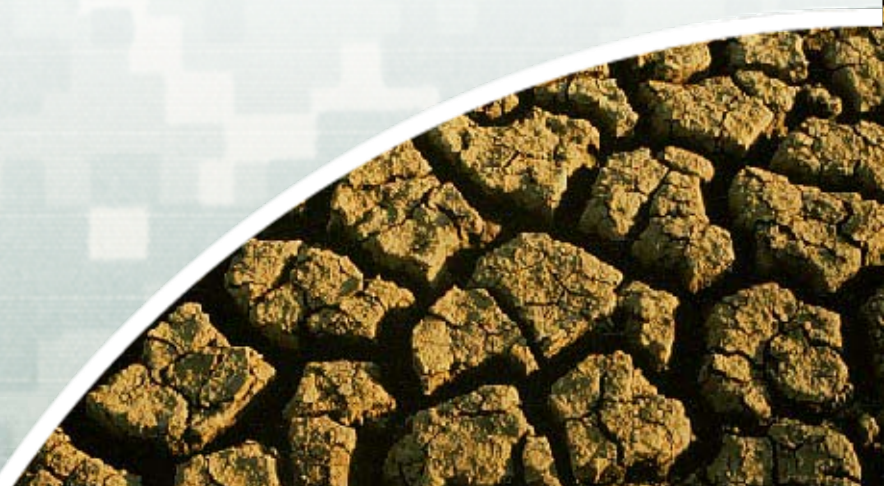
PROGRESSIVE FORECASTING

Incorporating Climate Change Implications into the Plan Formulation Process

Team NOAH

Planning Associates Class of 2009

September 14, 2009



US Army Corps of Engineers

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What's going to happen…

- Tomorrow?
- Next Week?
- Next Month?
- Next Year?
- In the Next 50 Years???

Problem Statement

The Corps of Engineers must find ways to better forecast future conditions in light of the uncertainty of climate change impacts.

