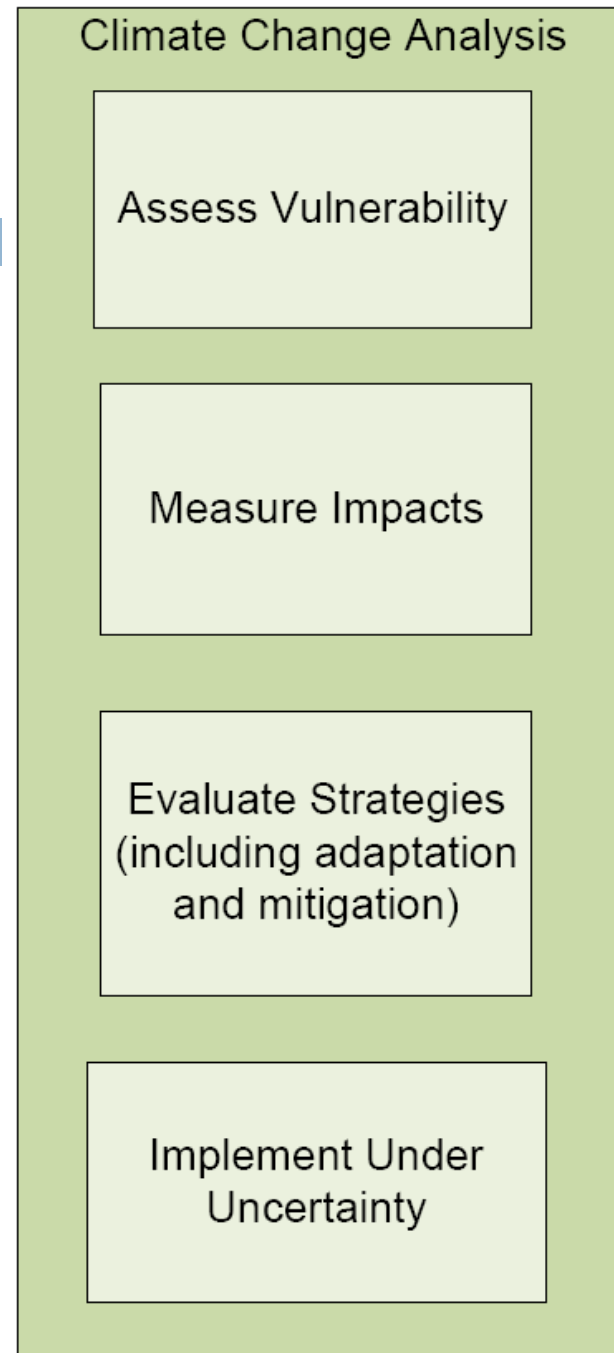


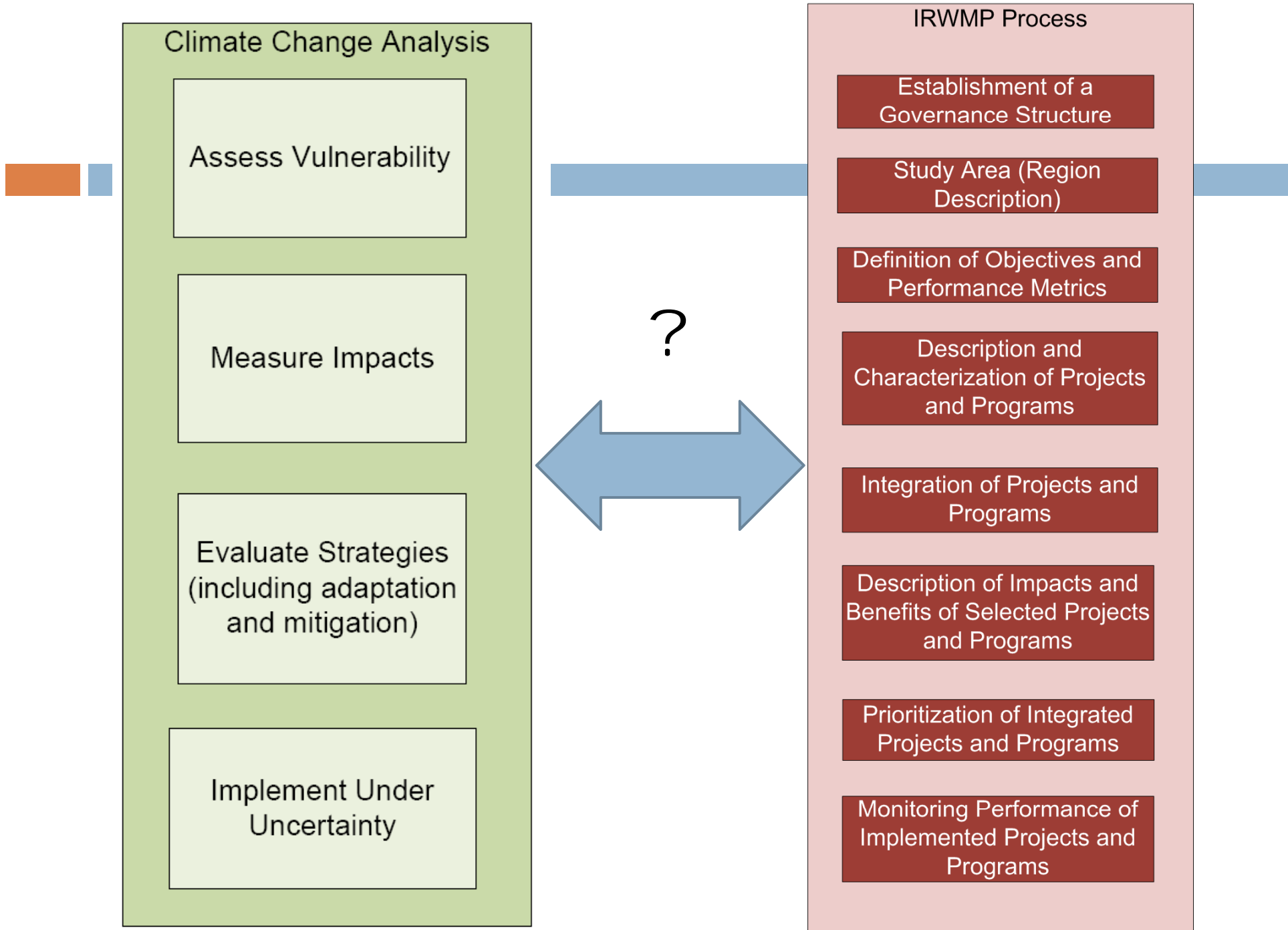
# Process is Shaped by DWR Planning Standards



