APNEP
Planning, Monitoring, & Assessment Update

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Albemarle-Pamlico National Estuary Partnership

STAC Meeting
ECU Greenville Centre, Greenville
30 April 2019

APNEP Science & Technology Overview

- APNEP
- APNEP S&T
- Planning
- Monitoring
- Assessment
- Interdisciplinarity
- STAC

APNEP

- Mission
- Map
- Ecosystem Threats
- Staff
- History 1986-2003
- Administration

National Estuary Partnership

APNEP Science & Technology

- Science for Stewardship: Case Study
- Demand for S&T
- Core Questions of S&T for Sustainability
- Informing Decisions with Ecological Knowledge
- APNEP S&T Mission
- Strategic Planning Model
- APNEP S&T's Goals and Objectives
- Current S&T Status
- Technical Guidance for APNEP

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Strategic Planning Model

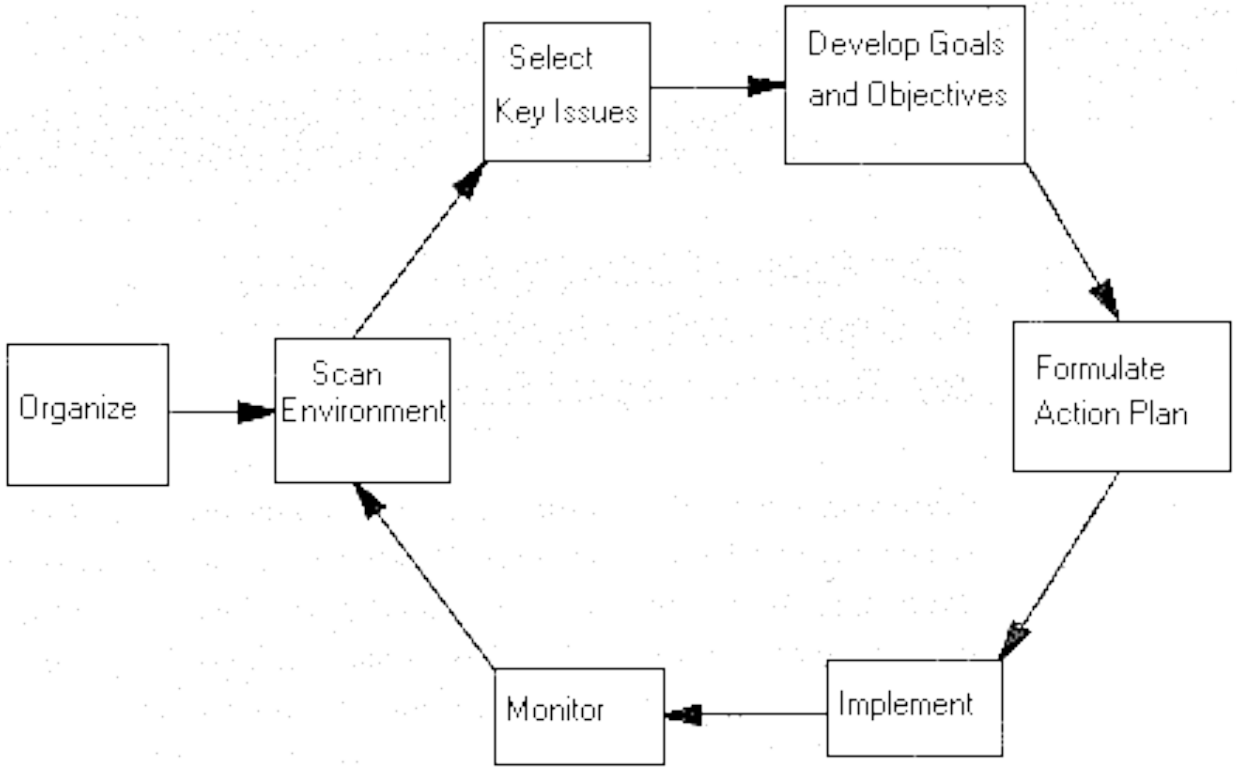
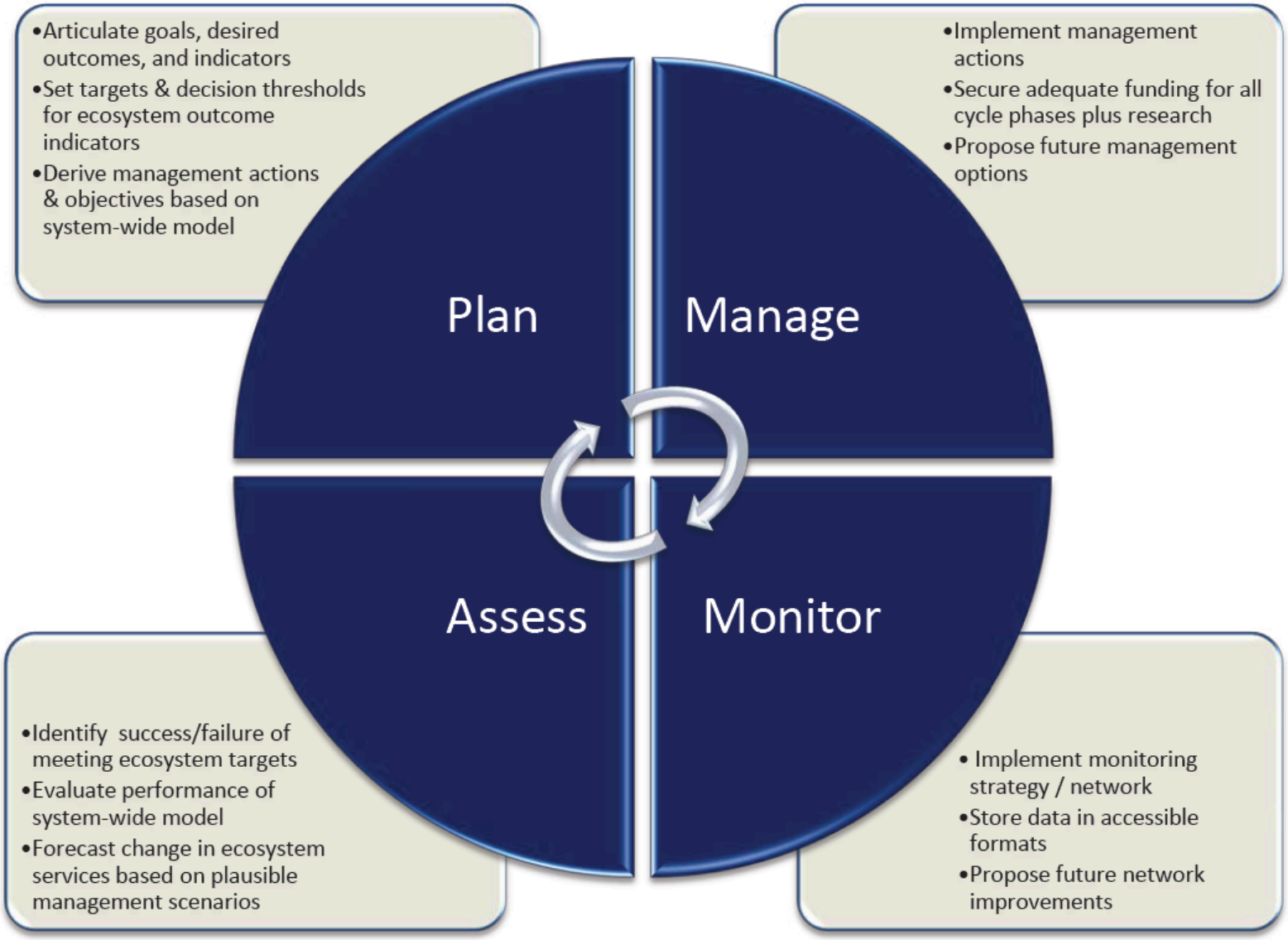