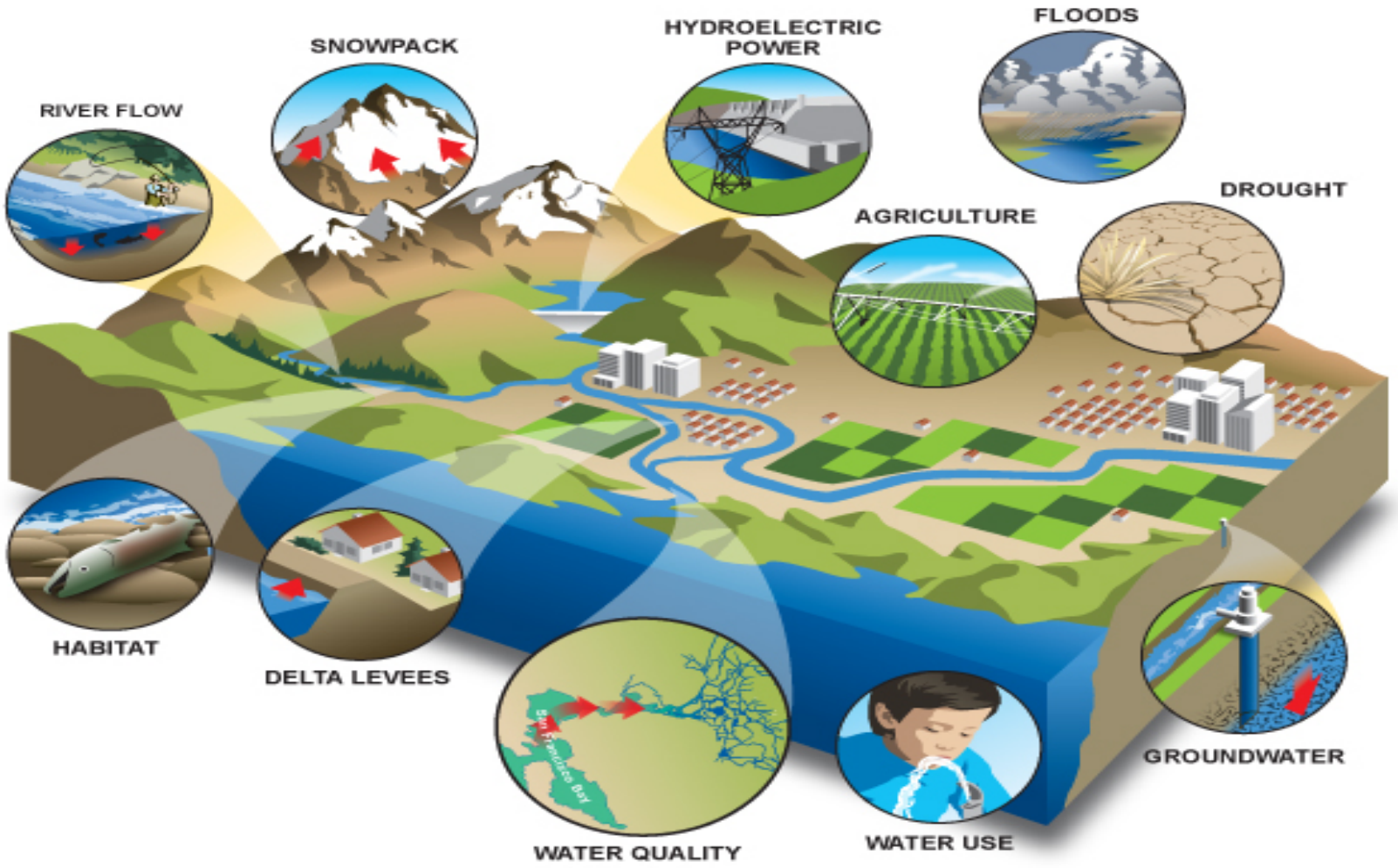
Objectives of Presentation

1) Identify climate change effects on Civil Works (CW) mission areas and challenges for incorporating those effects into the plan formulation process

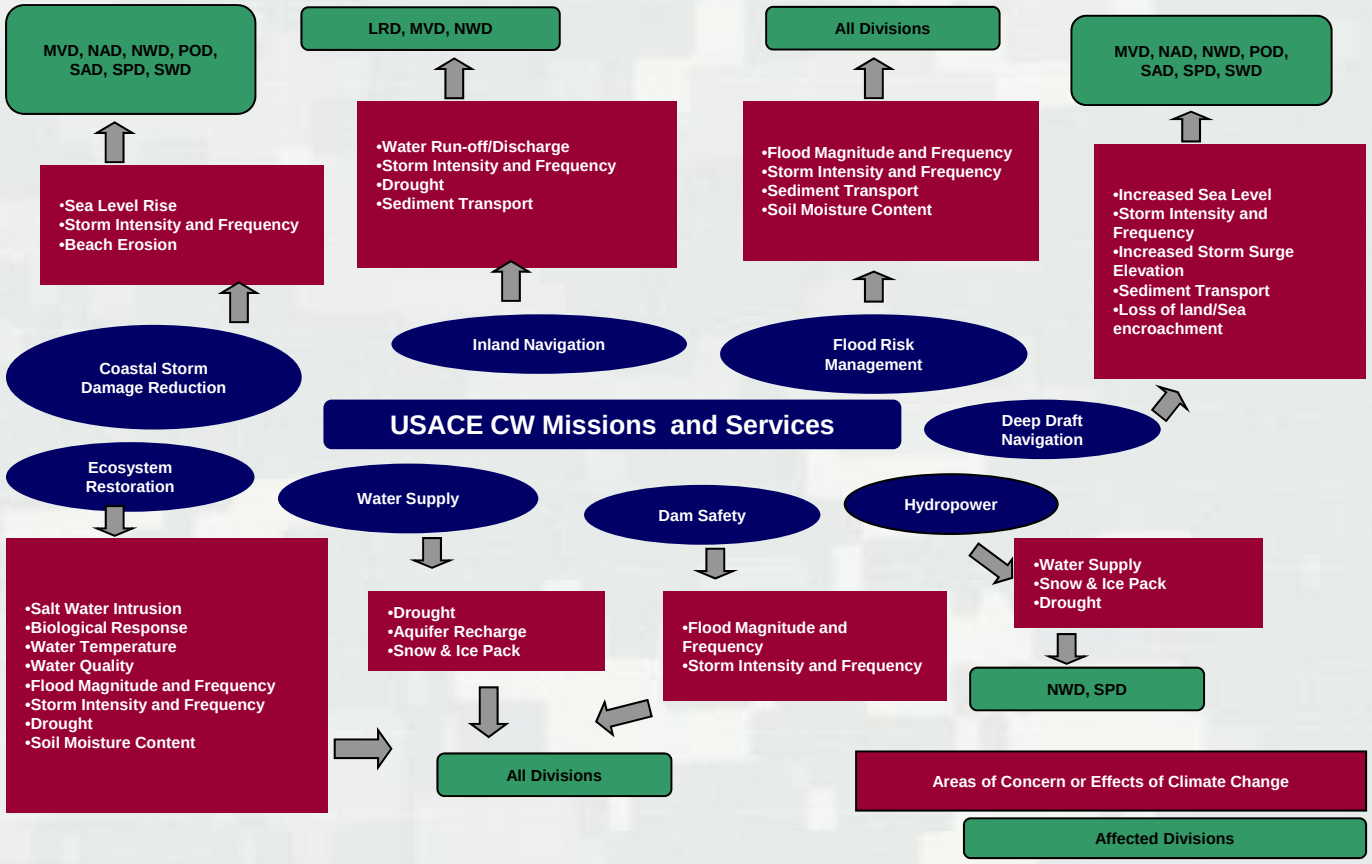
2) Present 3 broad recommendations

3) Identify ways these recommendations could be implemented

Effects are Broader than Sea Level Change



Implications are Confusing and Complicated for Every Division



Ongoing Climate Change Initiatives

- Sea Level Change (SLC) Guidance (EC 1165-2-211)
- Intergovernmental Panel on Climate Change (IPCC Reports) & National Research Council (NRC Reports)
- GCM Downscaling
- Actions For Change
- New “Principles”

