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

July 22, 2010

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

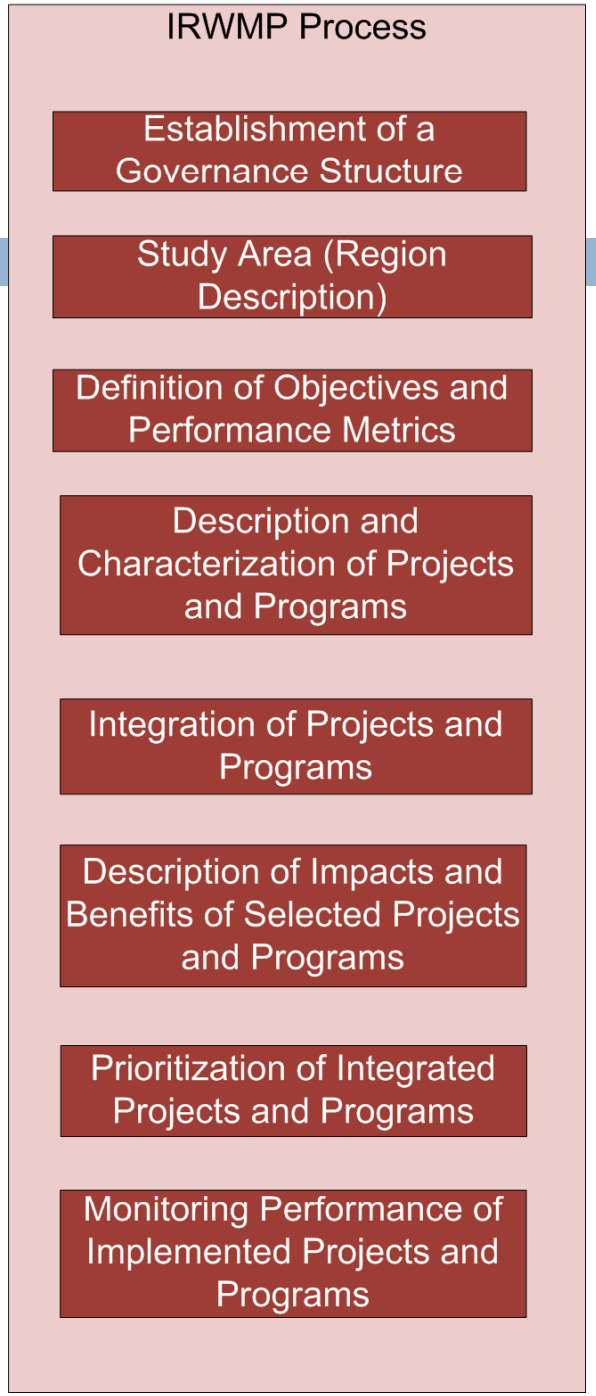
Questions the Handbook should Answer

- 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

Overarching Planning Standards

Stakeholder involvement

Data management

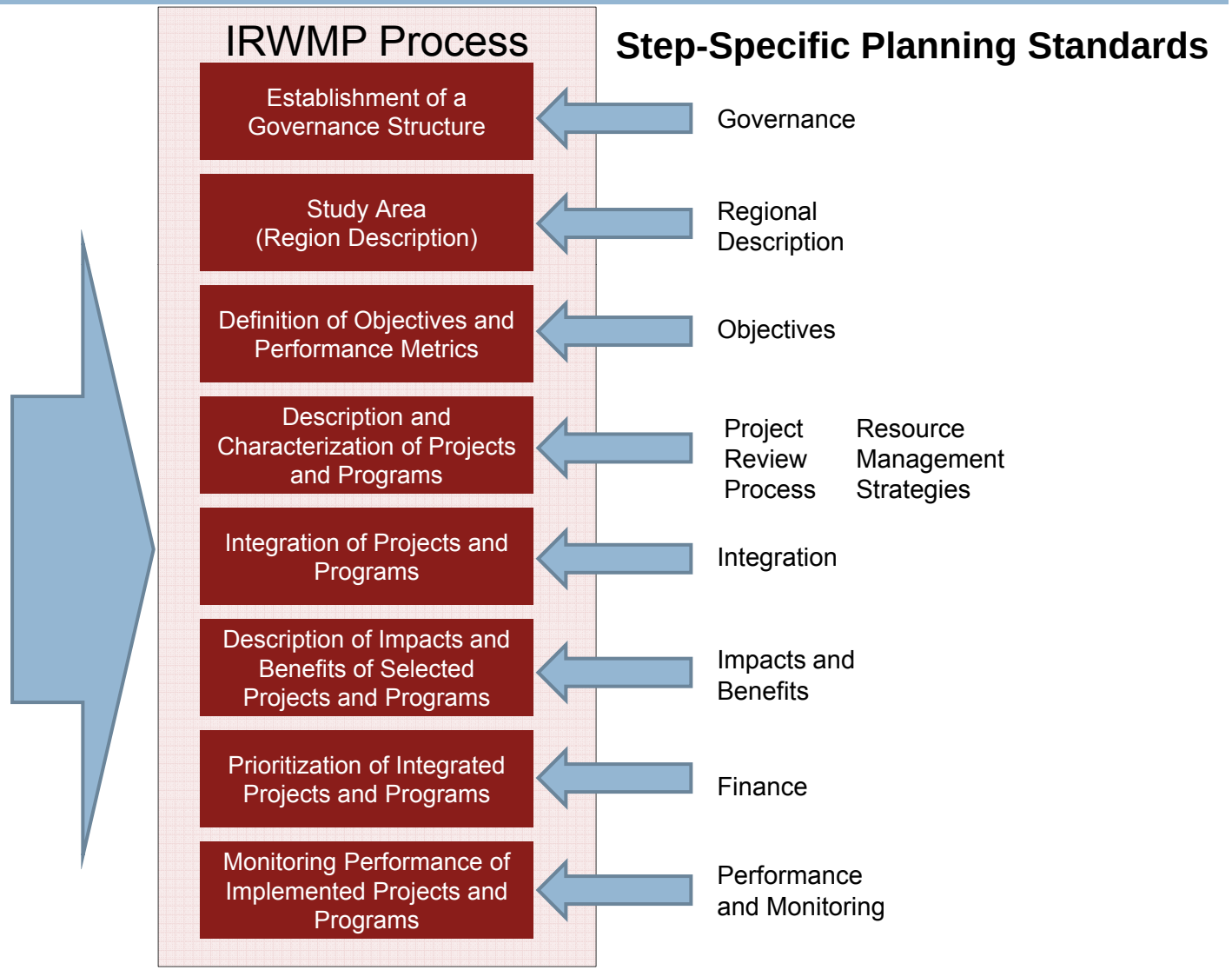
Coordination

Relation to Local Water Planning

Relation to Local Land Use Planning

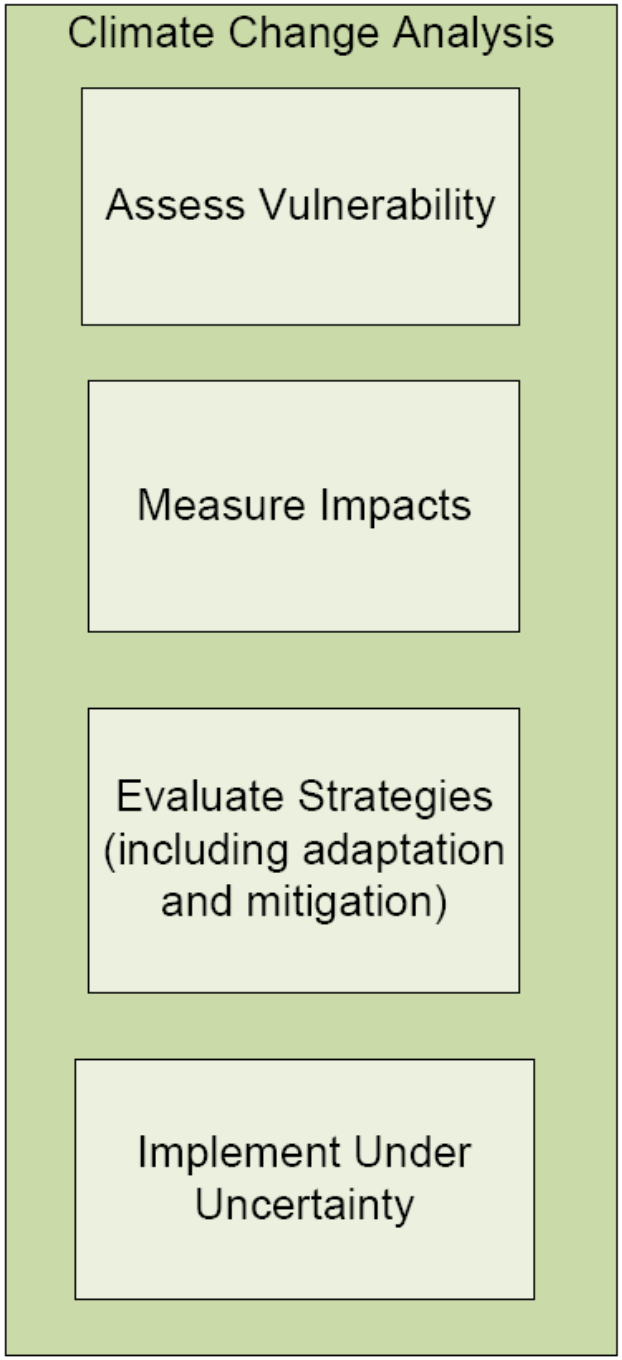
Technical Analysis

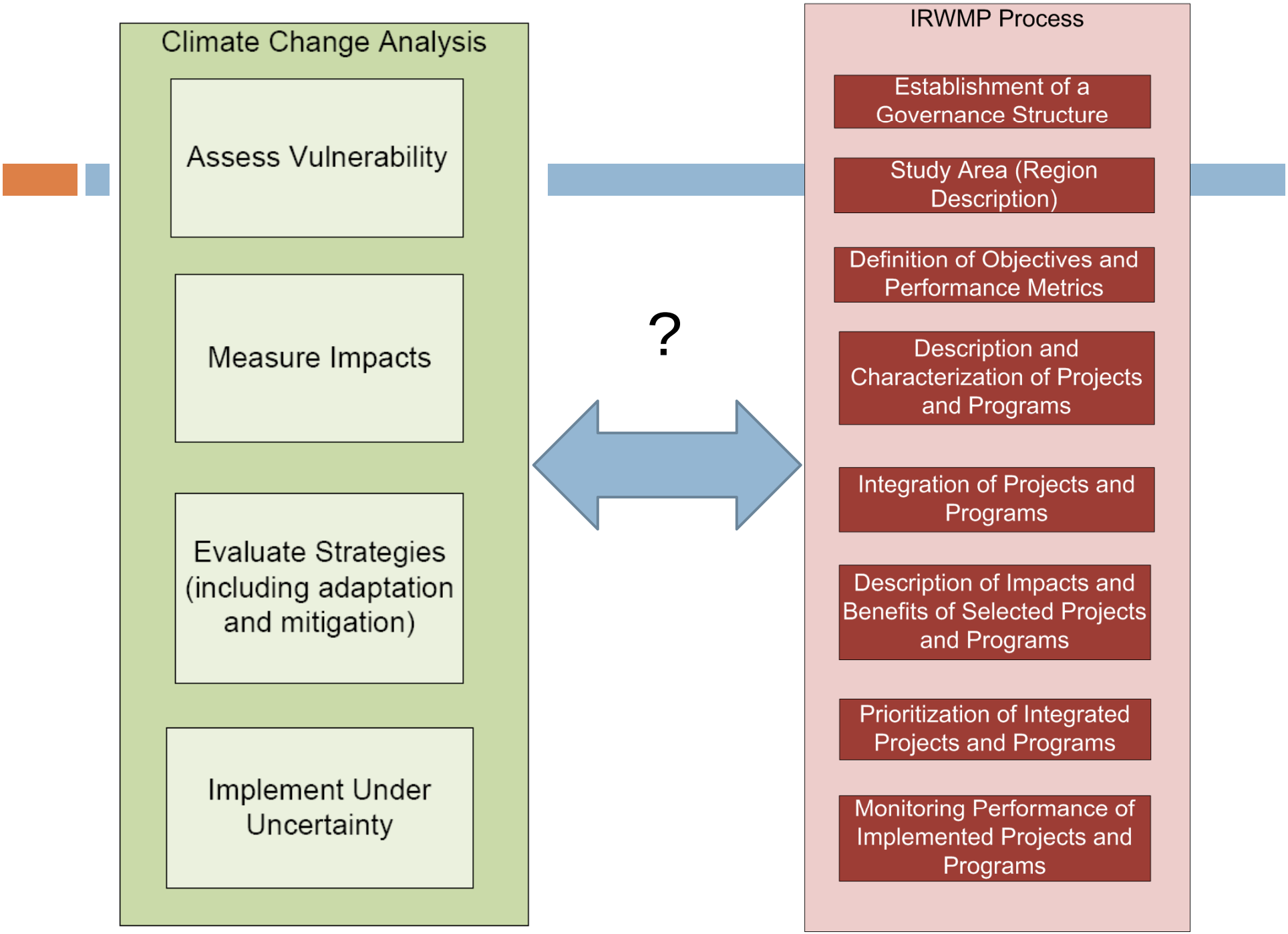
Climate Change



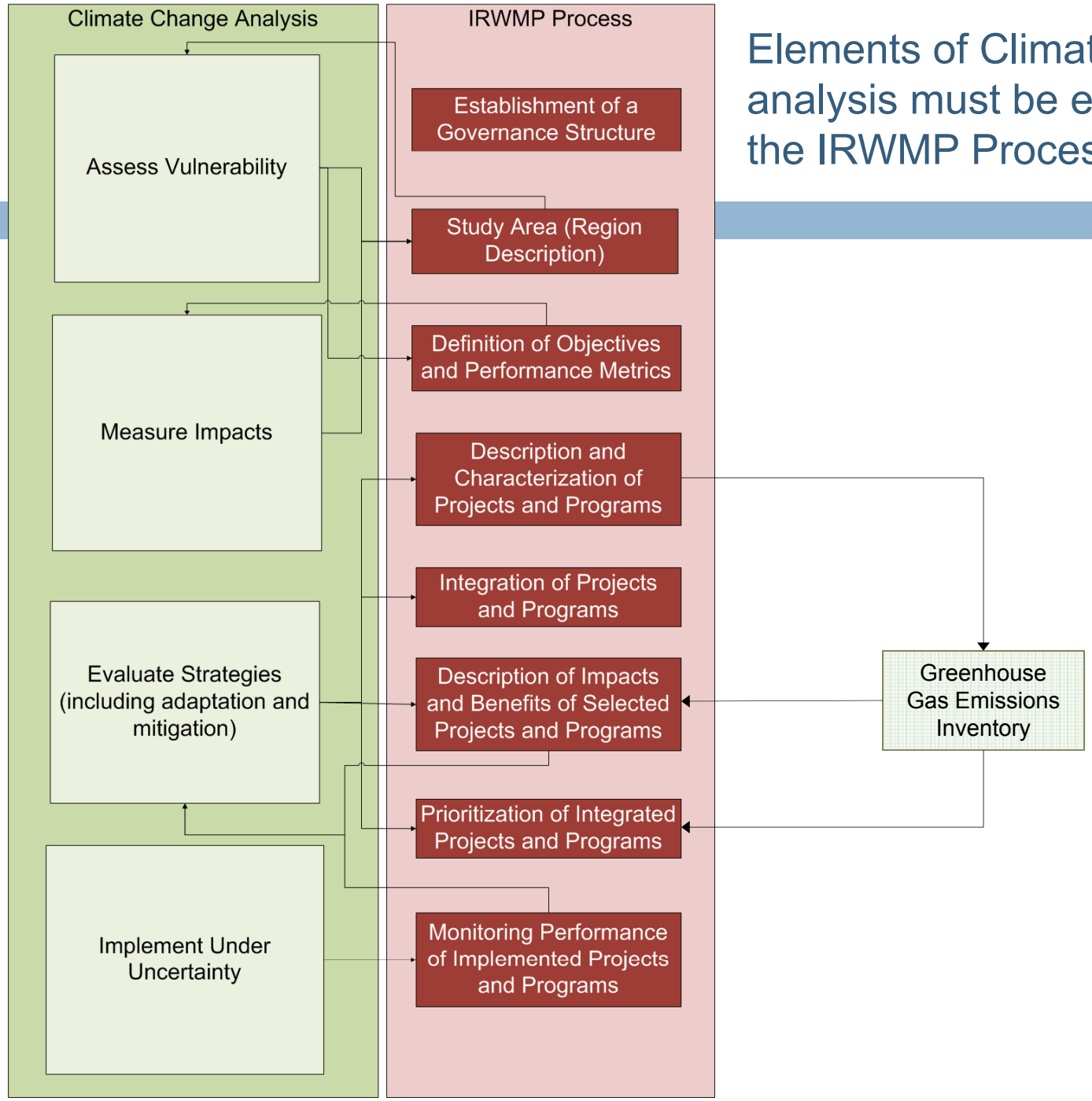
Steps of Climate Change Analysis

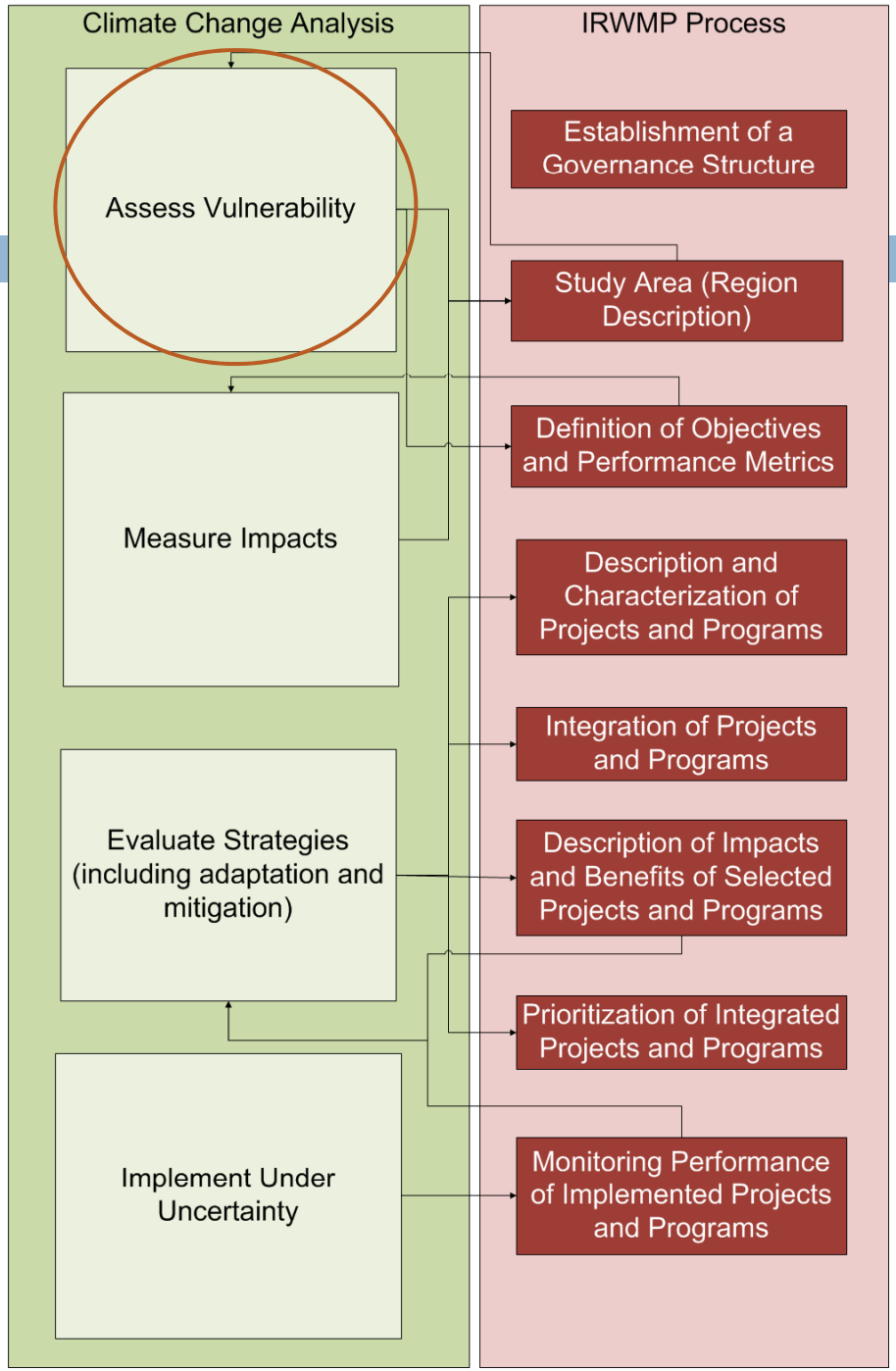
- CC analysis must address both
  - Mitigation: greenhouse gas emissions
  - Adaptation: implementing strategies to address climate change impacts




Climate Change Analysis
Assess Vulnerability
Measure Impacts
Evaluate Strategies (including adaptation and mitigation)
Implement Under Uncertainty
?
IRWMP Process
Establishment of a Governance Structure
Study Area (Region Description)
Definition of Objectives and Performance Metrics
Description and Characterization of Projects and Programs
Integration of Projects and Programs
Description of Impacts and Benefits of Selected Projects and Programs
Prioritization of Integrated Projects and Programs
Monitoring Performance of Implemented Projects and Programs