Figure 2: APNEP's adaptive management cycle.



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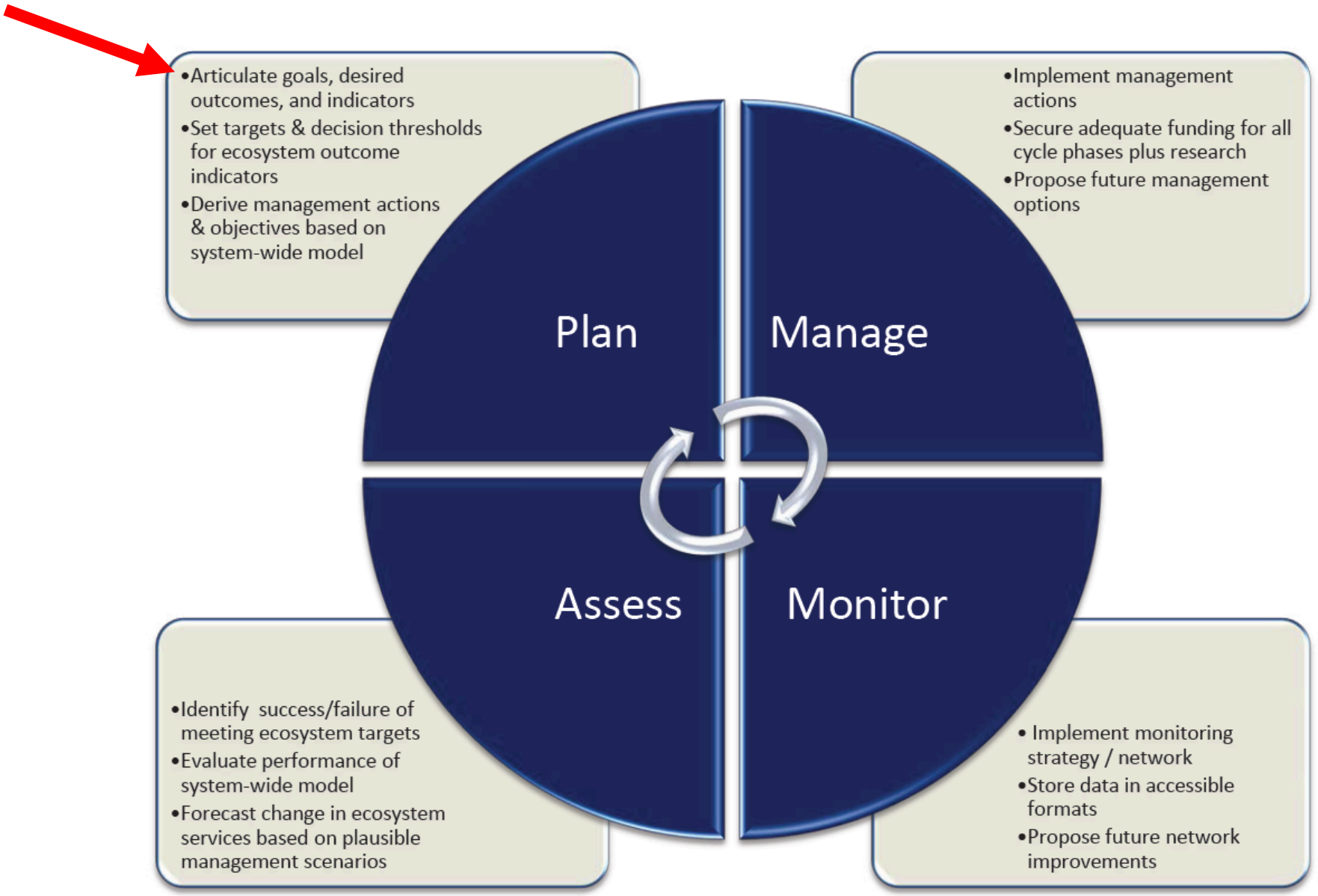