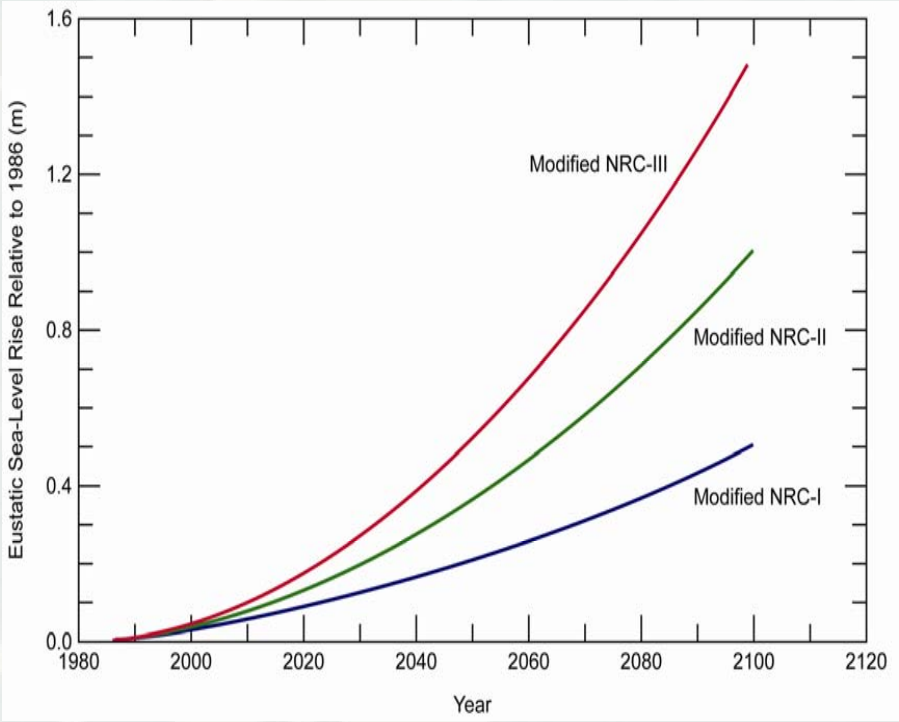
Challenges Addressed in our STP

1. Lack of comprehensive planning guidance
2. Data is not readily available or user friendly
3. Need tools for multi-scenario planning

Challenge 1

Lack of Comprehensive Planning Guidance

- For Sea Level Change:
  - Guidance was developed that helps planners forecast future conditions
  - Recommends multiple-scenario approach
- No guidance for other effects of climate change



Recommendation 1

Develop New Planning Guidance

Develop new guidance for addressing all climate change implications in the plan formulation process

Recommendation 1 (cont.)
Develop New Planning Guidance

- Use similar approach employed for Sea Level Change (SLC) guidance
- Consider applicability of various methods
  - Traditional Approach
  - Multiple Scenarios (similar to SLC)
  - Sensitivity Analysis
  - Other Methods?
- Address scalability for projects of various size and complexity
- Develop flow chart (similar to SLC)

Recommendation 1 (cont.)

Implementation Plan

- Establish a expert team versed in policy, planning, risk analysis, climate change, etc.
- Identify potential key climate change impacts for geographic regions
- Work with climate change data providers
- Establish working level / field team to comment on usability

Challenge 2

Data is Not Readily Available or User Friendly

- For Sea Level Change
  - NRC Curves, IPCC data, and Updated Corps Guidance
- For Other effects of Climate Change
  - There is no centralized place to find data and there isn't a mechanism to downscale models/data.

Recommendation 2

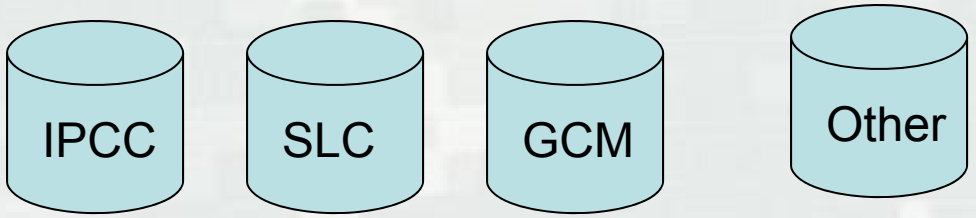
Develop Climate Change Data Repository

- Conduct inventory of climate change data needed for Corps plan formulation
- Link relevant data to a single location (such as CorpsMap, OMBIL)
- Provide data in a usable format
- Benefits to the Corps: saves money and time, increased consistency

Recommendation 2 (cont.)