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

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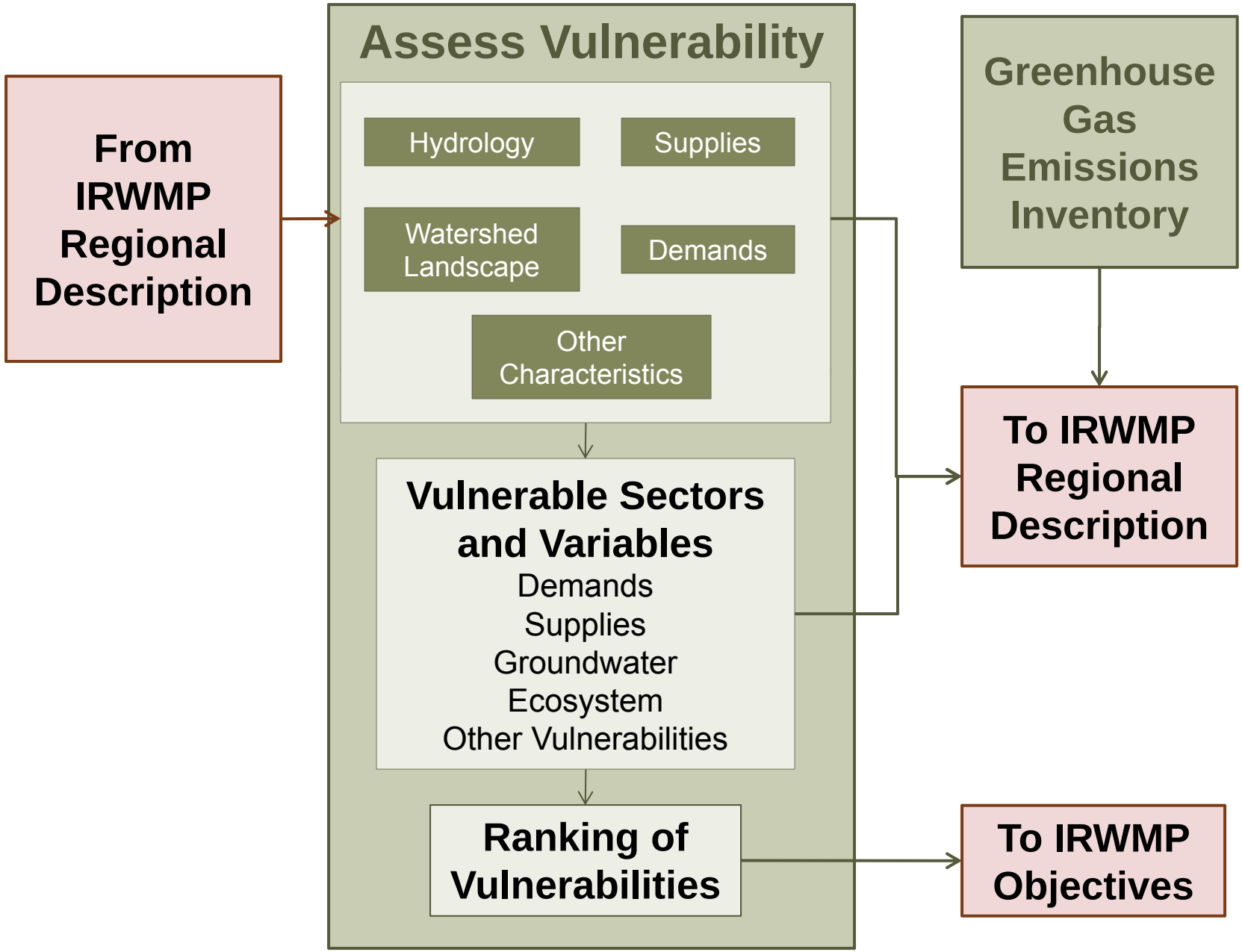
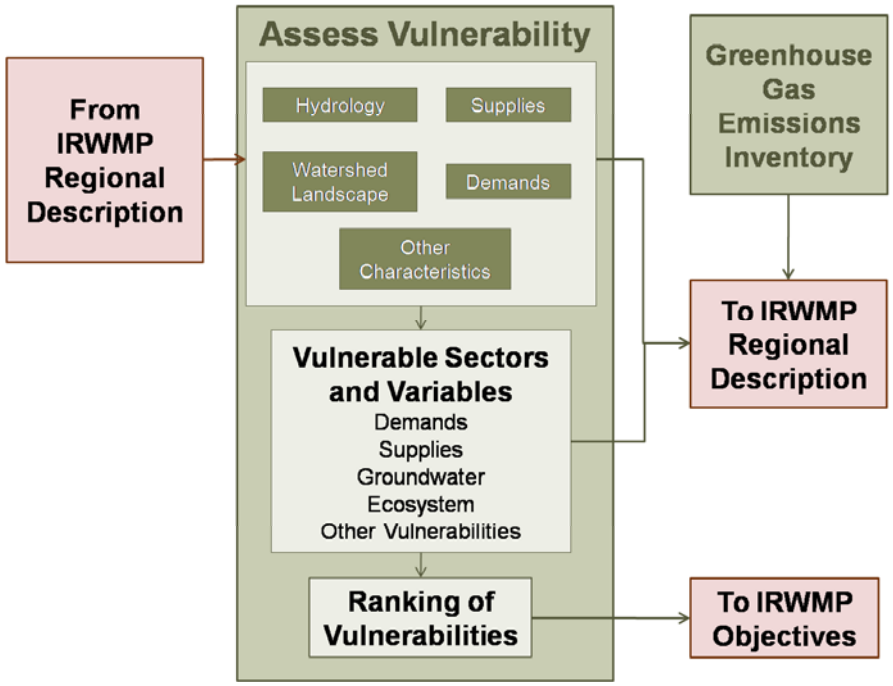
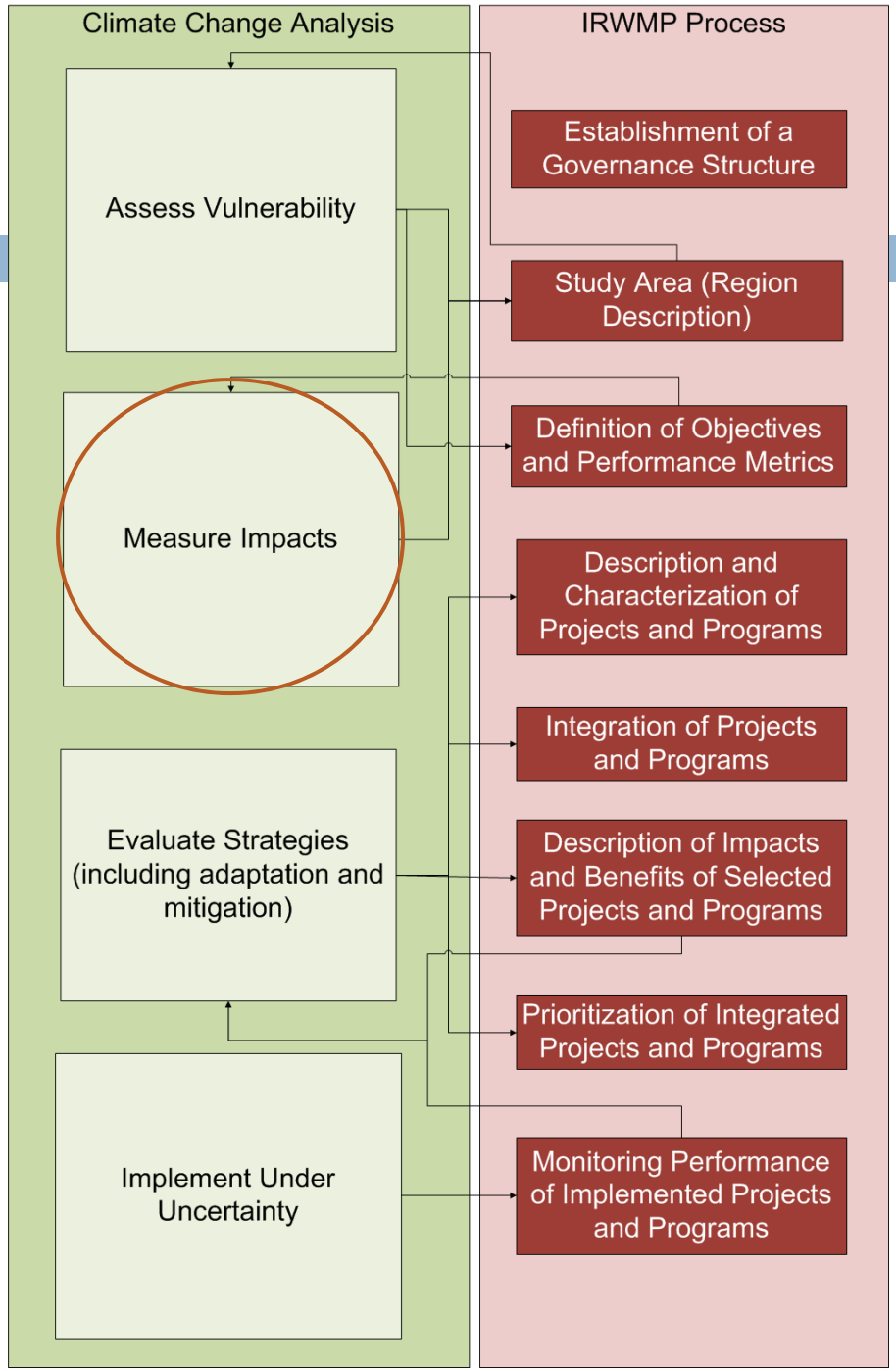

From IRWMP Regional Description
Assess Vulnerability
Hydrology
Supplies
Watershed Landscape
Demands
Other Characteristics
Vulnerable Sectors and Variables