Goal	Ecosystem Outcome
1: Human Communities A region where human communities are sustained by a functioning ecosystem	1a: Waters are safe for personal contact.
	1b: Designated surface and ground water supplies are safe for human consumption.
	1c: Surface hydrologic regimes sustain regulated human uses.
	1d: Fish and game are safe for human consumption.
	1e: Opportunities for recreation and access to public lands and waters are protected and enhanced.
2: Native Species A region where aquatic, wetland, and upland habitats support viable populations of native species	2a: The biodiversity, function, and populations of species in aquatic, wetland, and upland communities are protected, restored, or enhanced.
	2b: The extent and quality of upland, freshwater, estuarine and near-shore marine habitats fully support biodiversity and ecosystem function.
	2c: Non-native invasive species do not significantly impair native species' viability or function, nor impair habitat quality, quantity, and the processes that form and maintain habitats.
3: Water Quantity & Quality A region where water quantity and quality maintain ecological integrity	3a: Appropriate hydrologic regimes support ecological integrity.
	3b: Nutrients and pathogens do not harm species that depend on the waters.
	3c: Toxics in waters and sediments do not harm species that depend on the waters.
	3d: Sediments do not harm species that depend on the waters.

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APNEP Indicator Development

- STAC 2004-2007
  - Indicator Framework
  - Indicator List (Approved by Management Conference)
- MAT Phase I 2008-2012
  - Monitoring Template 2008-2009
  - Ecosystem Assessment Template 2010-
- MAT Phase II 2017-2019
  - Prioritization
  - Indicator Reports

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APNEP Monitoring & Assessment Teams Activity: 2017-2018

MAT	Jan 2017	Feb	Mar	Apr	May	Jun	Jul 2017	Aug	Sep	Oct	Nov	Dec	Jan 2018	Feb	Mar	Apr	May	Jun	Jul 2018	Aug	Sep	Oct	Nov	Dec
Wetlands																								
SAV																								
Air																								
Water																								
Aquatic Fauna																								
Terrestrial																								
Human Dimensions																								

Green = first workshop
Blue = post-kickoff workshops
Yellow = webinars/teleconferences
Orange = MAT leads brief STAC

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Proposed Indicators* and Associated Metrics for the A-P Ecosystem
*Organized by the 12 CCMP Ecosystem Outcomes; XX pertains to SAV MAT

1A-E = Outcomes to meet Human Communities CCMP goal
2A-C = Outcomes to meet Native Species CCMP goal
3A-D = Outcomes to meet Water Quantity and Quality CCMP goal

Monitoring and Assessment Team Assignments by CCMP Ecosystem Outcome

1A - Waters safe for personal contact: Water Resources
1B - Water supplies safe for consumption: Water Resources
1C - Hydrologic regimes sustain uses: Water Resources
1D - Fish and game safe for consumption: Aquatic Fauna, Terrestrial Resources
1E - Access to public lands/waters protected: Human Dimensions
2A - Populations of aquatic and upland species protected: Wetland Resources, Aquatic Fauna, Terrestrial Resources
2B - Upland and Aquatic habitats support ecosystem function: Water Resources, Wetland Resources, SAV, Aquatic Fauna, Terrestrial Resources
2C - Invasive species do not impair native species and habitats: Wetland Resources, SAV, Aquatic Fauna, Terrestrial Resources
3A - Hydrologic regimes support ecological integrity: Water Resources
3B - Nutrients and pathogens do not harm water-dependent species: Water Resources
3C - Toxics do not harm water-dependent species: Water Resources
3D - Sediments do not harm water-dependent species: Water Resources
Ecosystem Stressors: Water Resources, Wetland Resources, Air Resources, Aquatic Fauna, Terrestrial Resources, Human Dimensions