Develop Climate Change Data Repository

Robust data needs in plan formulation



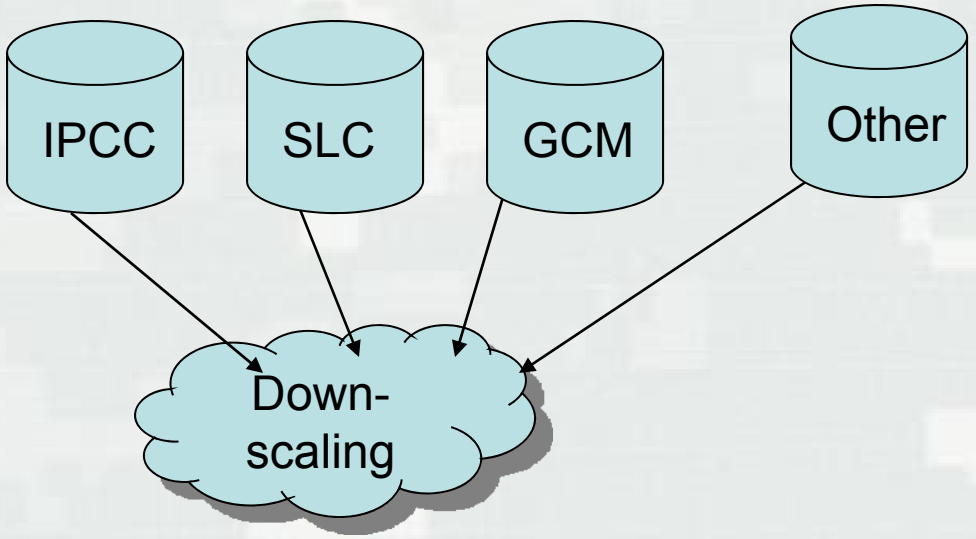
- Existing data – Global Circulation Models (GCM), IPCC data, SLC data, and TP-40.

- Potential Future data needs – Drought, wind & rain pattern etc.

Recommendation 2 (cont.)

Develop Climate Change Data Repository

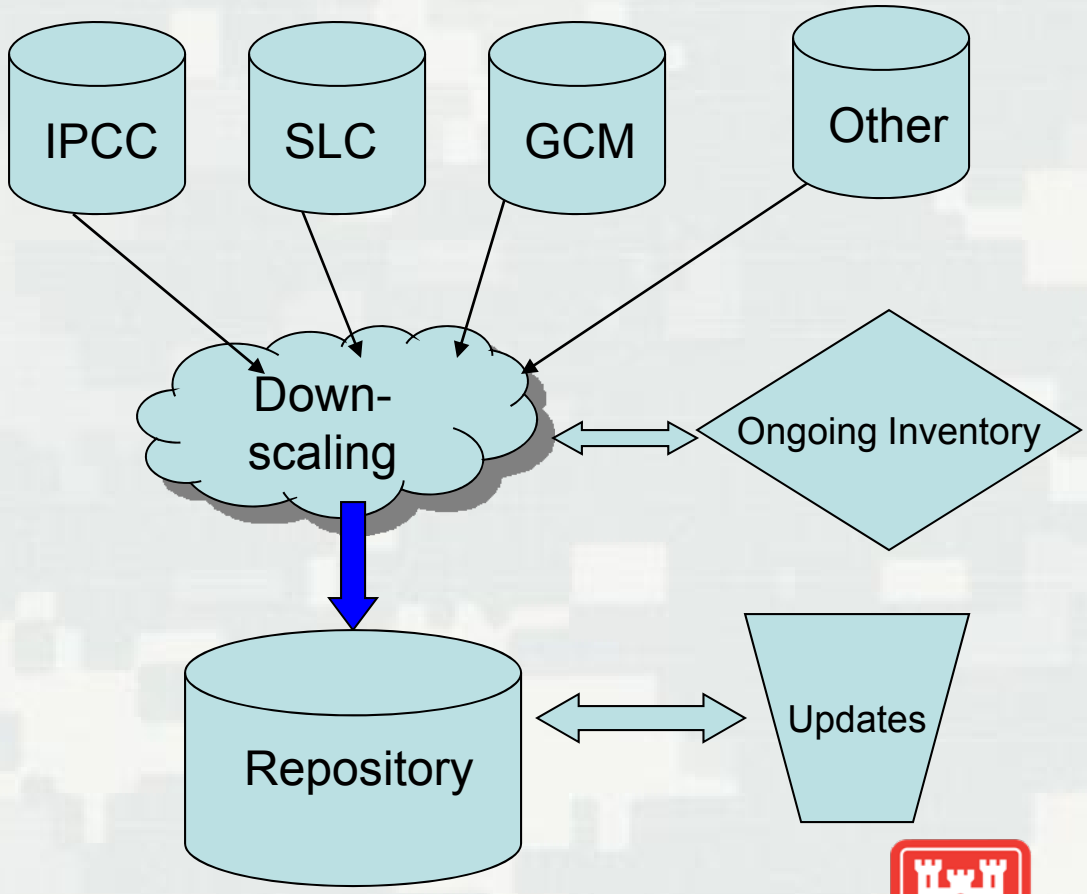
- Link data/models from multiple agencies (IPCC, NOAA, USGS, NAS).
- Downscale data/models to regional/watershed/ project level



Recommendation 2 (cont.)