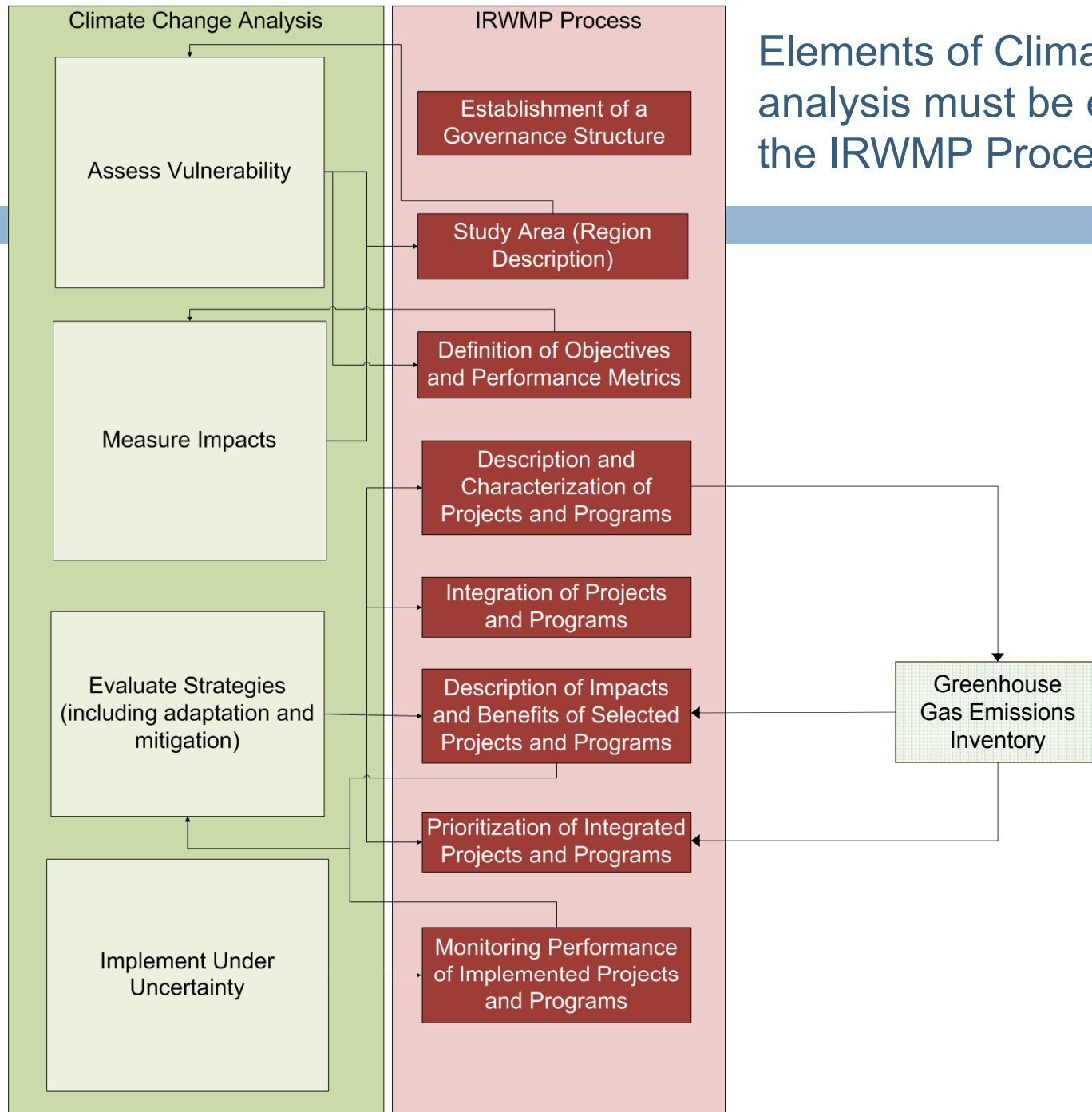
# Steps of Climate Change Analysis

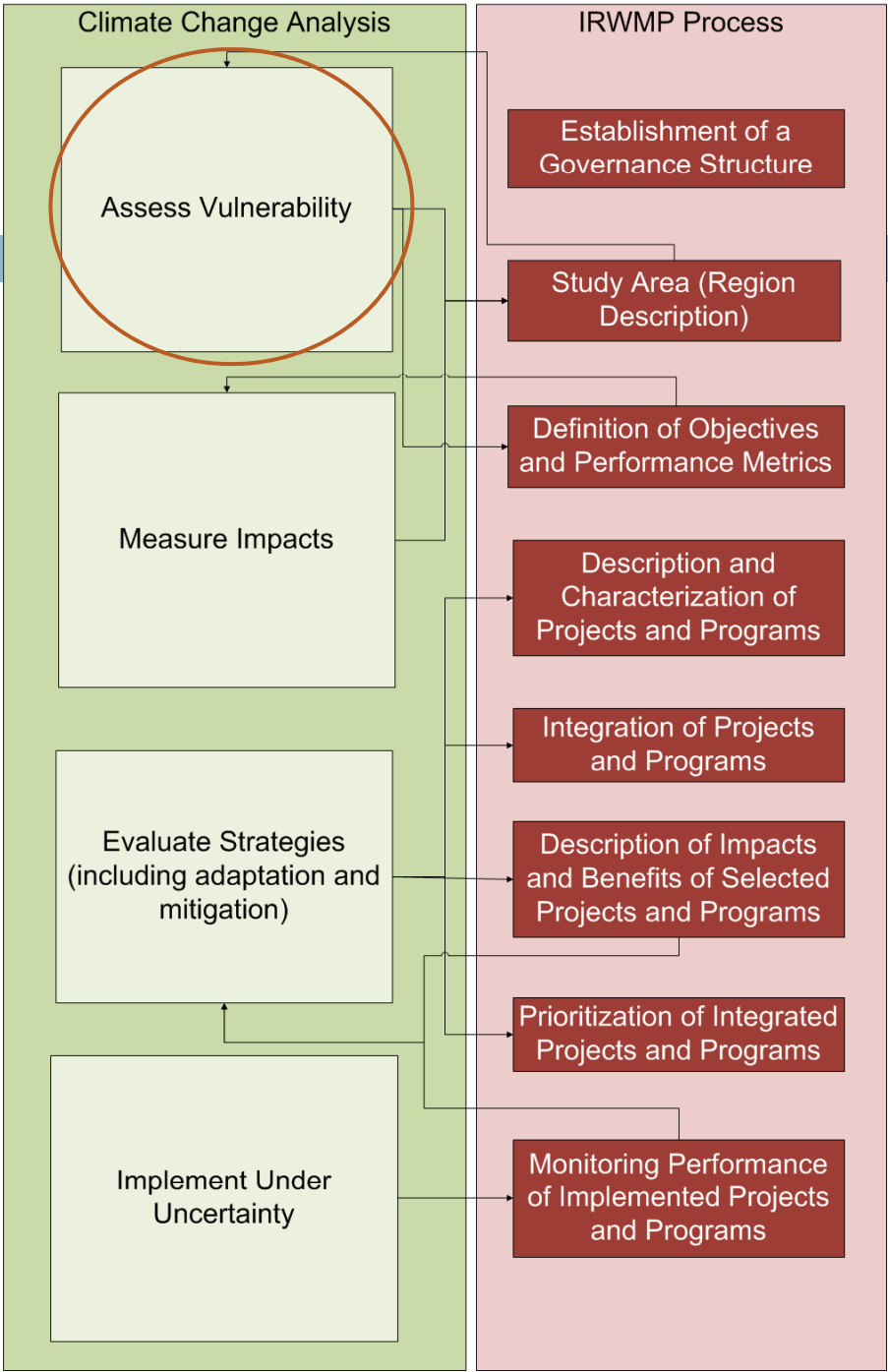
- CC analysis must address both
  - ▣ Mitigation: greenhouse gas emissions
  - ▣ Adaptation: implementing strategies to address climate change impacts