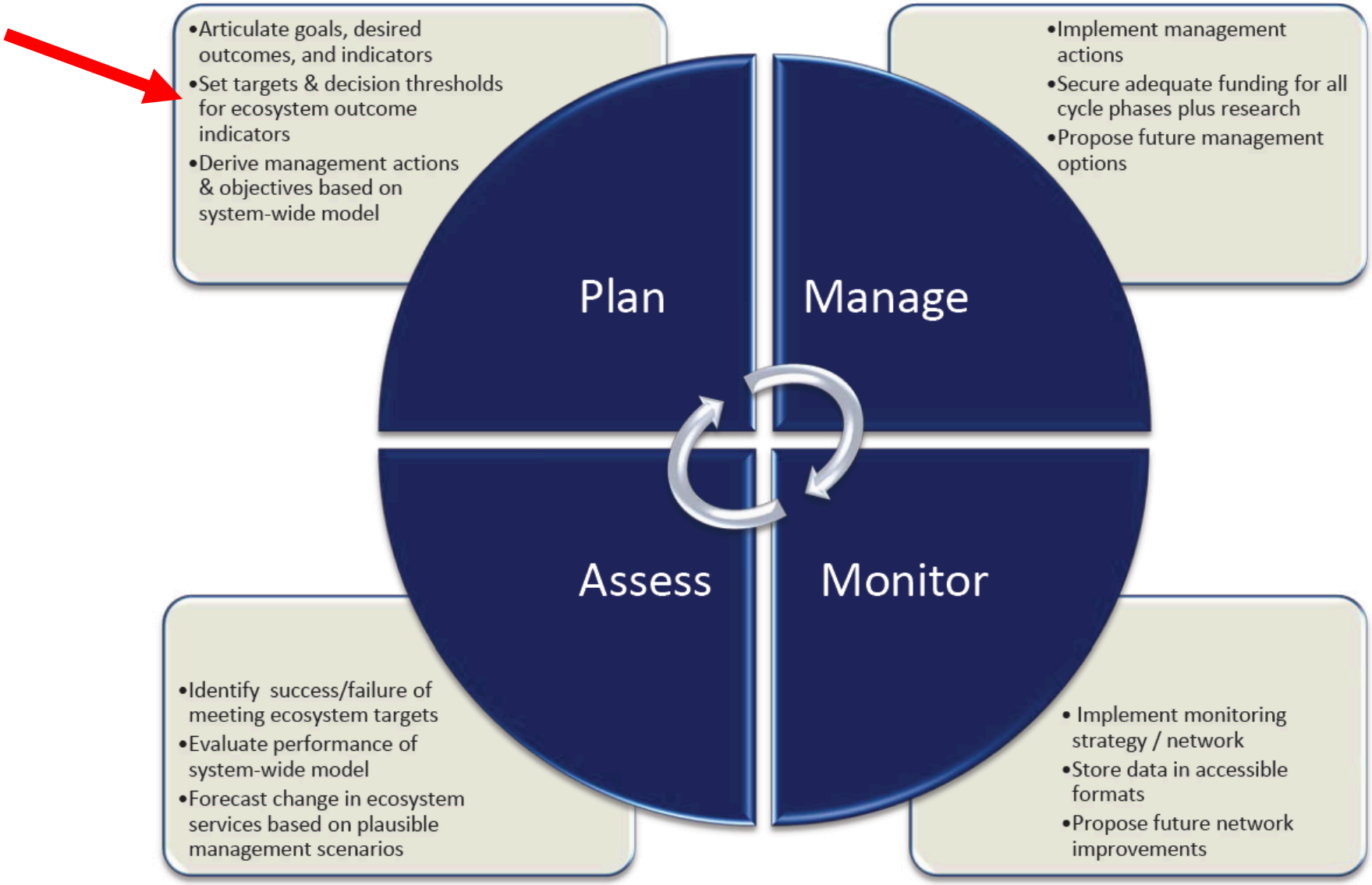
The following are for review by the **SAV Resources MAT**:

(Blue = Indicator, Green = Associated metric; 2012 = Metrics included in the last ecosystem assessment)

2B: The extent and quality of upland, freshwater, estuarine, and near-shore marine habitats fully support biodiversity and ecosystem function.
1 indicator, 3 metrics
SAV (also see Outcome 2C)
- Areal extent of SAV by density class (2012)
- Shore normal distance to deepwater edge of SAV dense beds
- SAV species composition

2C: Non-native invasive species do not significantly impair native species' viability or function, nor impair habitat quality, quantity, and the processes that form and maintain habitats.
1 indicator, 2 metrics
SAV (also see Outcome 2B)
- Eurasian watermilfoil population status/occurrences
- *Hydrilla* population status/occurrences

Figure 2: APNEP's adaptive management cycle.



APNEP Targets & Decision Thresholds for EOIs

- MAT Phase I 2008-2012
  - Monitoring Template 2008-2009
  - Ecosystem Assessment Template 2010-
- MAT Phase II 2017-2019
  - Prioritization
  - Indicator Reports
    - Assessment Points

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Table 1. Hypothetical assessment points for the following human health, wetland, and water quality indicators respectively: a) blood pressure, b) saltmarsh aboveground primary production, and c) salinity.

a) Human Health Indicator = Blood Pressure	**Assessment Points**		
Metric	Excellent/Good	Fair	Poor
Total Cholesterol	150-200	125-149 or 201-225	< 125 or > 225
High-Density Lipoprotein (HDL) Cholesterol	40-60	30-39 or 61-70	< 30 or > 70
Low-Density Lipoprotein (LDL) Cholesterol	< 150	150-175	> 175
Total Cholesterol/HDL Cholesterol Ratio	< 5.0	5.0-6.0	> 6.0

b) Wetland Indicator = Salt Marsh Aboveground Primary Production	**Assessment Points**		
Metric	Excellent/Good	Fair	Poor
Aboveground Standing Live Biomass	> 600 g/m2	300-600 g/m2	< 300 g/m2

c) Water Quality Indicator = Salinity	**Assessment Points**			
Metric	Excellent	Good	Fair	Poor
Summer mean salinity (psu) for oyster growth	12-20	5-12 or 20-25	3-7 days at <5 or > 25	8+ days at <5 or > 25