Develop Climate Change Data Repository

- Data repository in user friendly format (similar to FEMA Flood Insurance Studies maps).
- Long term plan to update these data/models continuously to capture accurate & latest data.



Recommendation 2 (cont.)
Implementation Plan

- Establish an interagency team of data providers and data users.
- Team inventories existing data sets among agencies and identifies needs and gaps.
- Downscale or regionalize data for usability in models and planning efforts.
- Provide the data in an accessible and user-friendly format.

Challenge 3

Need Tools For Multi-scenario Planning

- Constitutes a change from the traditional approach to forecasting and alternative evaluation
- Tools such as IWR Planning Suite do not currently accommodate Multiple FWOPC
- IWR Planning Suite is specific to only Ecosystem Restoration Projects

Recommendation 3

Scenario Based Plan Formulation Tool

Benefits

- Facilitate implementation of Climate Change guidance (Including SLC and new Guidance under Recommendation 1)
- Utilize data gathered under Recommendation 2
- Improve Communication

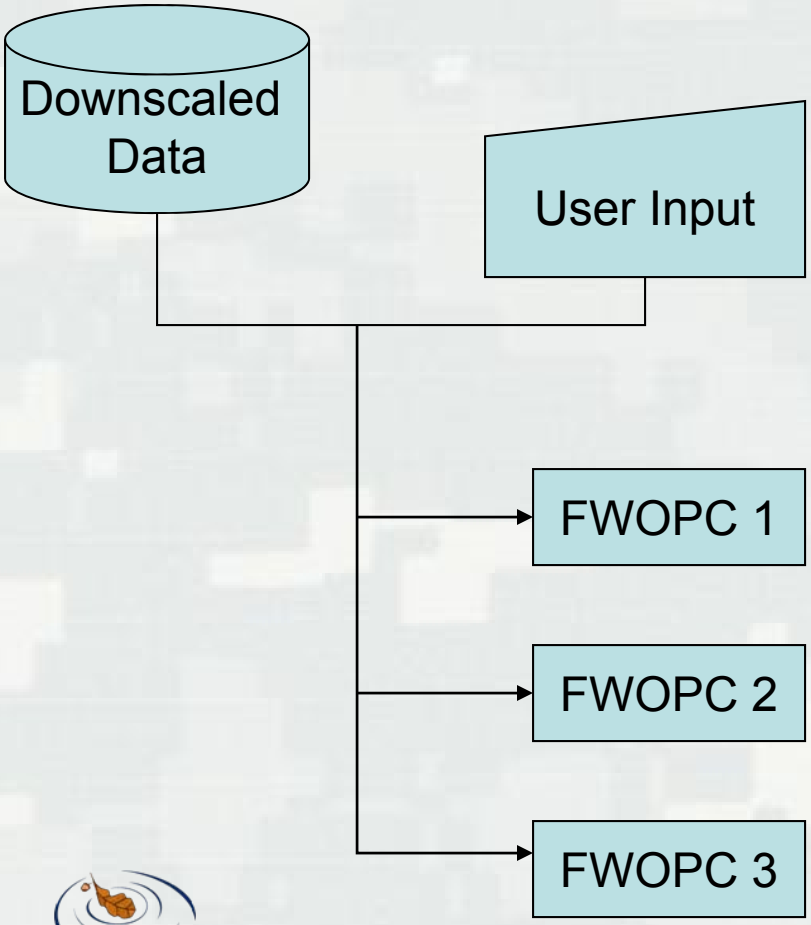
Recommendation 3 (cont.)

Scenario Based Plan Formulation Tool

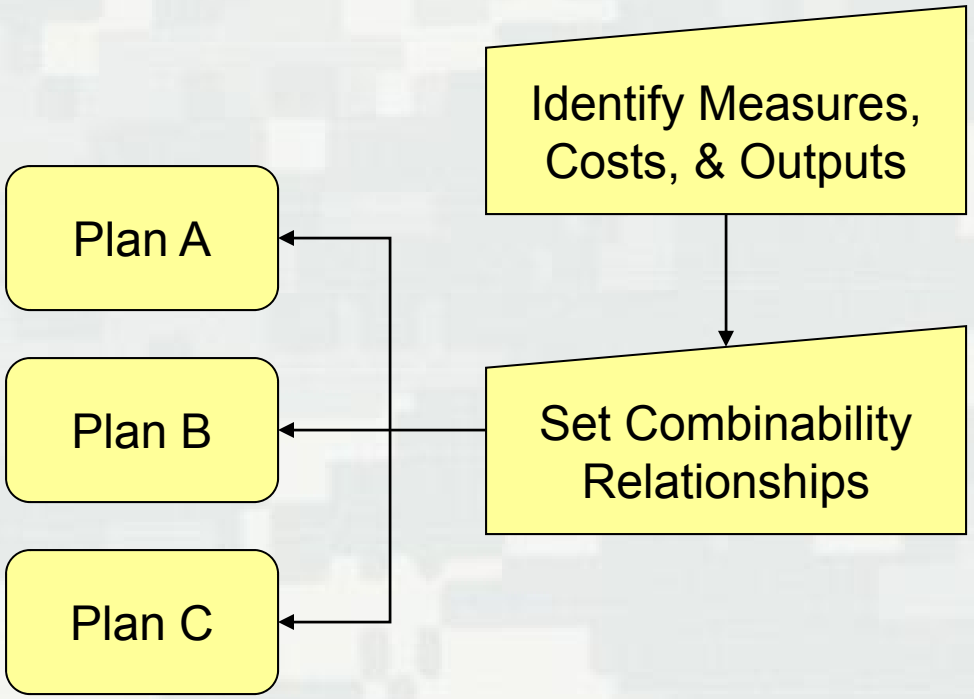
Software Functionality:

1. Build Multiple FWOPC Scenarios
2. Combine Measures into Plans
3. Compare Plans across Multiple FWOPC
4. Display Outputs

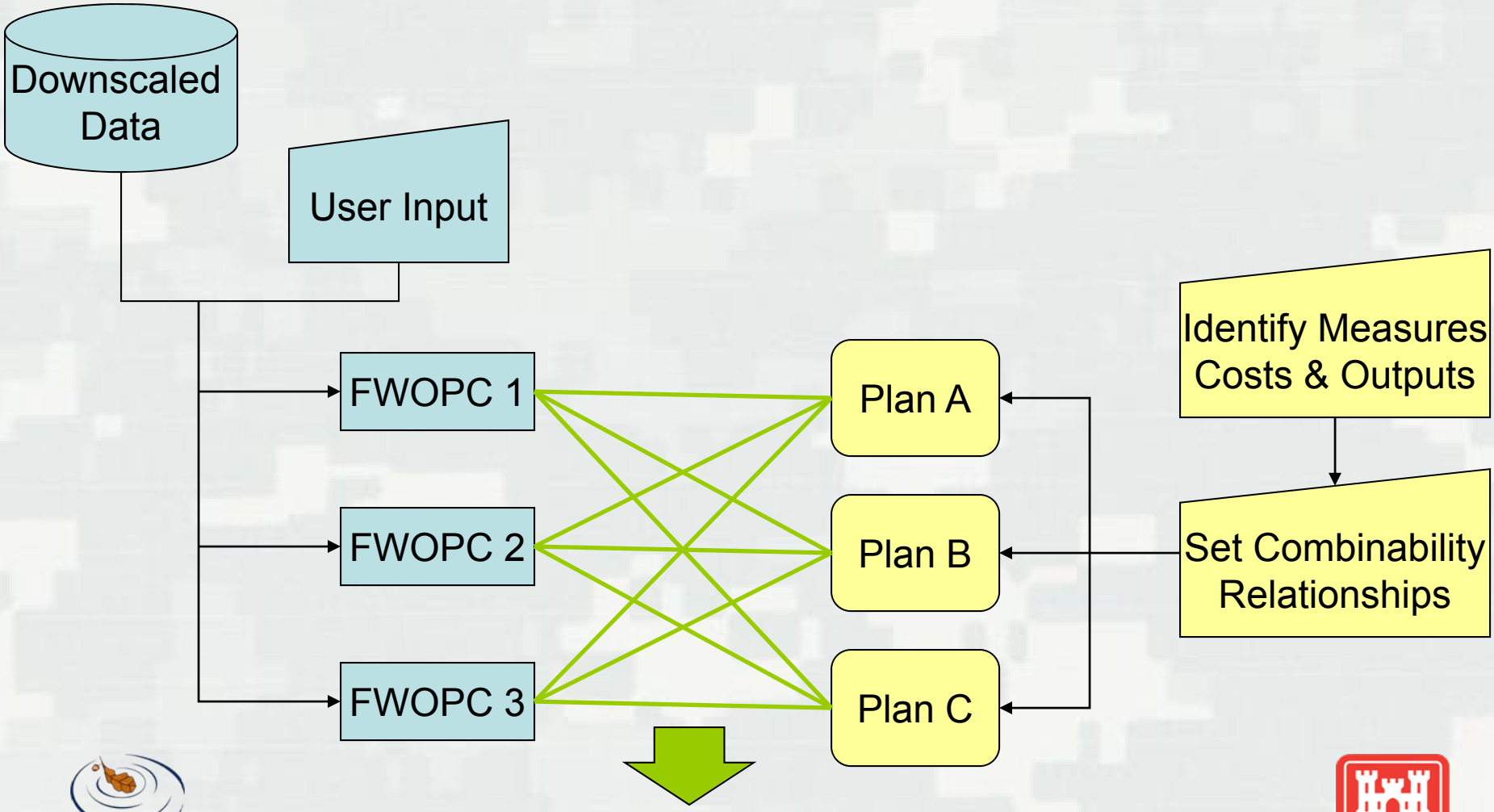
Function 1: Build Scenarios



Function 2: Construct Plans



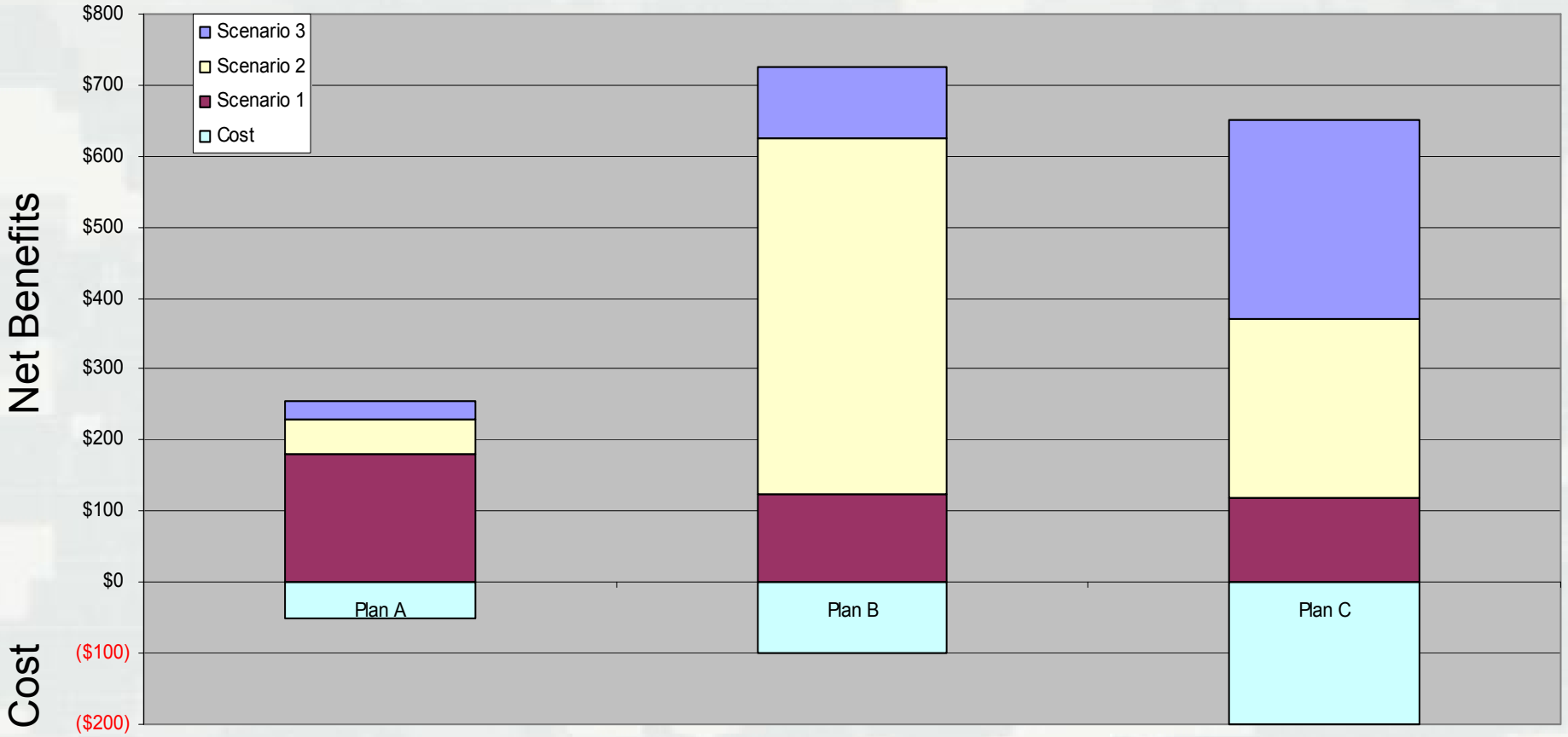
Function 3: Compare Plans

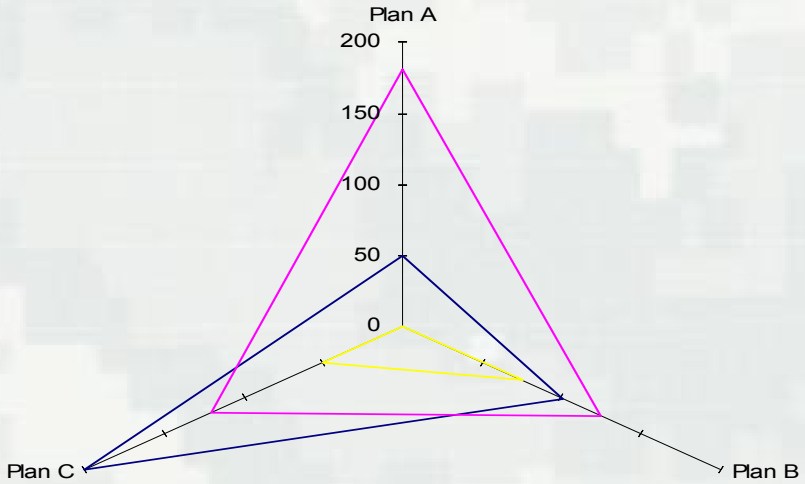


Function 4: Sample Outputs

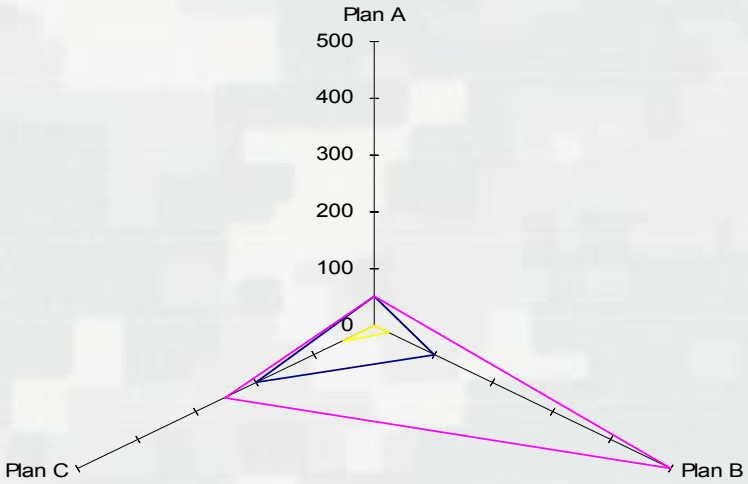
	Plans	Cost (M)	Benefits (M)	AAHUs (Acres)
FWOPC 1	A	$50	$180	0
	B	$100	$125	75
	C	$200	$120	50
FWOPC 2	A	$50	$50	0
	B	$100	$500	25
