

River basin and coast as a single system

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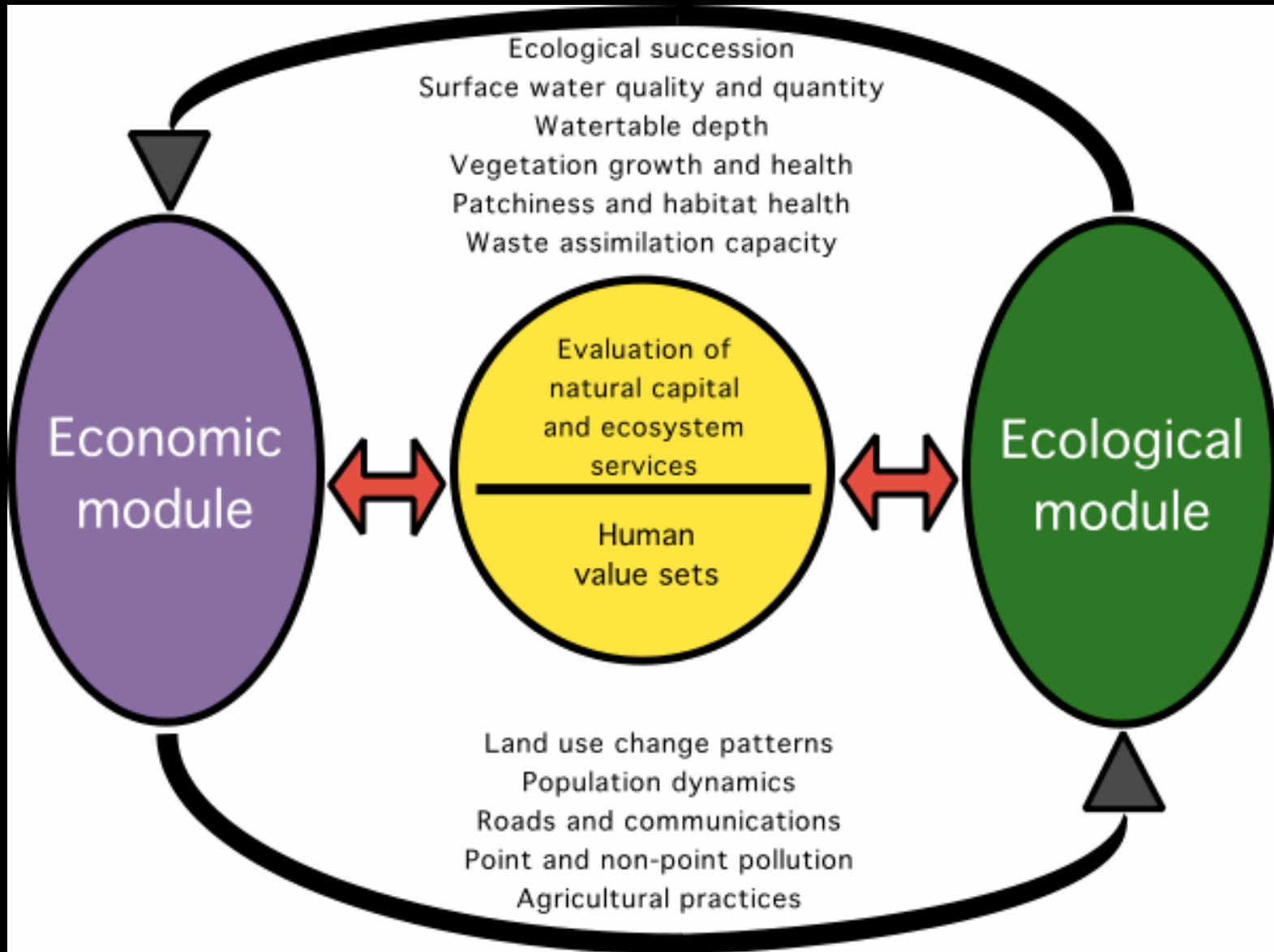
University of Kansas

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Integration

- **Coupled river basin and coast**
- **Coupled natural and human system (CNH)**
- **Possible combinations**
 - **river basin and CNH**
 - **coast and CNH**
 - **river basin and coast and natural system**
 - **river basin and coast and human system**
 - **river basin and coast and CNH**