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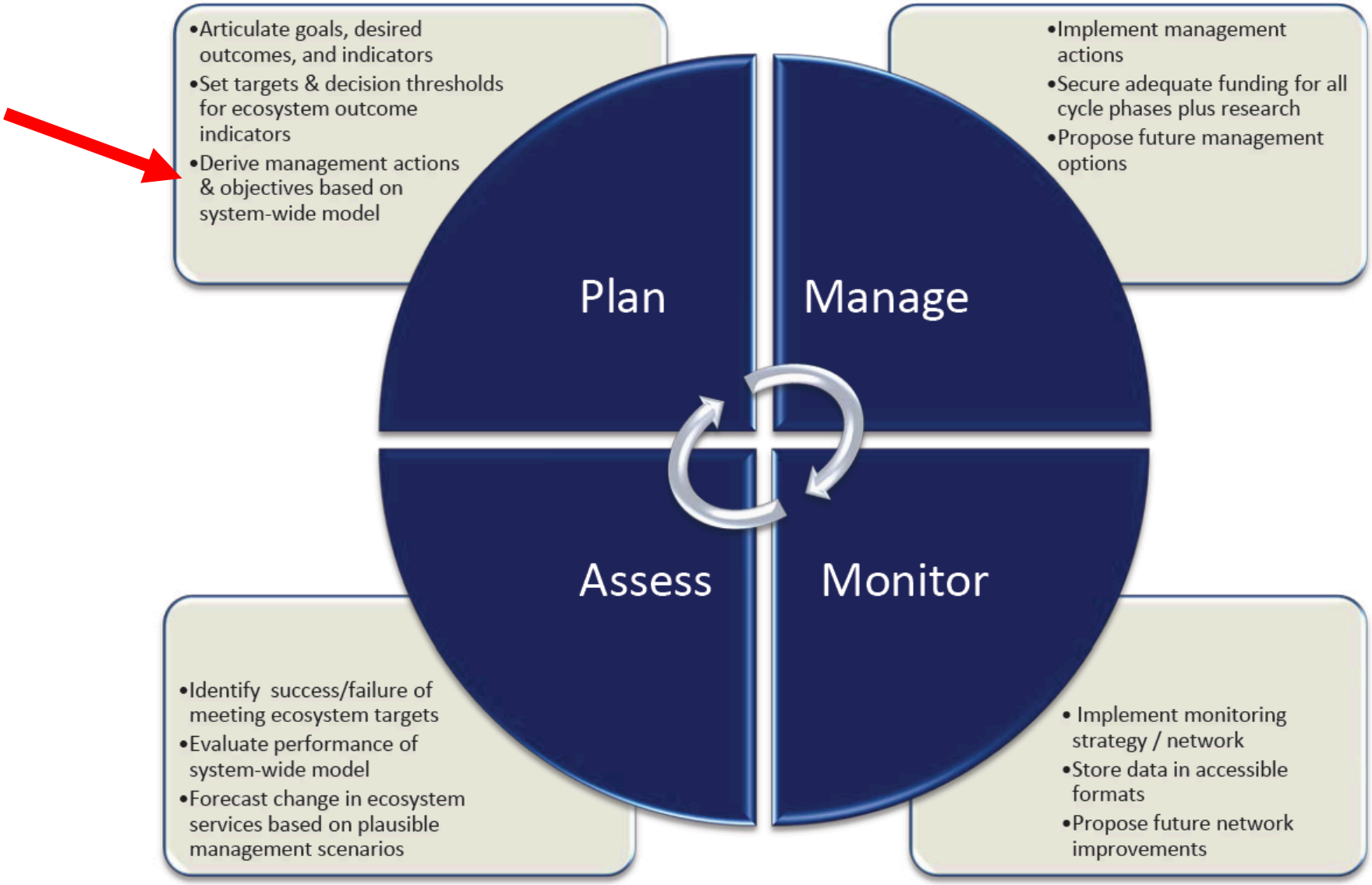
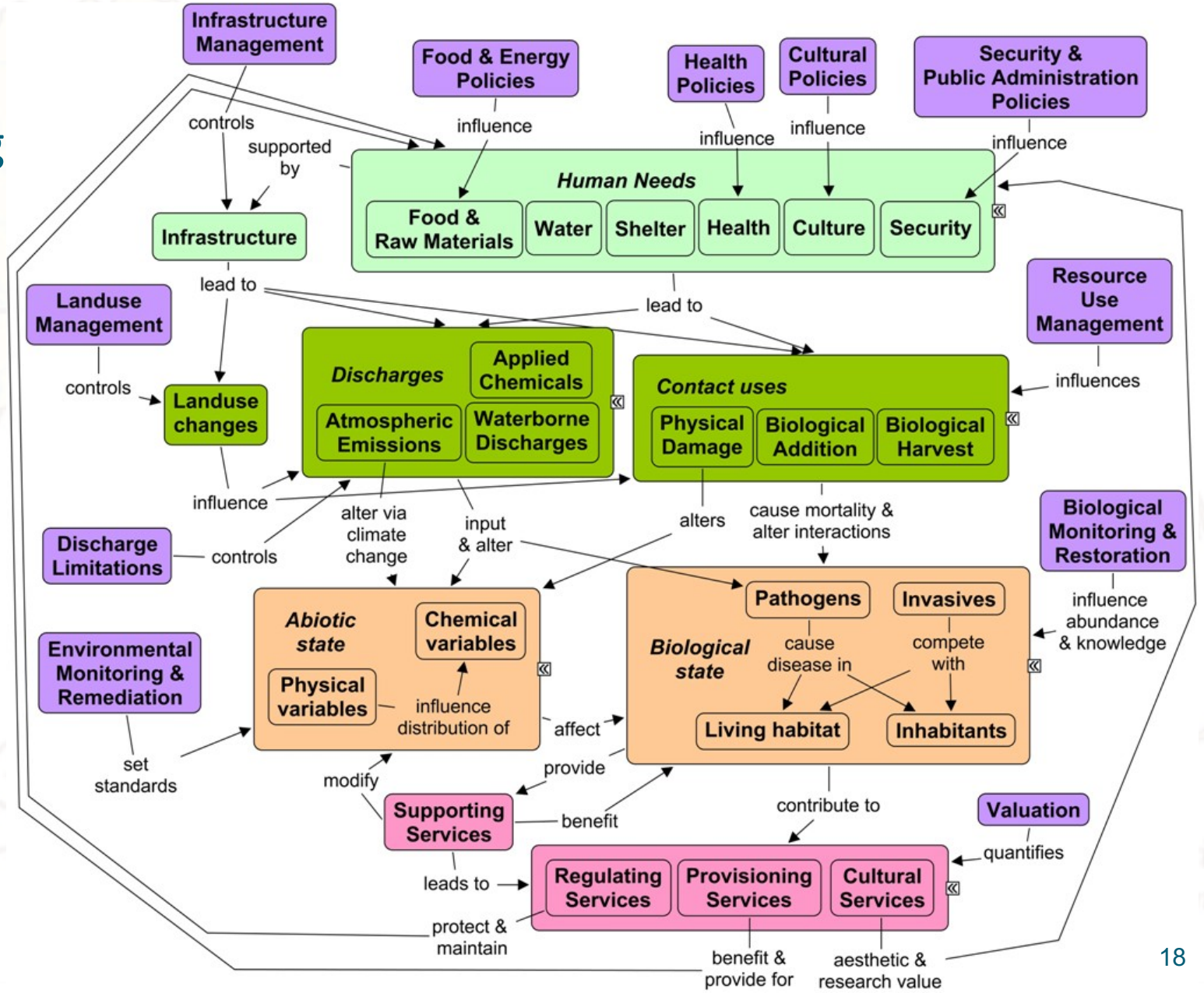