Demands
Supplies
Groundwater
Ecosystem
Other Vulnerabilities
Ranking of Vulnerabilities
Greenhouse Gas Emissions Inventory
To IRWMP Regional Description
To IRWMP Objectives

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

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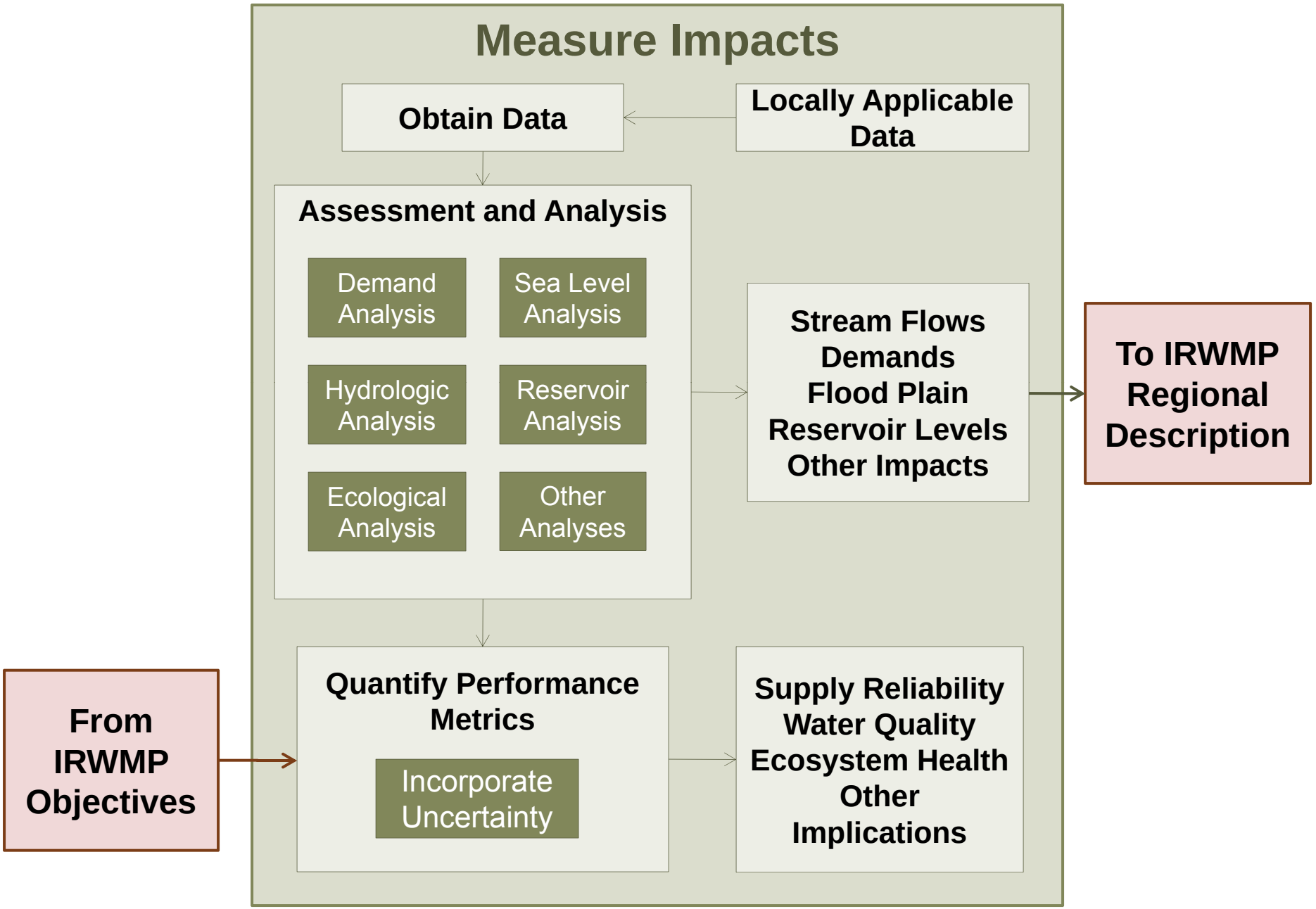
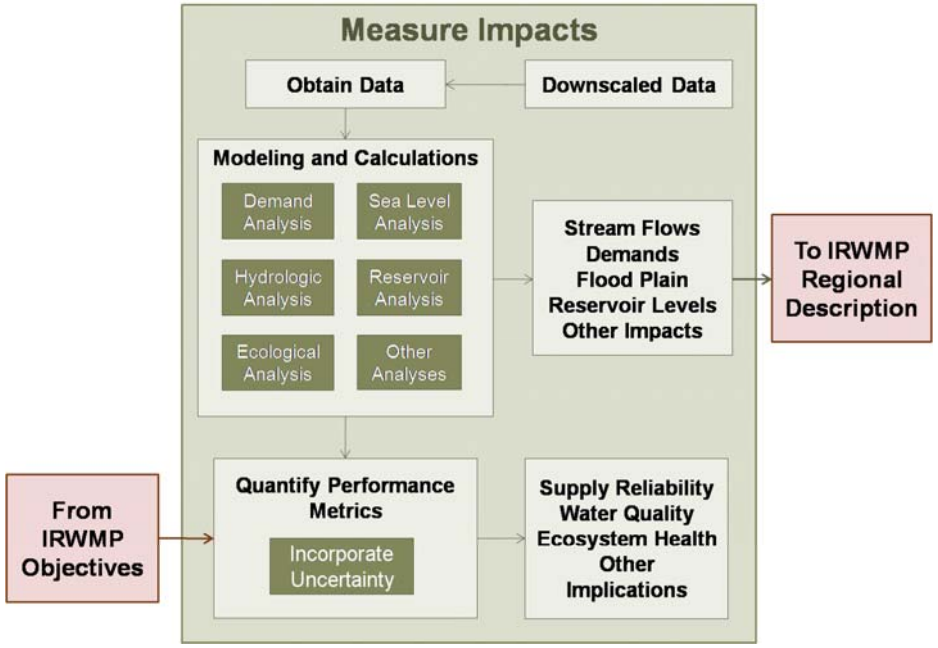