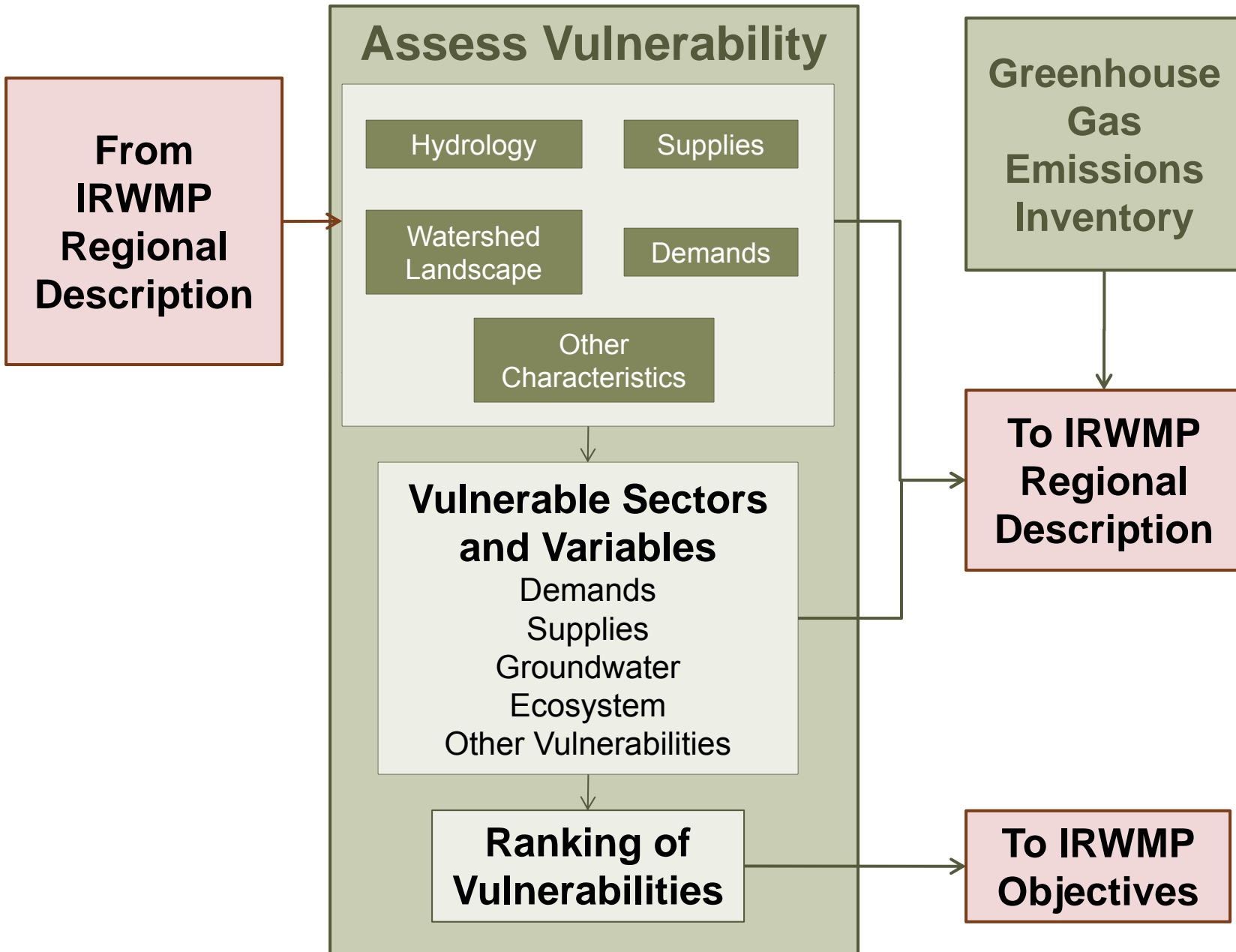




# Elements of Climate Change analysis must be embedded into the IRWMP Process

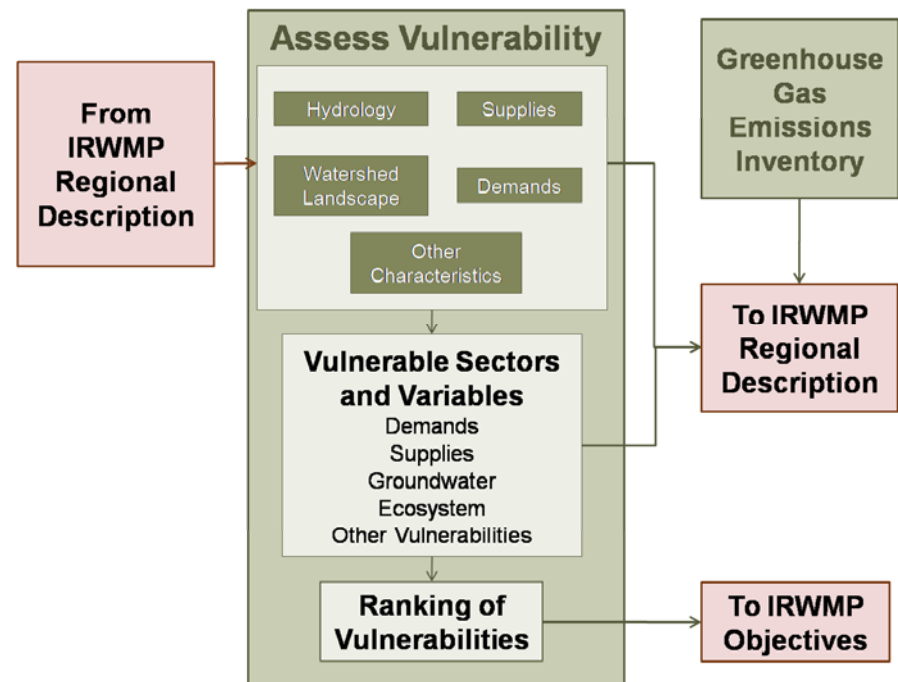


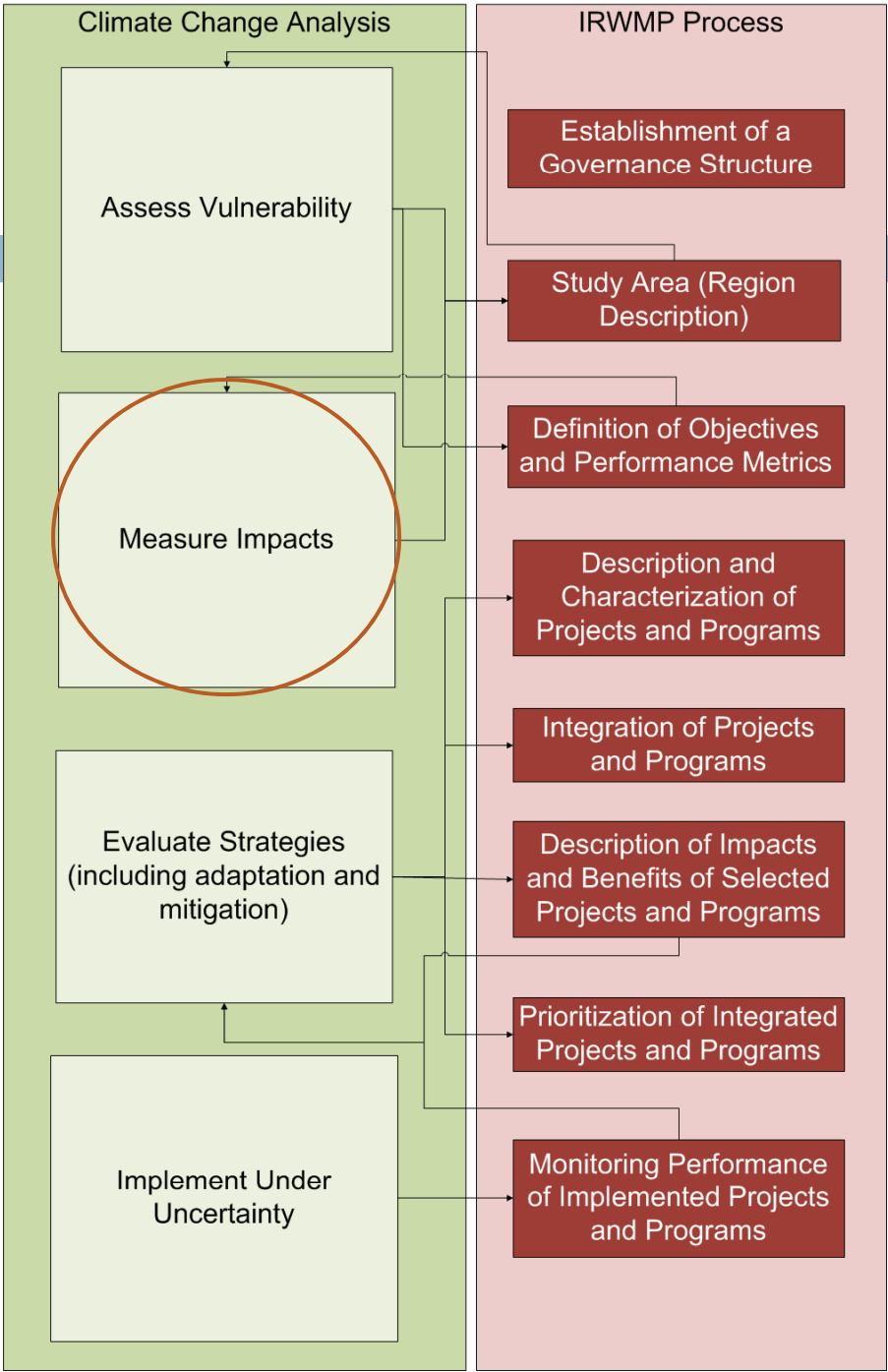




# Assess Vulnerability & GHG Emissions Inventory

- Regional Description
  - ▣ IRWMPs characterize physical setting
  - ▣ Climate change vulnerabilities depend on physical setting and water supplies
  - ▣ Vulnerabilities inform the characterization of the region (feedback)
- IRWMP Objectives
  - ▣ Should target the highest ranked vulnerabilities
- GHG Emissions
  - ▣ The region's GHG emissions included in the region description