Models Necessary to Guide Indicator Development

DPSER Modeling



Lt. green = Drivers
Dk. Green = Pressure
Orange = State
Red = Ecosystem Services
Purple = Response

EPA-ORD-ESRP 2010

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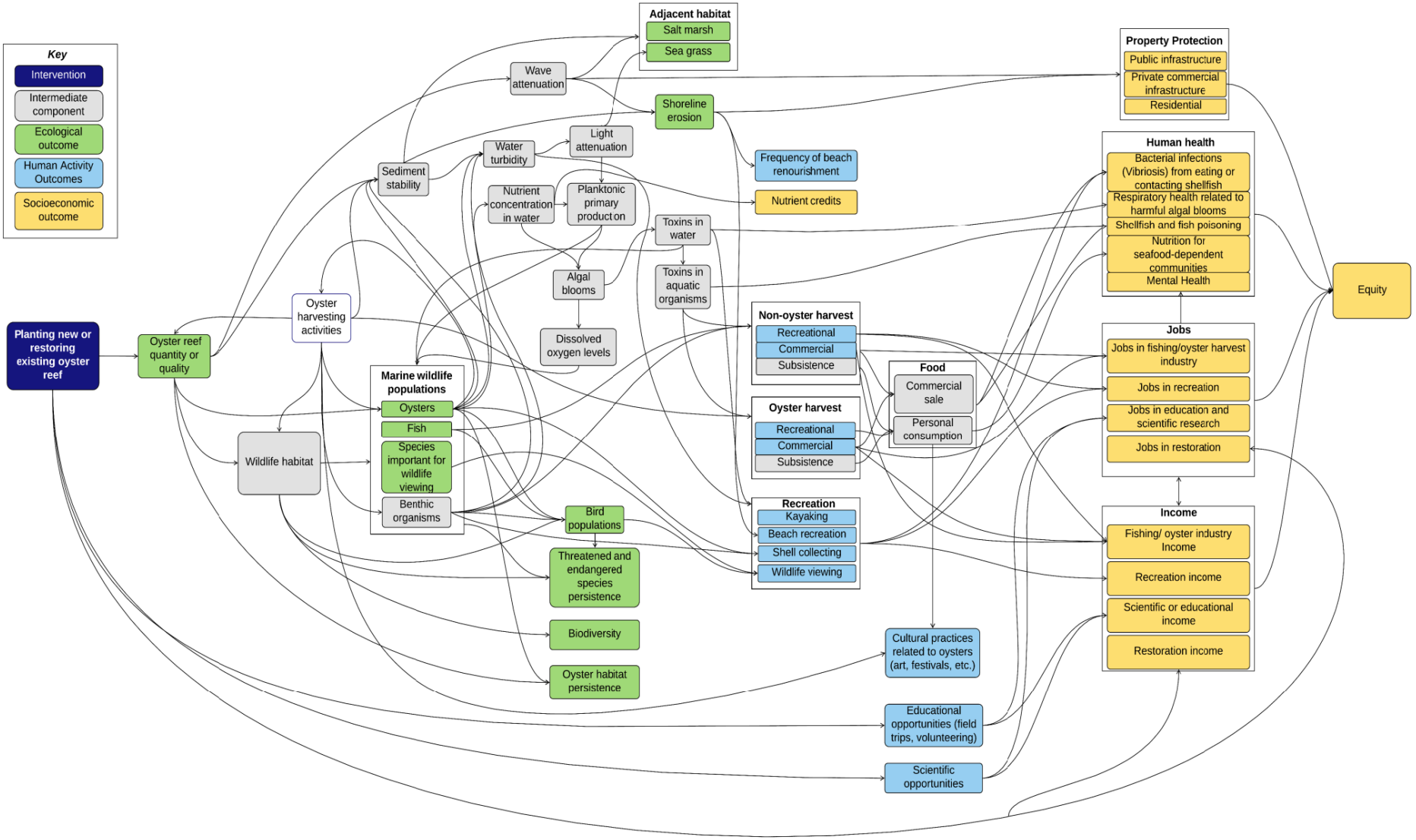
Key
Intervention
Intermediate component
Ecological outcome
Human Activity Outcomes
Socioeconomic outcome
Planting new or restoring existing oyster reef
Oyster reef quantity or quality
Oyster harvesting activities
Wildlife habitat
Adjacent habitat
Salt marsh
Sea grass
Wave attenuation
Shoreline erosion
Sediment stability
Water turbidity
Light attenuation
Nutrient concentration in water
Planktonic primary production
Toxins in water
Toxins in aquatic organisms
Algal blooms
Dissolved oxygen levels
Frequency of beach renourishment
Nutrient credits
Marine wildlife populations
Oysters
Fish
Species important for wildlife viewing
Benthic organisms
Bird populations
Threatened and endangered species persistence
Biodiversity
Oyster habitat persistence
Non-oyster harvest
Recreational
Commercial
Subsistence
Oyster harvest
Recreational
Commercial
Subsistence
Recreation
Kayaking
Beach recreation
Shell collecting
Wildlife viewing
Food
Commercial sale
Personal consumption
Cultural practices related to oysters (art, festivals, etc.)
Educational opportunities (field trips, volunteering)
Scientific opportunities
Property Protection
Public infrastructure
Private commercial infrastructure
Residential
Human health
Bacterial infections (Vibriosis) from eating or contacting shellfish
Respiratory health related to harmful algal blooms
Shellfish and fish poisoning
Nutrition for seafood-dependent communities
Mental Health
Jobs
Jobs in fishing/oyster harvest industry
Jobs in recreation
Jobs in education and scientific research
Jobs in restoration
Income
Fishing/ oyster industry Income
Recreation income
Scientific or educational income
Restoration income
Equity