Measure Impacts
Obtain Data
Locally Applicable Data
Assessment and Analysis
Demand Analysis
Sea Level Analysis
Hydrologic Analysis
Reservoir Analysis
Ecological Analysis
Other Analyses
Stream Flows
Demands
Flood Plain
Reservoir Levels
Other Impacts
To IRWMP Regional Description
From IRWMP Objectives
Quantify Performance Metrics
Incorporate Uncertainty
Supply Reliability
Water Quality
Ecosystem Health
Other Implications

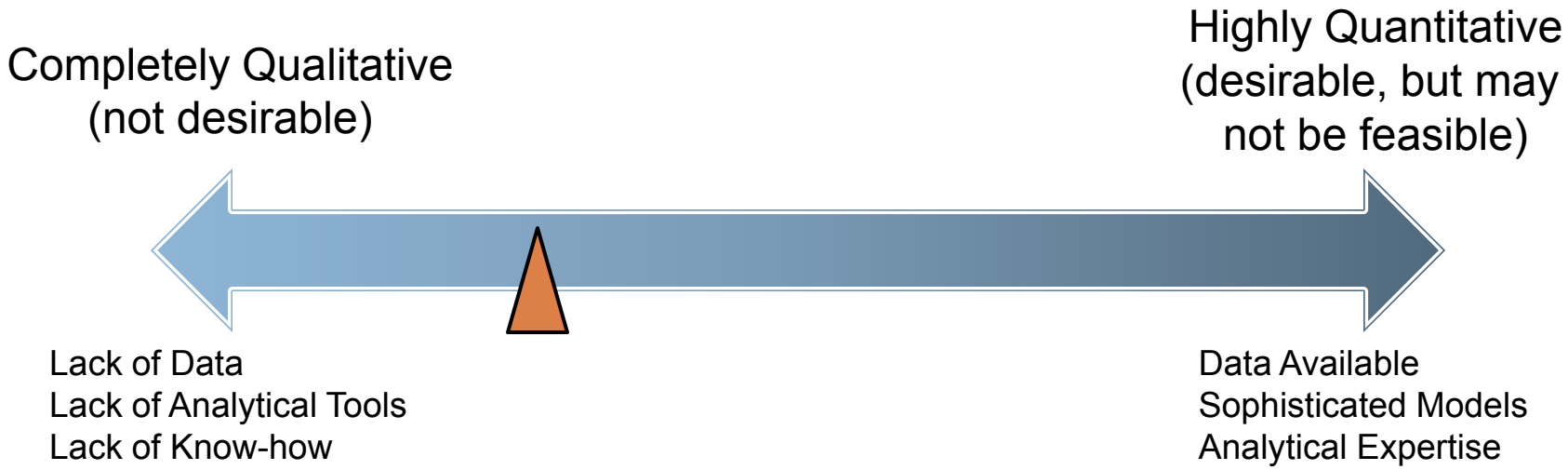
Measure Impacts

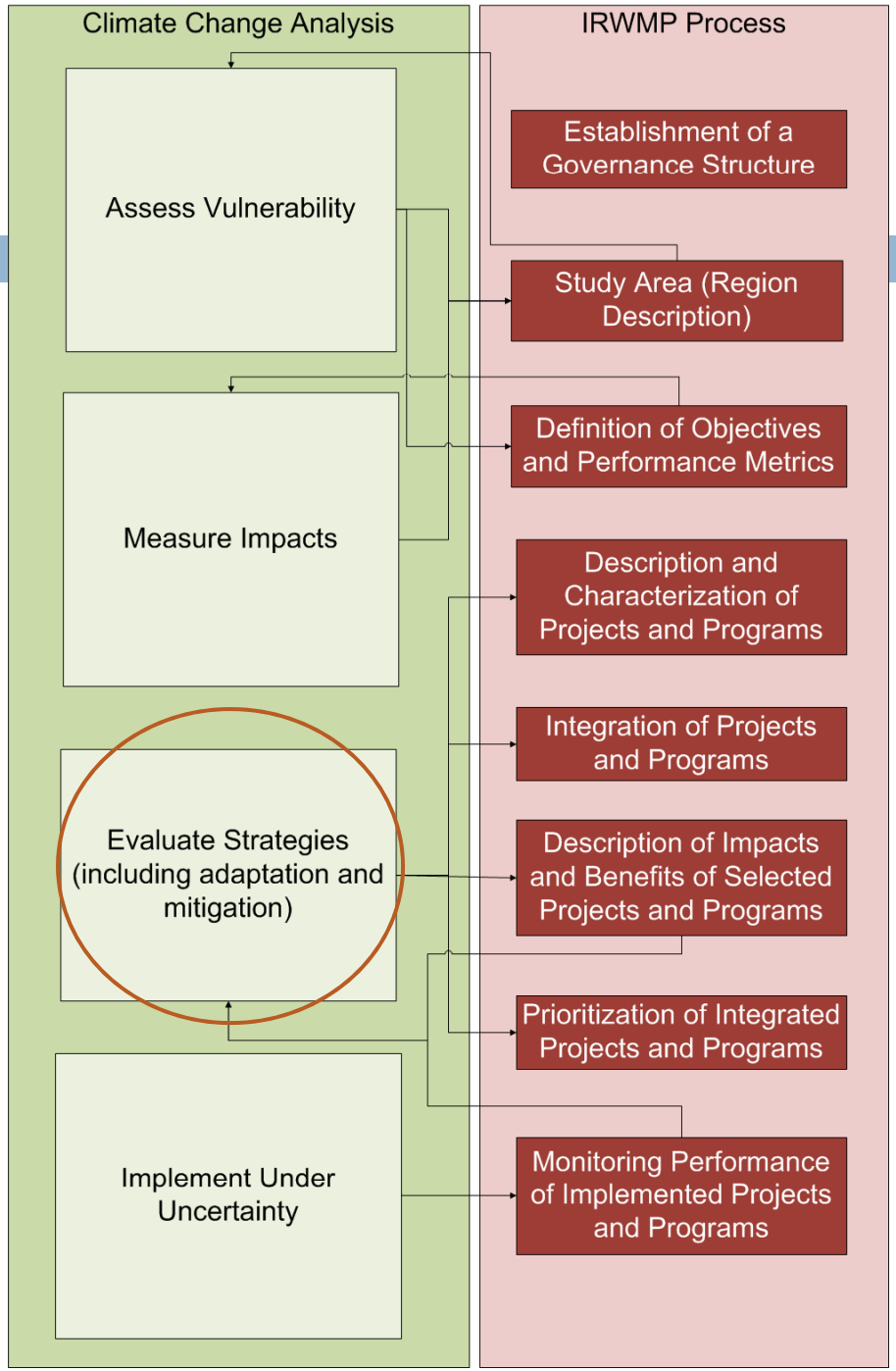
- Regional description
  - Includes impacts
- IRWMP Objectives
  - Include definition of performance metrics, quantified in climate change analysis