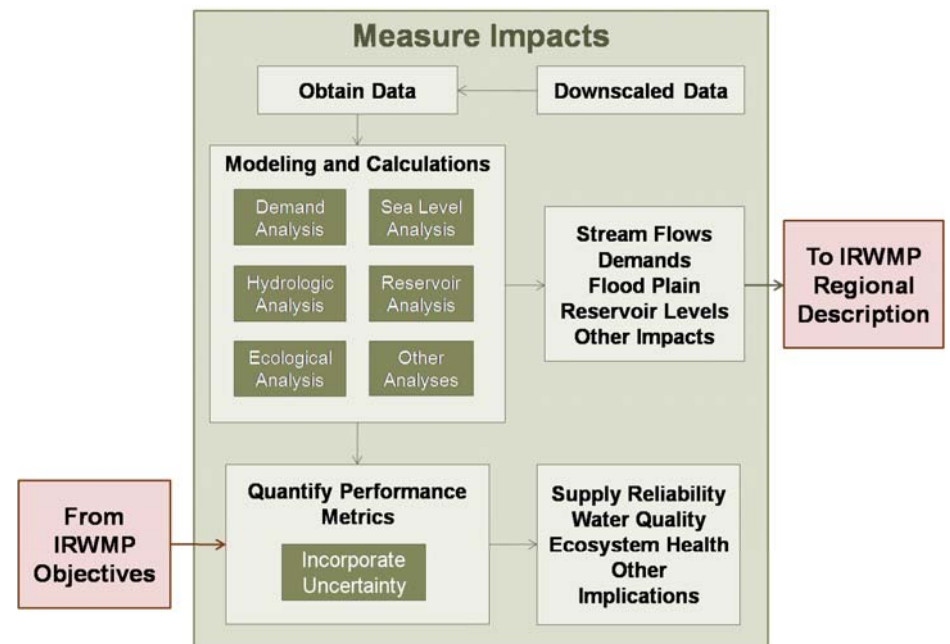






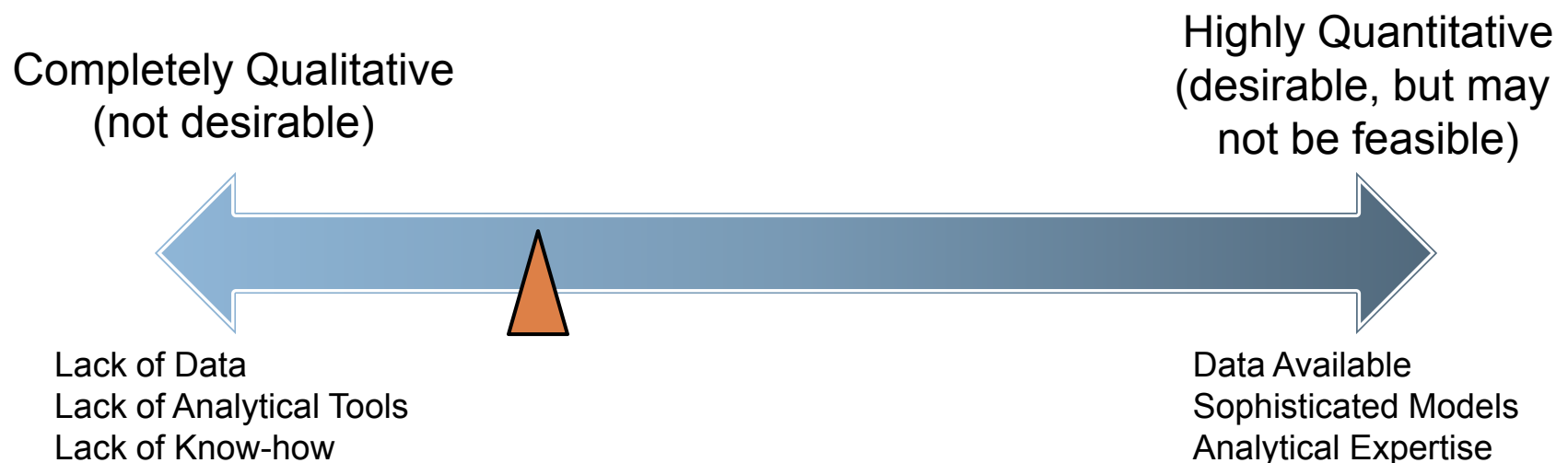
# Measure Impacts

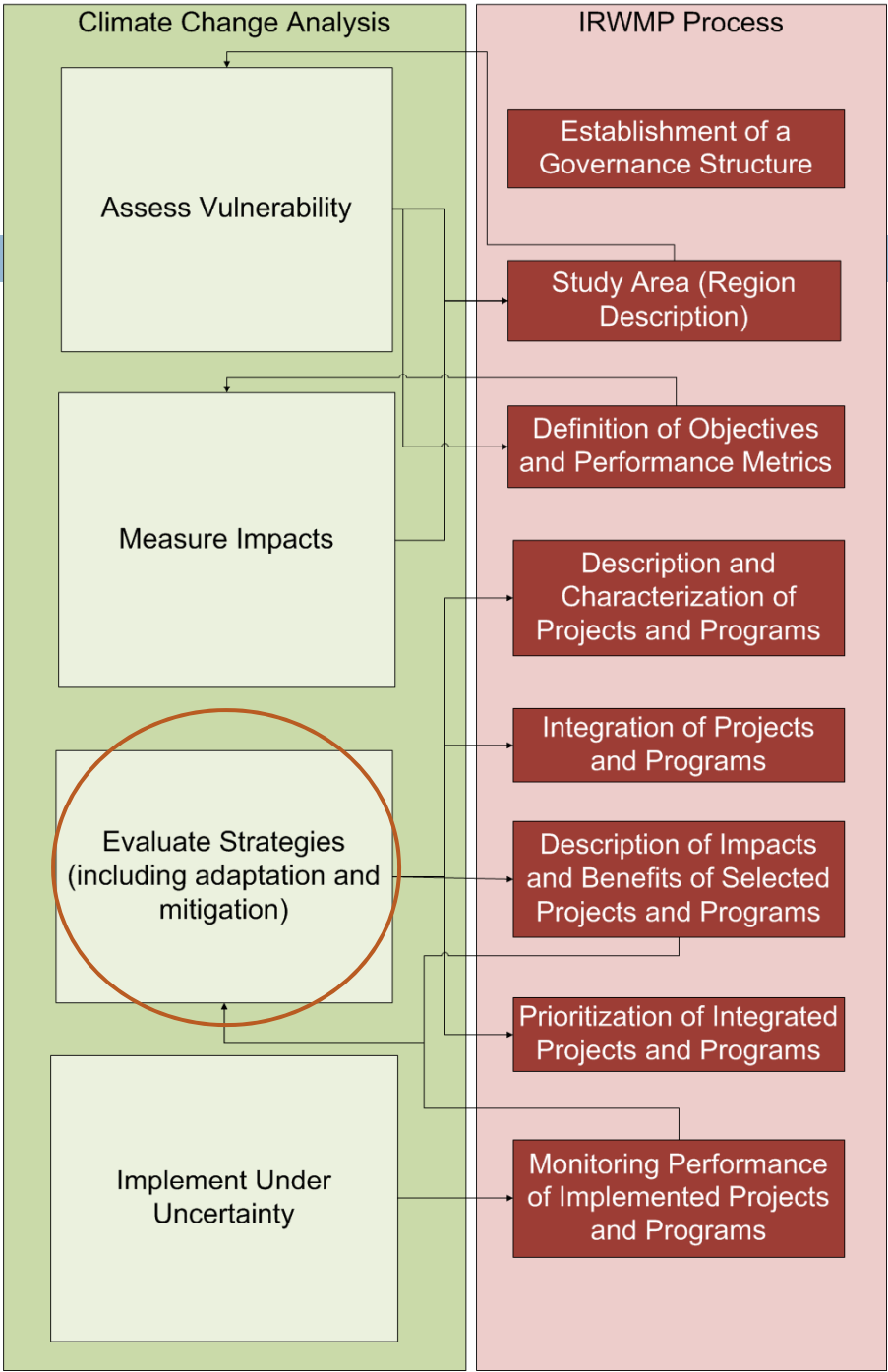
- Regional description
  - ▣ Includes impacts
- IRWMP Objectives
  - ▣ Include definition of performance metrics, quantified in climate change analysis



# Level of Analysis on Impact Measurements

- IRWMPs should quantitatively address climate change elements, if feasible
  - ▣ *IRWMPs should identify appropriate balance*
  - ▣ *Level of detail will depend on available resources and data*





# Evaluate Strategies

(Including adaptation and mitigation)