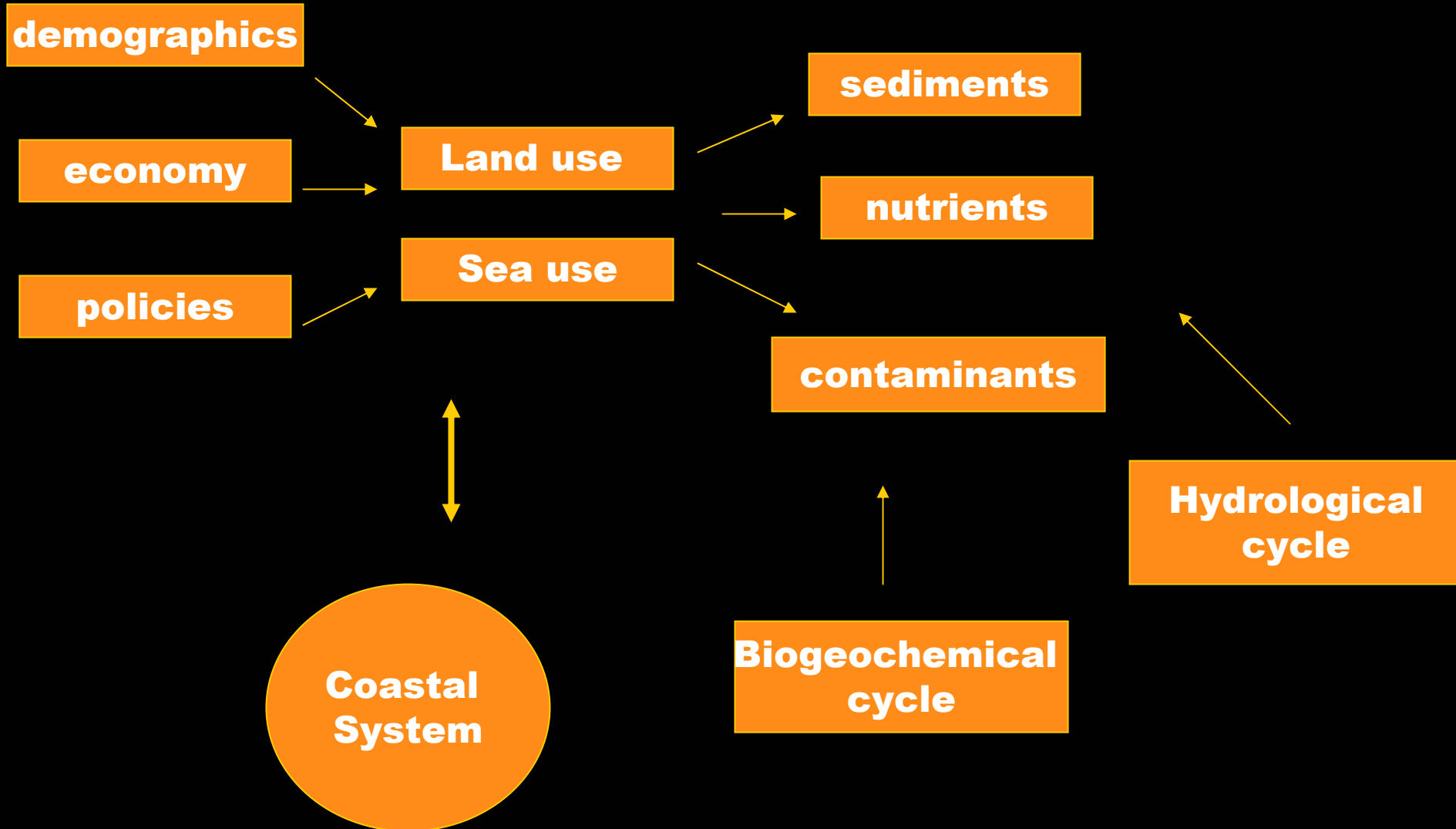
Patuxent Watershed Model



Significance

- **Most coastal systems especially estuaries are strongly influenced by upland watersheds**
 - **Necessitate interactions because of spatial proximity**
 - **Reduce negative effects**
 - **Create benefits by pooling resources**

River basin ↔ Coast



Physical Linkages

- **Sediments**
- **Nutrients**
- **Contaminants**

Anthropogenic influences

- **Seawalls, jetties, levees, navigation channels disrupted natural circulation patterns, altered salinity levels and changed the rate of freshwater, sediment, and nutrient delivery.**
- **Dredging of deep draft shipping channels, ports, access canals, and other waterways, the construction of shore protection works (bulkheads, riprap) destroy or modify habitats and prevent the natural landward migration of wetlands as sea level rises.**
- **Storage reservoirs can trap sediments and reduce the natural sediment load reaching inner coastal systems**