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*

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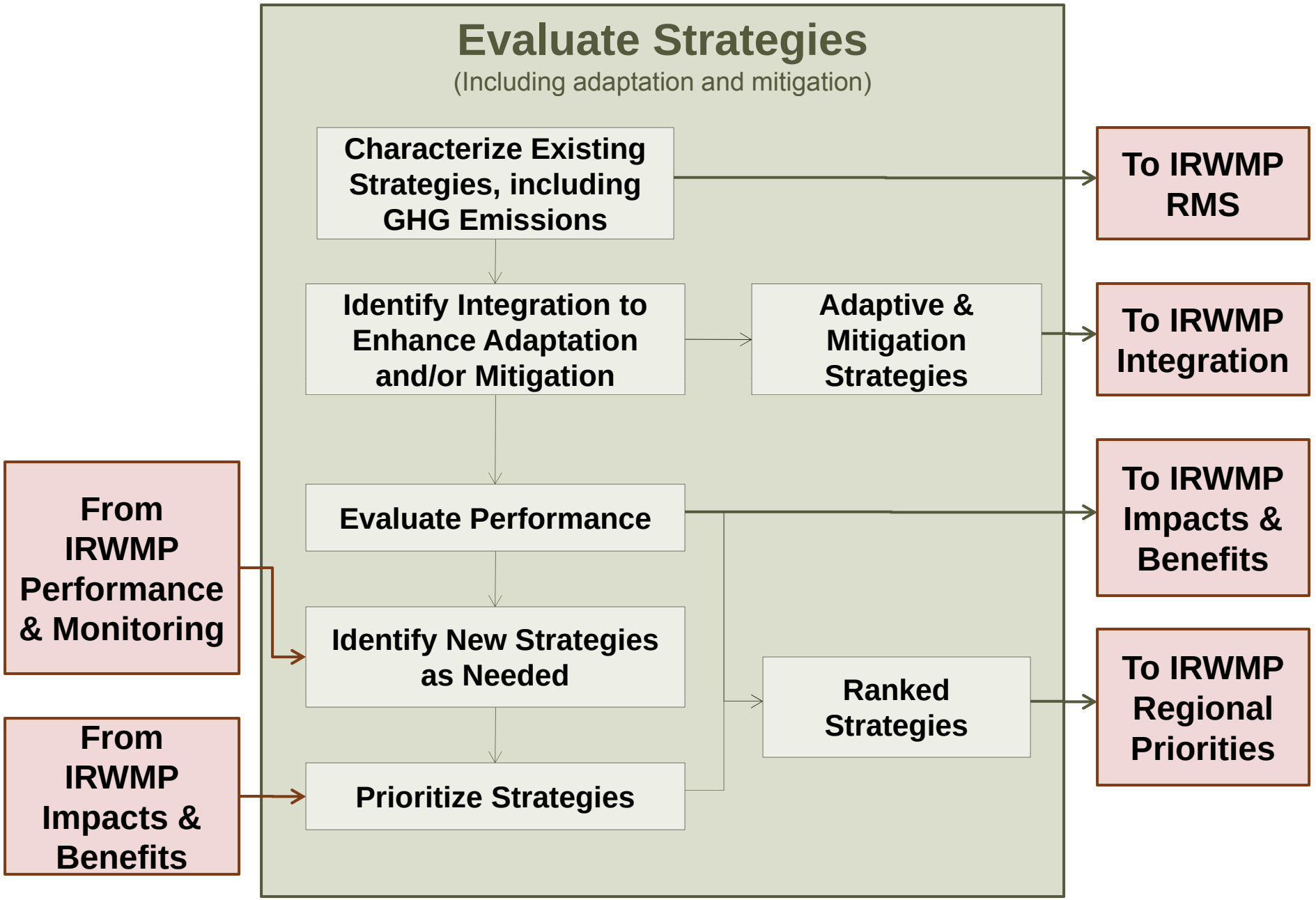
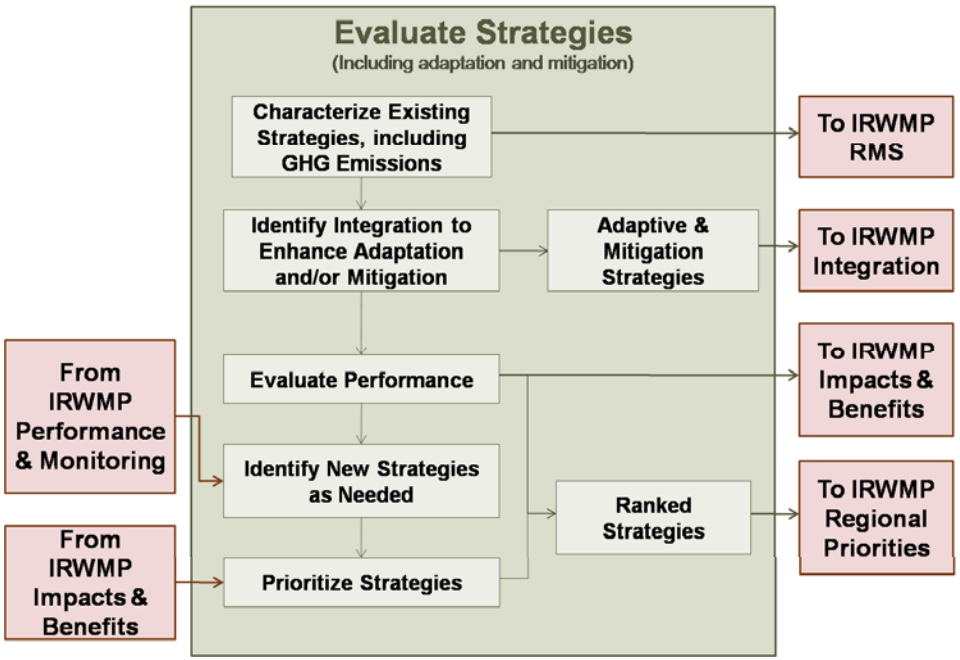

Evaluate Strategies
(Including adaptation and mitigation)
Characterize Existing Strategies, including GHG Emissions
Identify Integration to Enhance Adaptation and/or Mitigation
Adaptive & Mitigation Strategies
Evaluate Performance
Identify New Strategies as Needed
Ranked Strategies
Prioritize Strategies
From IRWMP Performance & Monitoring
From IRWMP Impacts & Benefits
To IRWMP RMS
To IRWMP Integration
To IRWMP Impacts & Benefits
To IRWMP Regional Priorities