Characterize Existing Strategies, including GHG Emissions

Identify Integration to Enhance Adaptation and/or Mitigation

Evaluate Performance

Identify New Strategies as Needed

Prioritize Strategies

Adaptive & Mitigation Strategies

Ranked Strategies

To IRWMP RMS

To IRWMP Integration

To IRWMP Impacts & Benefits

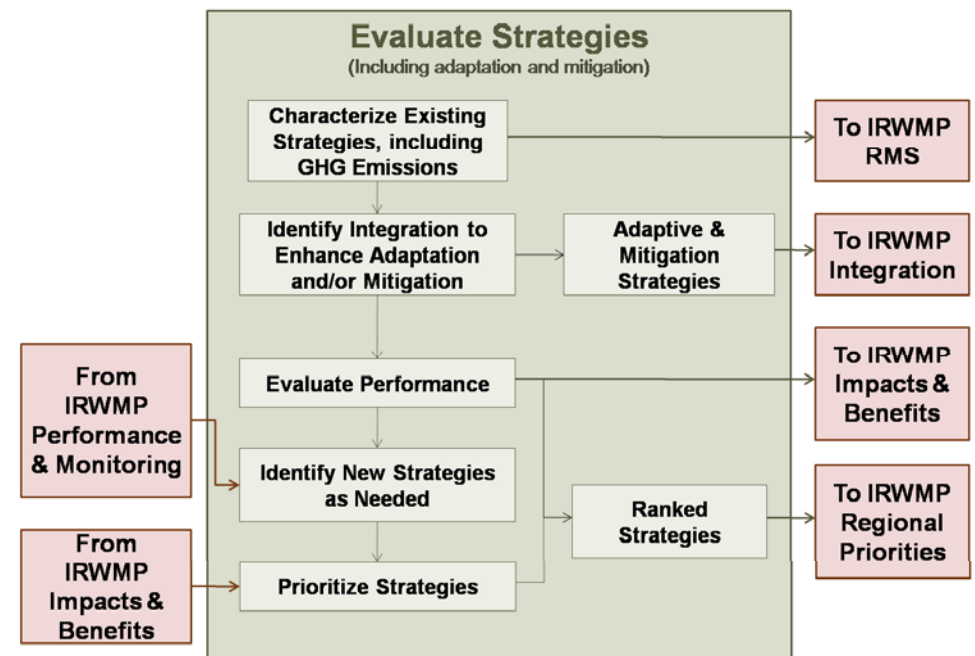
To IRWMP Regional Priorities

From IRWMP Performance & Monitoring

From IRWMP Impacts & Benefits

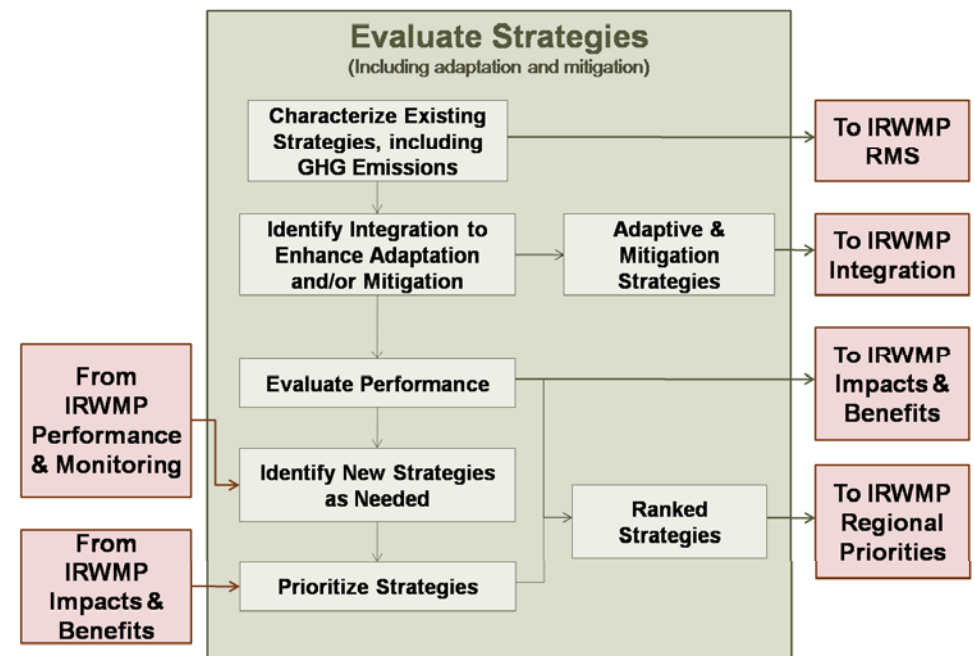
# Evaluate Strategies

- IRWMP Regional Management Strategies (projects) evaluated as part of CC analysis
- Integration strategies should consider CC impacts
- Performance of strategies (Impacts & Benefits) should account for CC analysis



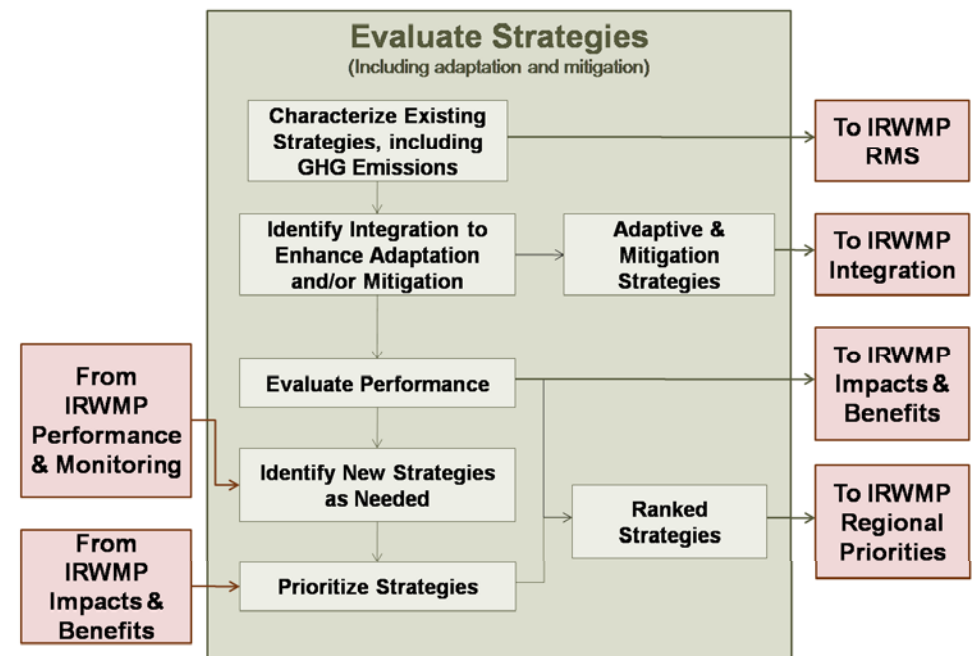
# Evaluate Strategies

- IRWMP Impacts & Benefits analysis:
  - ▣ Help prioritize CC strategies
- Ranked strategies based on CC analysis result in regional priorities