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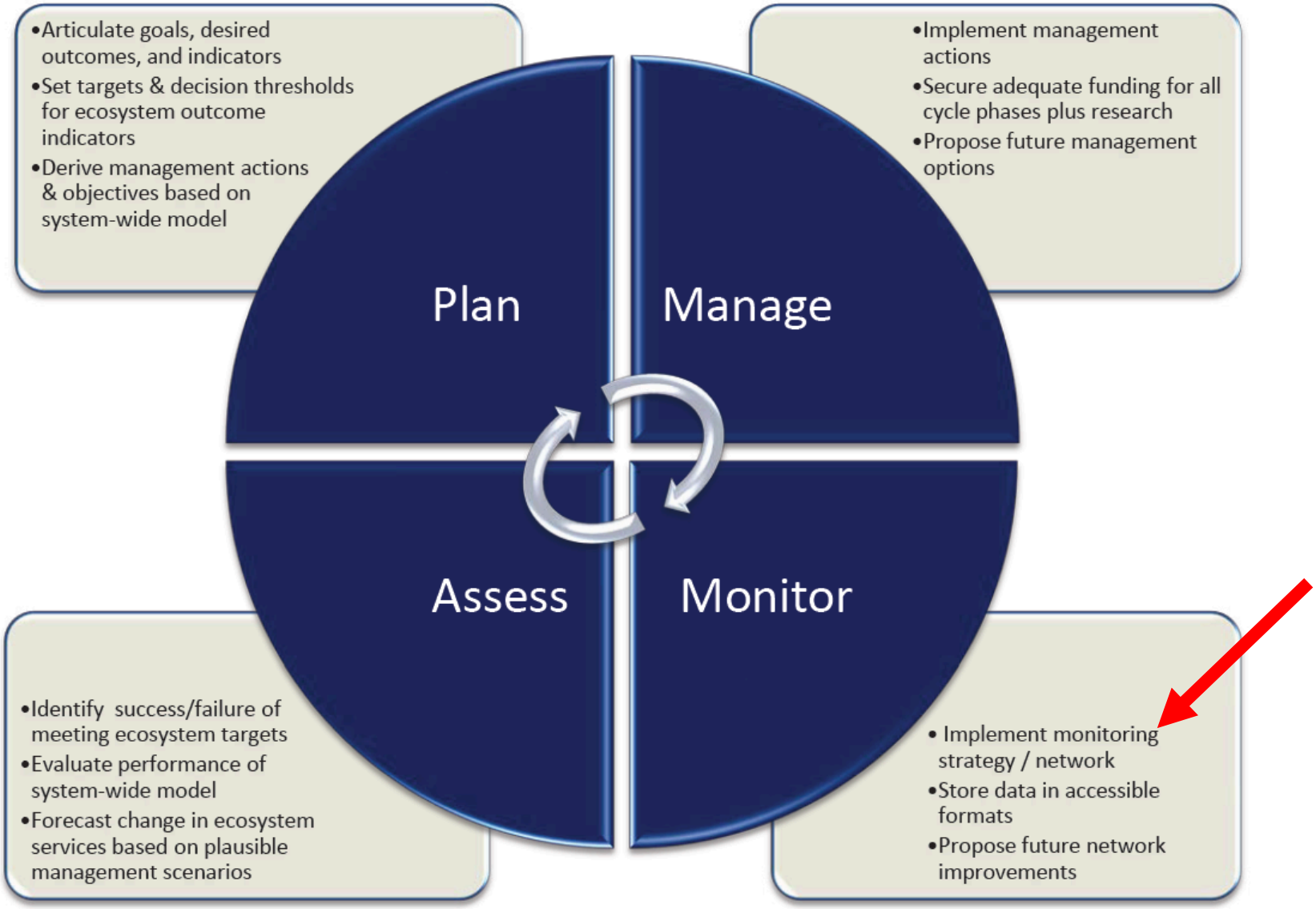

APNEP Monitoring

- APNEP Monitoring Conference 2000
- MAT Phase I 2008-2012
  - Monitoring Template
- MAT Phase II 2019
  - Indicator Report
  - Monitoring Plan
    - EPA's NEP monitoring guidance
    - Other NEPs monitoring plans
    - Large ecosystem programs

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APNEP Monitoring Template (2010)

