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Water Resources Management in  
an Ecosystem Context:  
System Dynamics  
and  
System Management

# Outline

- **Background - Current Importance of Ecosystem Approaches**
- **Translating Words into Action**
- **Systematic Approaches**
- **Basic System Dynamics**
- **Past Trends**
- **Management Changes**
- **Case Studies**
- **Conclusions**

# Objectives

- **Set IWRPM in a systematic context**
- **Outline how we can practically work in this context**

# Background

- **Unintended consequences of water management**
- **Slow learning process over the years**
- **Current intentional agency interest in ecosystem approaches**
- **Integrated Land and Water Initiatives**
  - **World Bank, UNPP, UNEP, FAO GEF**

# Translating Words into Action

- **Developing a systematic approach**
- **Understanding basic system dynamics**
- **Identifying past trends**
- **Inserting management changes**
- **Ongoing monitoring and feedback**
- **Use of models**

# Systematic Approach

- **In principle identify major systems involved**
  - Surface and sub-surface water systems
  - Ecosystem types - identify key biological indicators
  - Human systems and interferences: visible on the ground and intangible
- **In practice identify key linkages**
  - impact of management activities on these key linkages

# Understanding Basic System Dynamics

- Issues such as
  - Surface - subsurface interactions
  - Upstream and downstream impacts
  - Importance of extreme events
  - Dynamics of hydrology

# Identifying Past Trends

- **Nothing is stable**
- **Use land use change as a surrogate**
- **Assess hydrologic / meteorological data**
- **Identify patterns of fluctuation or change**

# Management Changes

- How will management changes influence the system?
- By changing
  - water system dynamics
  - biological systems
  - people relations
- Which may change ecosystem balance

# On Going Monitoring and Feedback

- **Identify key elements to monitor**
  - **Biological indicators**
  - **Land use Indicators**
  - **Hydrologic indicators**

# Models

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- **Develop models of the system**
- **Develop linkage changes of possible cause and effect**
- **Development of numerical models of system components**

# Case Studies

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- **Kissimmee**
- **Cameroon**



# Conclusions

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- **You Decide**
- **Discuss**

# References

- **Operational Program 12. Integrated Ecosystem Management. Global Environmental Facility W.D.C.**
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- **Abramovitz, J.N. Imperiled Waters, Impoverished Future The Decline of Fresh Water Ecosystems. World Water Paper No. 128. 1996.**
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