	C	$200	$250	50
FWOPC 3	A	$50	$25	0
	B	$100	$100	5
	C	$200	$280	50
AVERAGE	A	$50	$85	0
	B	$100	$242	35
	C	$200	$217	50

Comparison of Net Benefits by Scenario for Alternative Plans

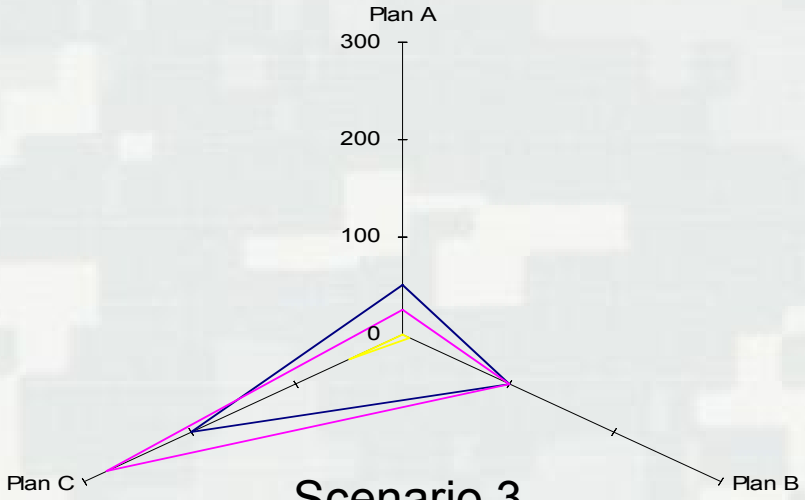




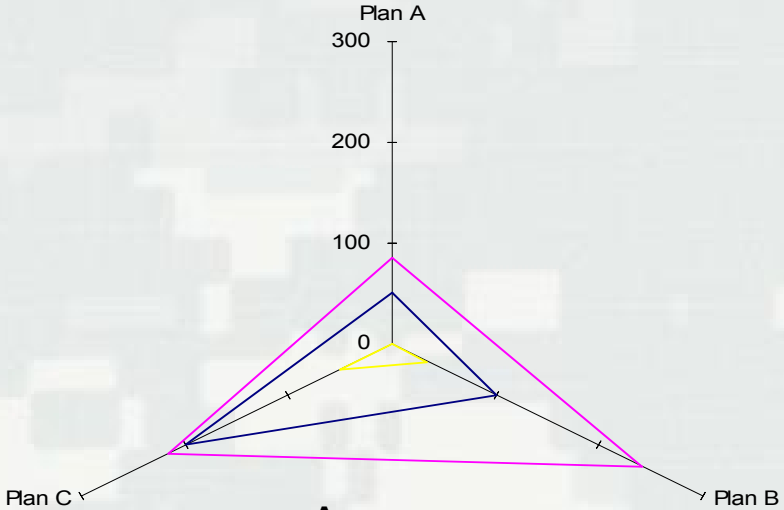
Scenario 1



Scenario 2



Scenario 3



Average

Recommendation 3 (cont.)

Implementation Plan

- Identify User Input needed to build Scenarios
- Use IWR Planning Suite as basis for combining Measures into Plans
- Analyze potential to include metrics for other accounts (Public Safety, Regional Economic Development, Other Social Effects)
- Standardize Output Types (Charts, Tables, Graphics)
- IWR Lead on Software Programming

Summary

- Develop comprehensive climate change guidance
- Develop climate change data repository
- Develop scenario based plan formulation tool

Conclusions

If these recommendations are implemented together, the benefits to the Corps would include:

- Increased Consistency
- Increased Efficiency in Plan Formulation by Streamlining the Process
- More Robust Projects