- Justification
- Goal
  - Monitoring Template
- Existing and Enhanced Monitoring
  - Objectives
  - Methods
  - Costs
  - Data Quality Control
  - Data Analysis, Statistical Methods, Hypotheses
- Data Sources
- References
- Contact Person(s)

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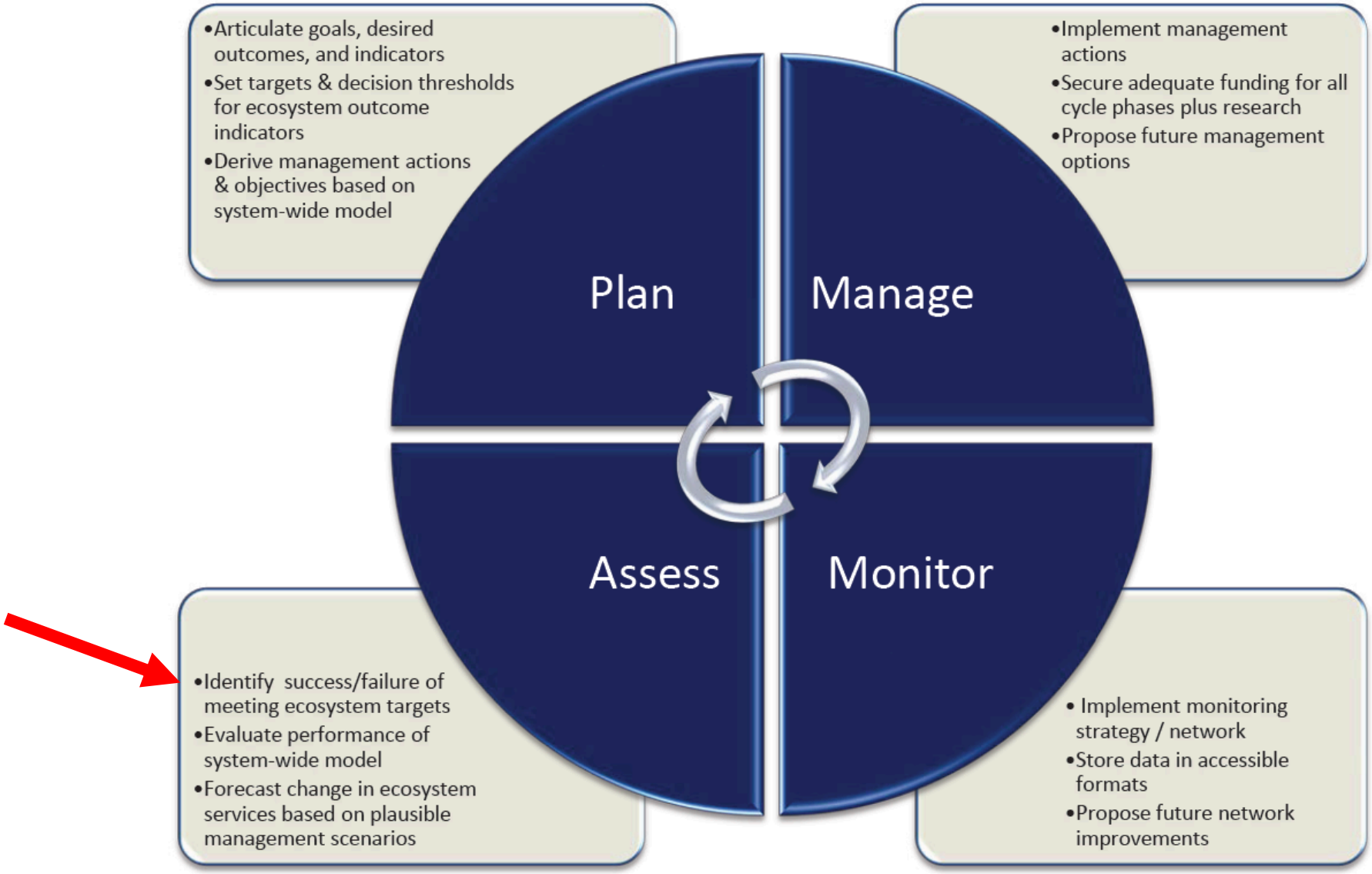

APNEP Assessment

- 1991 Status and Trends (APES)
- 2012 Ecosystem Assessment
  - Status and Trends
  - No assessment points, diagnoses
  - Limited in scope
- 2020 Ecosystem Assessment
  - Indicator Reports
  - Syntheses addressing assessment sub-elements

THE IPBES ASSESSMENT PROCESS

ipbes
Science and Policy for People and Nature

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Interdisciplinarity

- Tactics for Success
- Disciplinary Focus: Organizations
- Disciplinary Focus: Research
- Suggested Mid-Term S&T Activities
- A-P Research Consortium
- Scientific Peer Review

Tactics for Success

- Interdisciplinary
- Integration, systems
- Sustainability science
- Stakeholder involvement
- Risk, uncertainty
- Adaptive co-management

STAC

- Governance
- Challenge Case Study
- Strategy
- Best Scientific Information
- Policy-Driven Research Case Study
- Potential Benefit

Policy-Driven Research: Prehistoric Case Study

- "[Dionysius in 339 B.C.] gathered skilled craftsman, commandering them from the cities under his control and attracting them by high wages…his purpose was to make weapons in great numbers and every kind of projectile…the catapult was invented at this time…, since the best craftsman had been collected from everywhere into one place. The high wages as well as the numerous prizes offered to the craftsman who were judged to be the best stimulated their zeal. Moreover, Dionysius circulated daily among the workers…and rewarded the most zealous with gifts and invited them to his table."

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