Human Linkages

- **Land use**
- **Sea use**
- **Users/stakeholders**

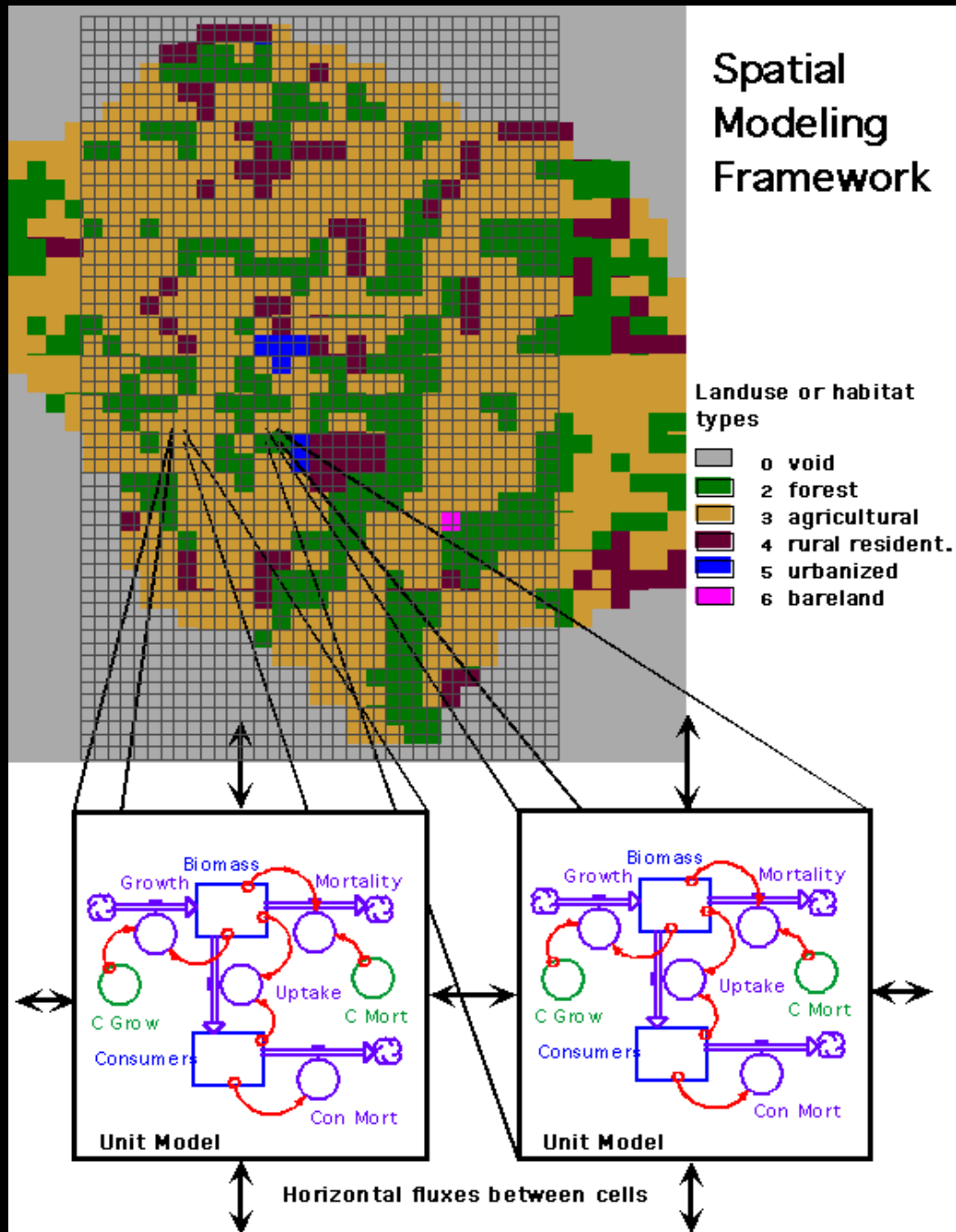
Land use

- **Land cover (biophysical conditions)**
- **Land use (human uses)**
 - **use types**
 - **ownership**

Spatial Modeling Framework

Landuse or habitat types

- 0 void
- 2 forest
- 3 agricultural
- 4 rural resident.
- 5 urbanized
- 6 bareland