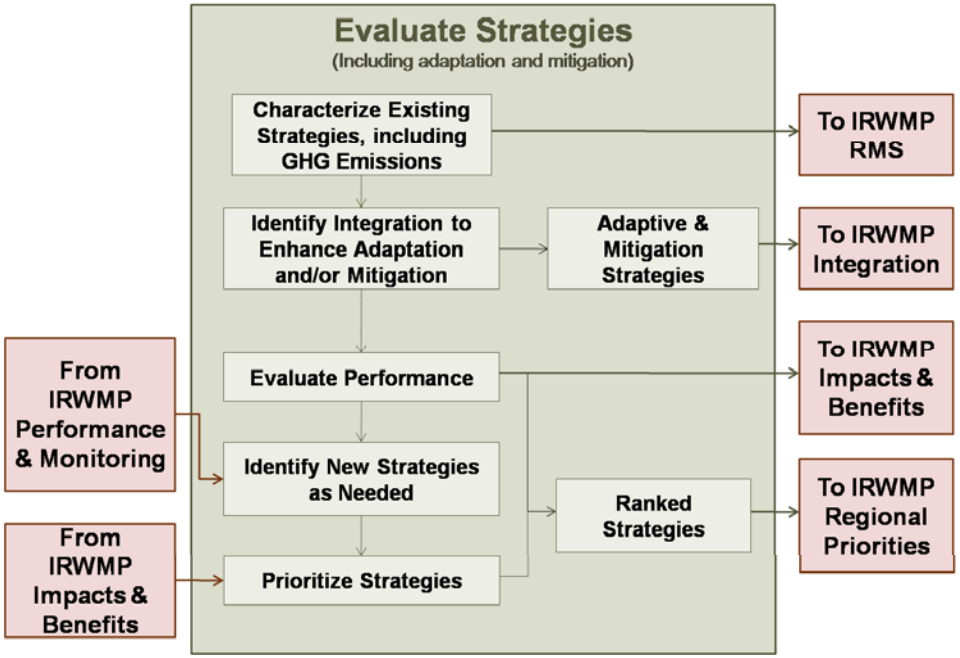
Evaluate Strategies

- 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



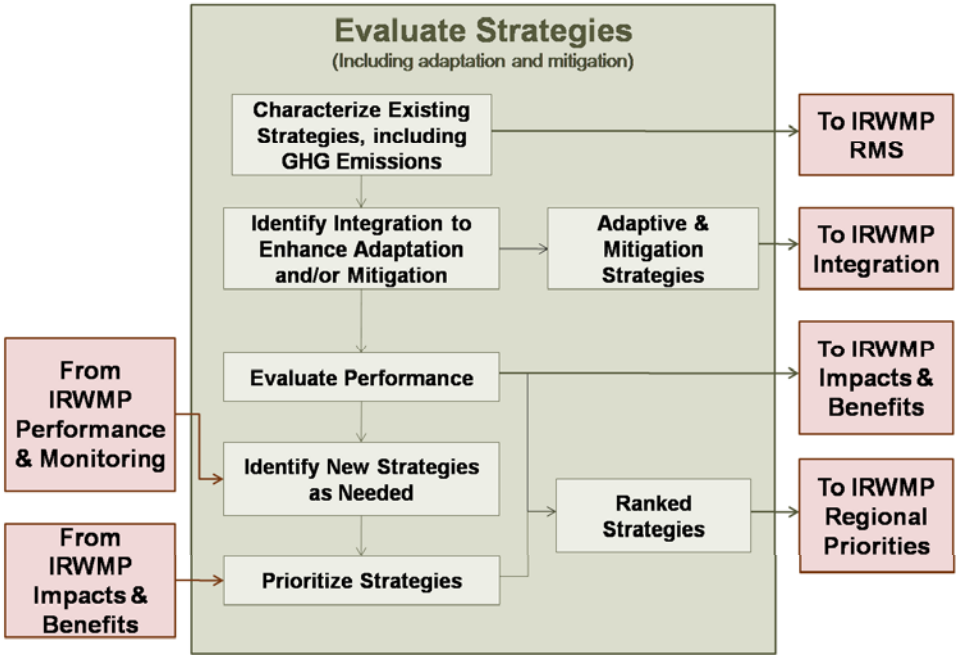
Evaluate Strategies

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

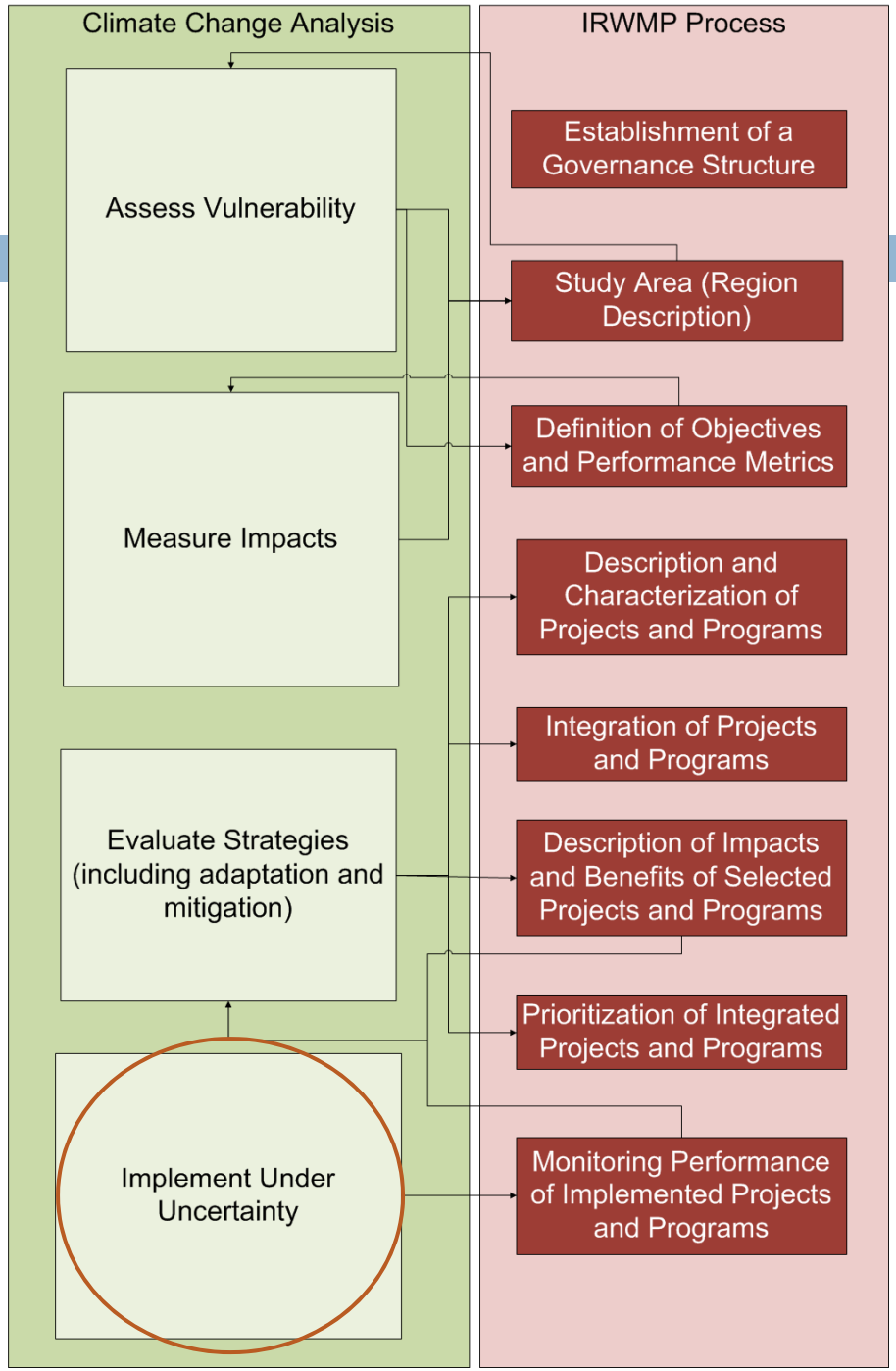


Evaluate Strategies

- 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.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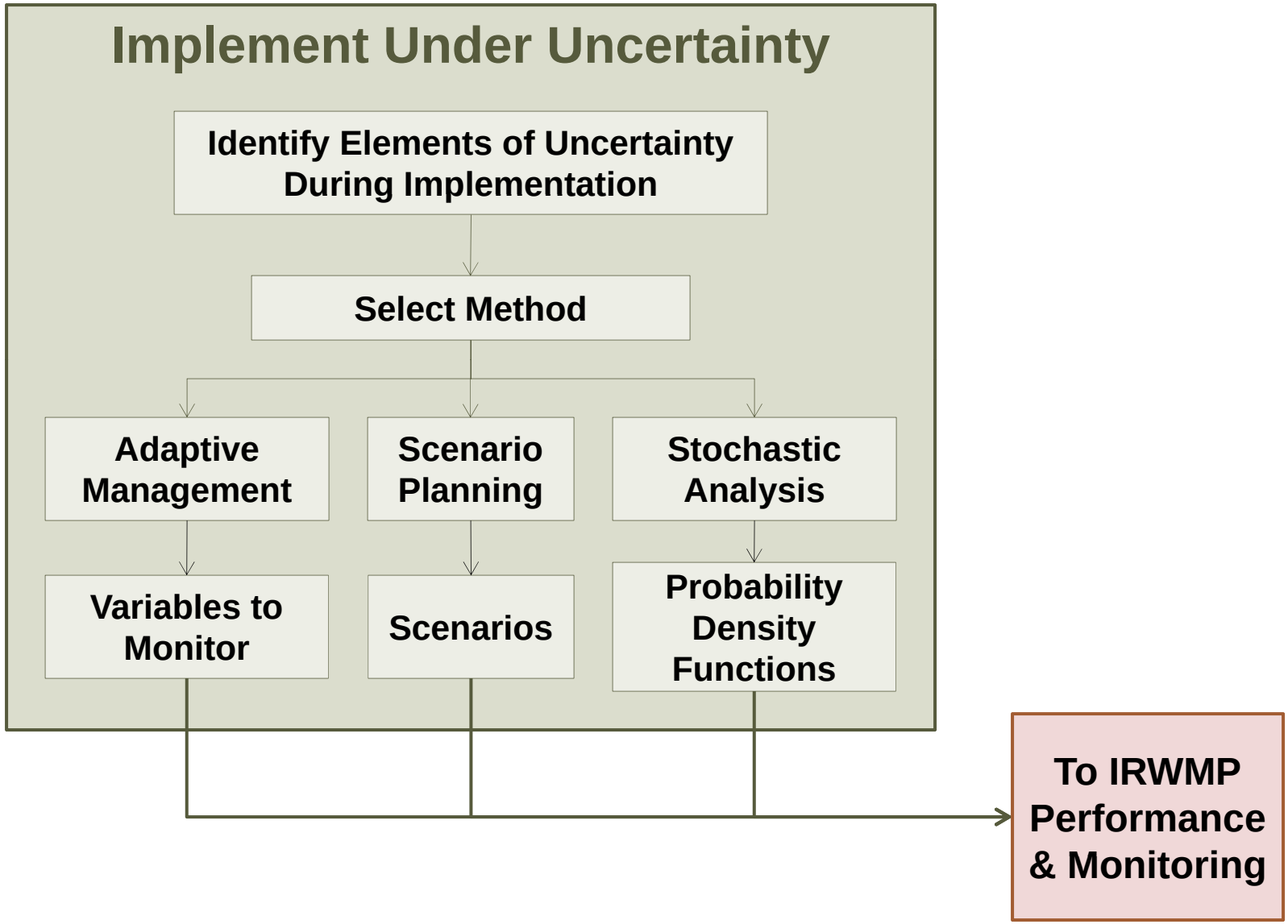