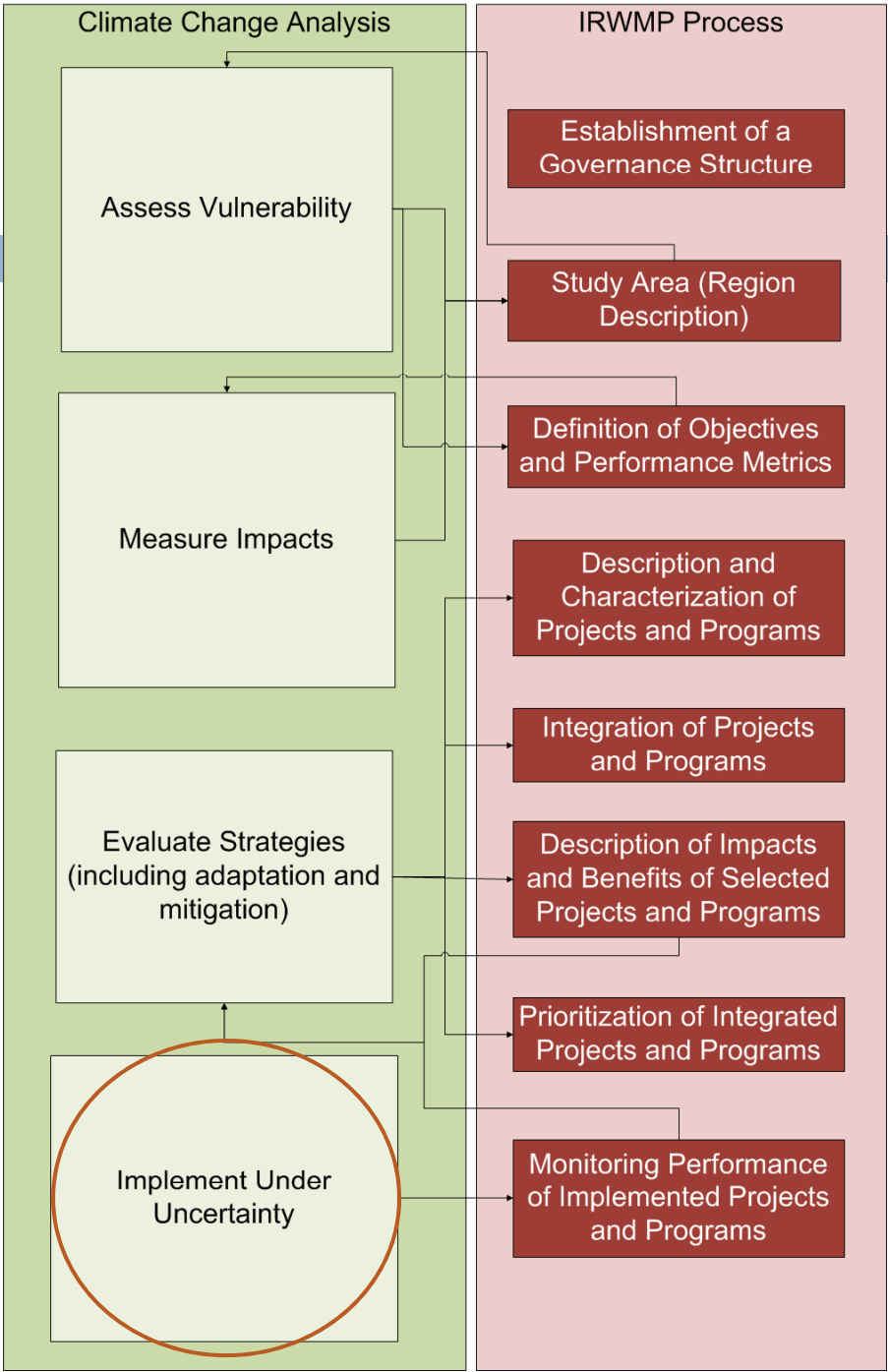


# Evaluate Strategies

- Feedback loop
  - ▣ Identify strategies
  - ▣ Implement under uncertainty
  - ▣ Monitor progress
  - ▣ Identify new strategies at regular intervals



Some strategies could include projects and programs to reduce GHG emissions and help meet AB-32 targets. Their performance is measured in terms of level of reductions.