**Baltimore
Ecosystem
Study**



Marine Transportation & Ship/Boat Building



Coastal Tourism, Recreation, and Real Estate



The Ocean Sector



Science, Research, & Technology Development



Coastal Construction, Restoration, & Repair



Living Resources



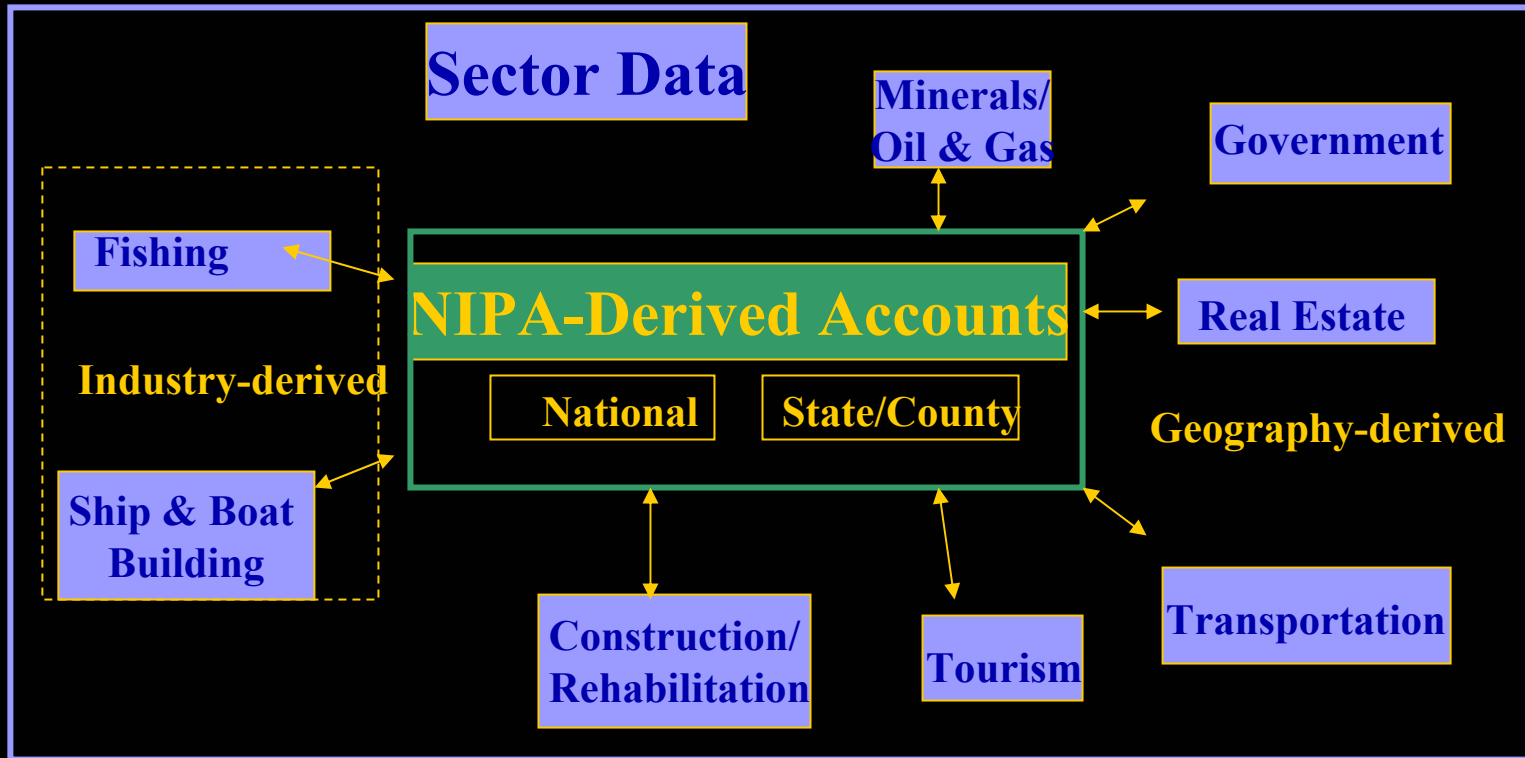
Nonmarket-based coastal resources

- **Recreational amenities**
 - **Beaches**
 - **Coral reefs**
 - **Estuaries**
 - **Wetlands**
 - **Clean coastal waters**
 - **Mangroves**

Capitol Stock
Assessment

Natural Resource Values

Research &
Development



Water Resources

Non-market Recreation
and Amenities

Amenities

Economy

- **Global and national economy**
- **Regional And Multiplier Values (Input/Output)**
 - **Interactions of ocean-linked and ocean-supporting activity in terms of employment and income among different levels and geographic units:**
 - **municipal, state, regional, global**

Integration efforts

- **Ecological and Economic integration**
 - **Integrated assessment**
 - **Cost-benefit and multi-criteria analysis**
- **Policy and conflict resolution**
- **Lack of research on societal and community impact studies**

How to actually investigate?

- **Case studies**
- **Field work**
- **Interdisciplinary teams**