Implement Under Uncertainty
Identify Elements of Uncertainty During Implementation
Select Method
Adaptive Management
Scenario Planning
Stochastic Analysis
Variables to Monitor
Scenarios
Probability Density Functions
To IRWMP Performance & Monitoring

Uncertainty Analysis Methods

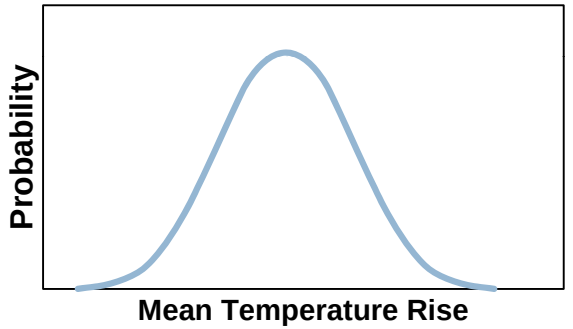
Scenario Planning

Scenario 1
Mean Temp: +2 °F
Mean Rainfall: +2 in/yr

Scenario 2
Mean Temp: +5 °F
Mean Rainfall: -1 in/yr

Management Strategy

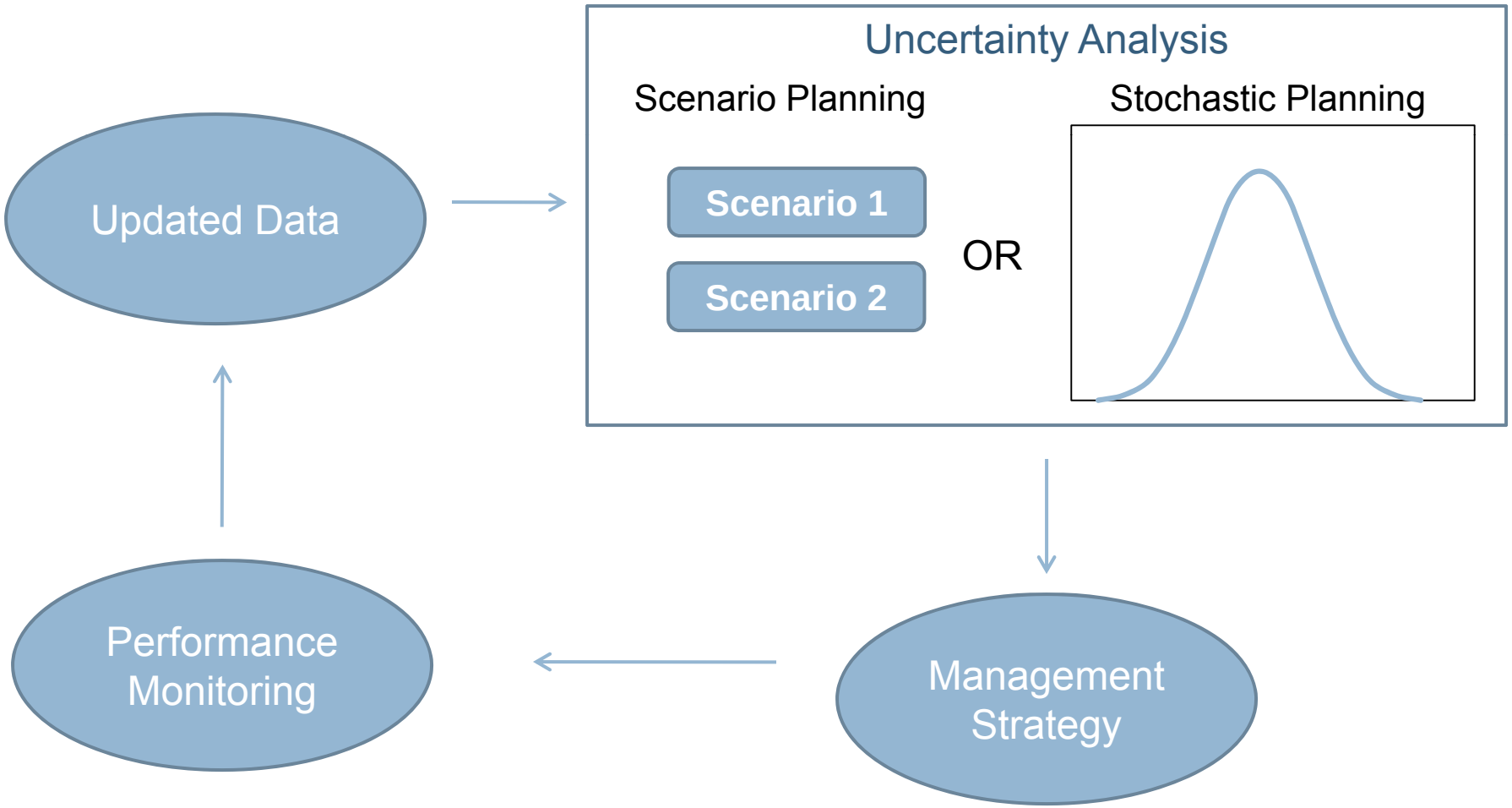
Stochastic Planning



Management Strategy

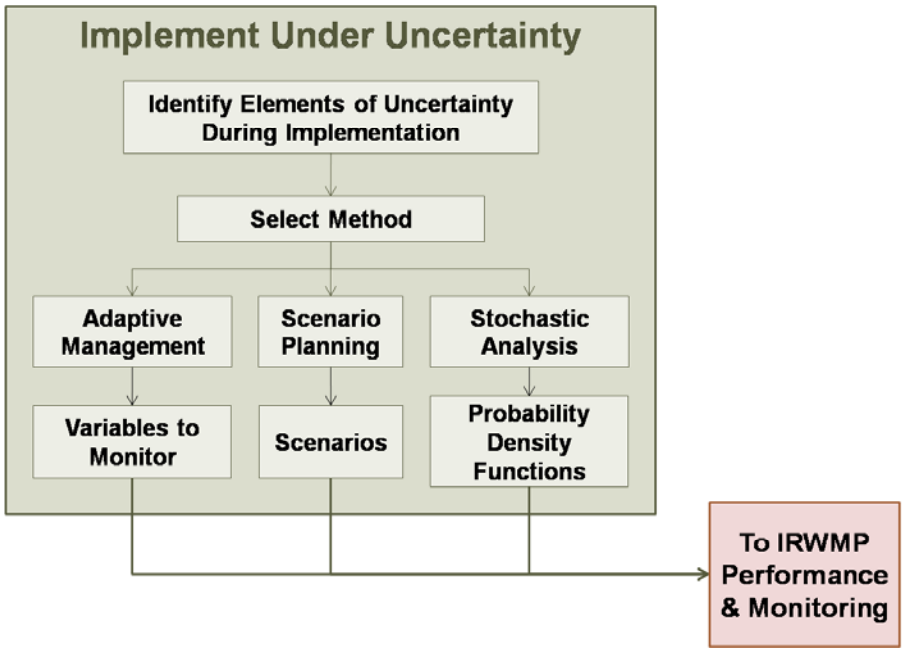
Uncertainty Analysis Methods

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