# Implement Under Uncertainty

Identify Elements of Uncertainty  
During Implementation

Select Method

Adaptive  
Management

Scenario  
Planning

Stochastic  
Analysis

Variables to  
Monitor

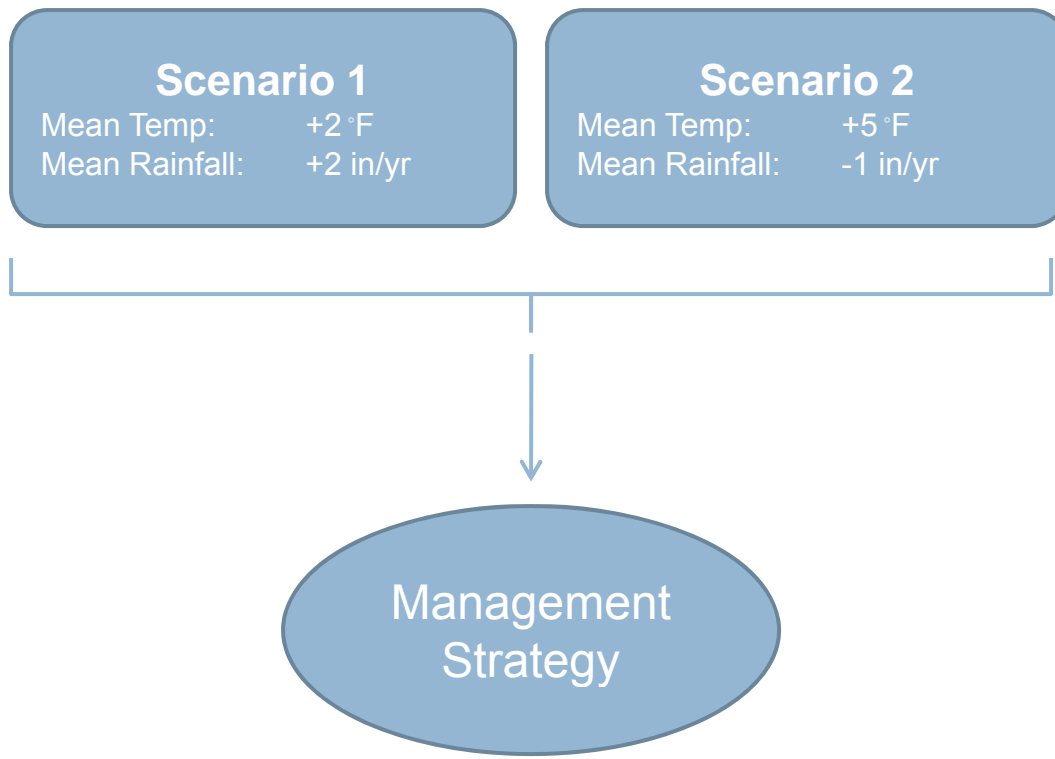
Scenarios

Probability  
Density  
Functions

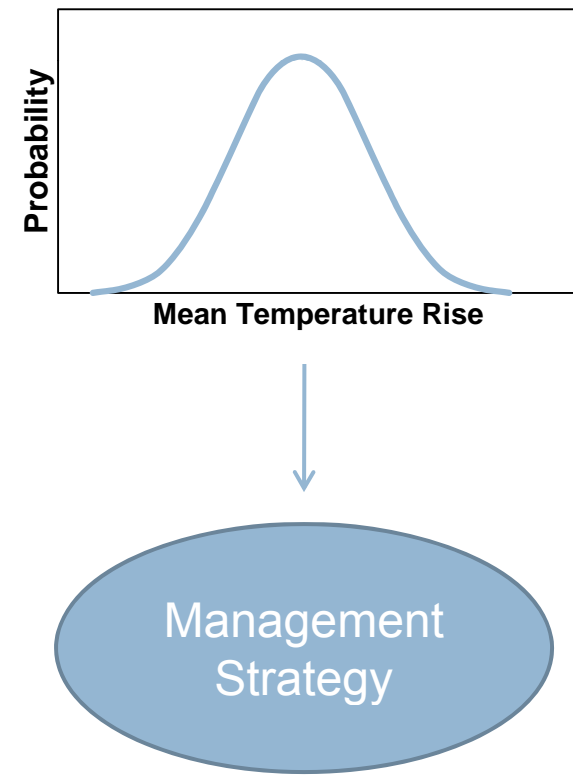
To IRWMP  
Performance  
& Monitoring

# Uncertainty Analysis Methods

## Scenario Planning

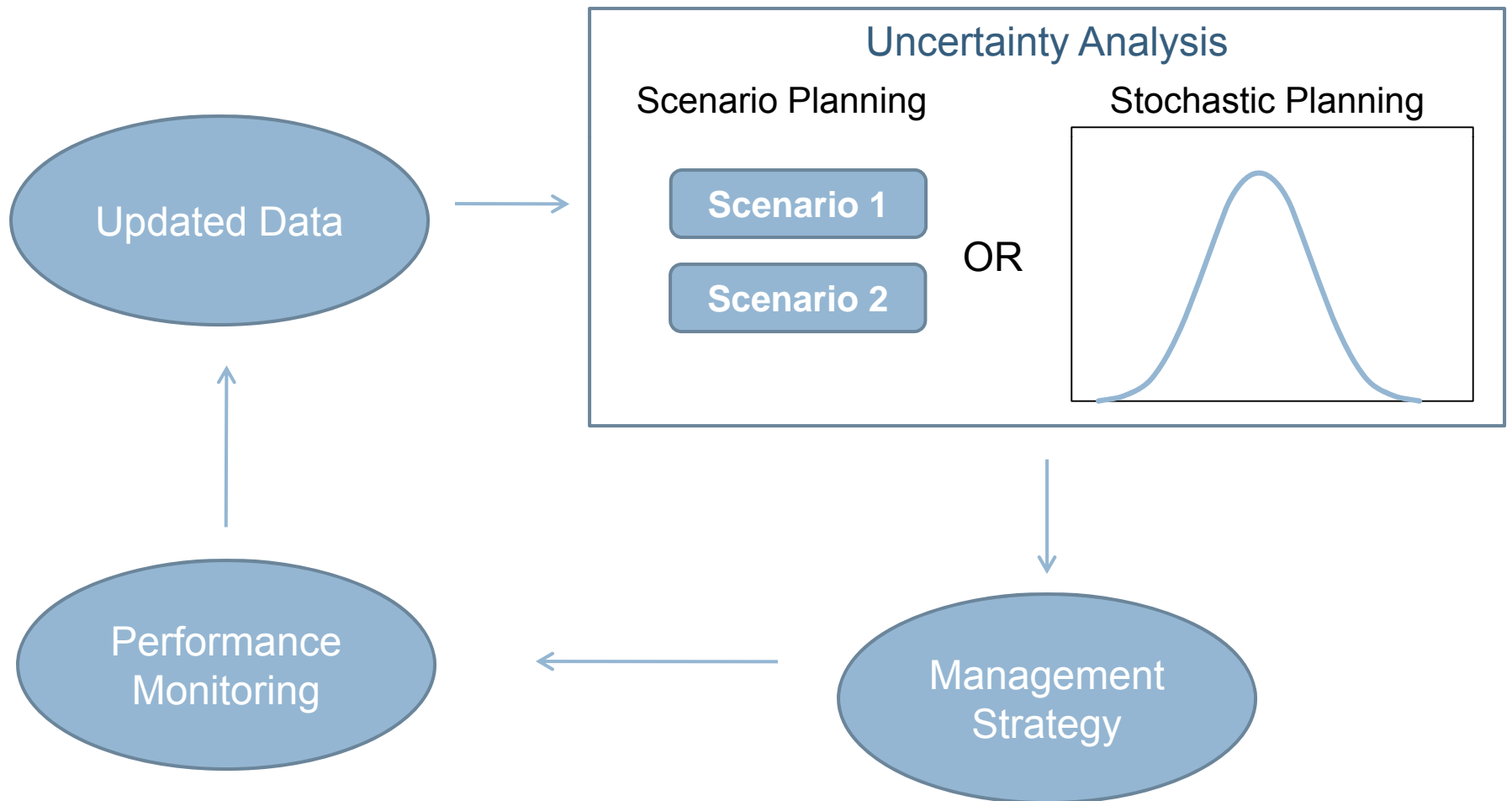


## Stochastic Planning



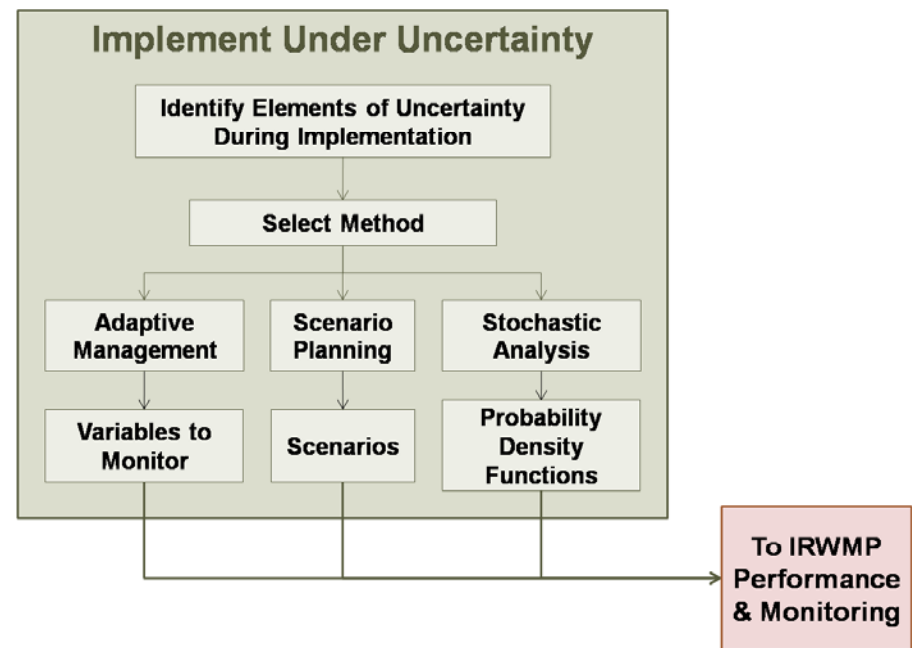
# Uncertainty Analysis Methods

## Adaptive Management



# Implement Under Uncertainty

- CC Results support IRWMP implementation
  - ▣ Indicate variables to monitor
  - ▣ Drive performance evaluation for projects and strategies
- Feedback loop
  - ▣ Implement under uncertainty
  - ▣ Performance & monitoring
  - ▣ Identify new strategies
  - ▣ Adjust implementation under uncertainty



# Summary



- Climate change analysis can be integrated into the IRWMP process
- Projects (RMS) are evaluated and prioritized in the context of their performance under varying climate change assumptions
- Uncertainty must be addressed in the analysis
- Implementation uncertainty can be addressed during implementation phase
- Handbook will establish guidance

# Draft Outline of Climate Change Handbook

# Draft Outline



- Executive Summary
- Overview of IRWMP Planning and Climate Change Requirements
- The Science of Climate Change – From Global to Regional Application
- Assessing Regional Vulnerability to Climate Change

# Draft Outline (continued)



- Quantifying Regional Impacts
- Evaluating Regional Management Strategies Against Climate Change
- Planning Under Uncertainty
- Appendices
  - ▣ *Appendix A* Literature Summary
  - ▣ *Appendix B* Tools – Models, Data Analysis, Decision Support
  - ▣ *Appendix C* Case Studies

# Questions and Comments

