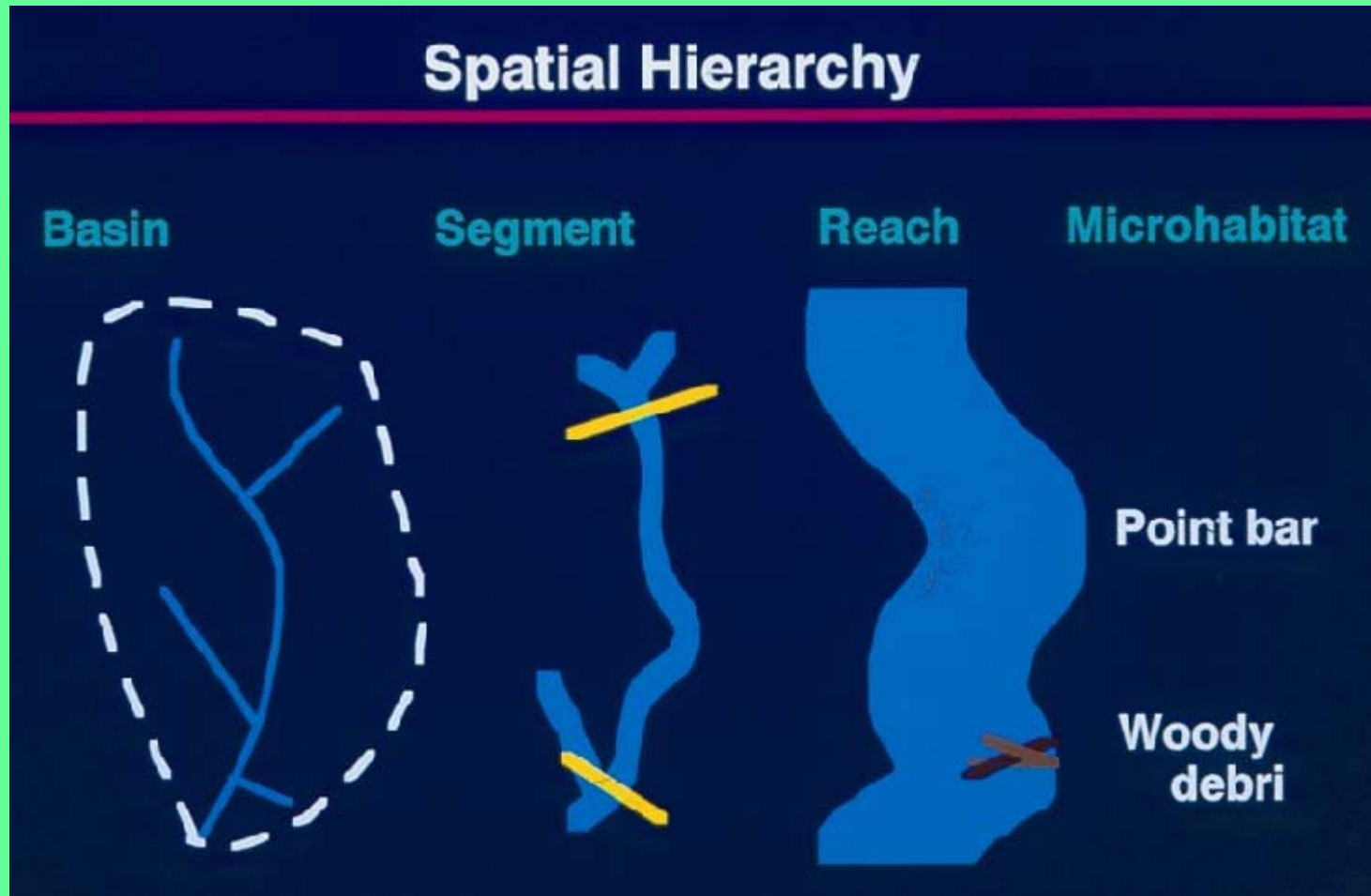


Near Stream, Far stream, Instream Variables:

what the scale do they explain?

The temporal and spatial scales at which elements of ecosystems interact with each other often differ. Thus the scale at which variables are measured and compared can influence our ability to quantify those relationships.

Studies of Stream Ecosystems Involve the Measurements of Variables at Multiple Scales



**SAND HILLS
OF NEBRASKA
and
WESTERN
HIGH PLAINS**



100 Meter Buffer on Stream Channels

Banner Creek (Jackson Co. KS)



Middle North Elm Creek

Marshall Co., KS



Middle Silver Creek

Douglas Co., NE



Fiberglass measuring tape, densiometer, clinometer



**Multiple Regression Model Results for
Macroinvertebrate Variables from WCBP Watersheds
(Lary 1997)**

<i>DEPENDENT</i>	<i>INDEPENDENT</i>	<i>SIMPLE R²</i>
BAEDIDAE	HDI (+)	0.23
	Riparian Condition (+)	0.17
	Channel Width (+)	0.17
	% Soft Silt (-)	0.15
	Treated Cropland (+)	0.21
SHANNON'S INDEX	Vegetative Overhang (+)	0.09
	% FPOM (+)	0.18
	Depth to Width Ratio (+)	0.15
	Treated Cropland (+)	0.06

**Multiple Regression Model Results for
Macroinvertebrate Variables from WCBP Watersheds
(Anderson 1990)**

<i>DEPENDENT</i>	<i>INDEPENDENT</i>	<i>SEQUENTIAL R²</i>
INSECT RICHNESS	HDI (+)	0.61
	Cropland (-)	0.75
GLEASON'S INDEX	HDI (+)	0.37
	Cropland (-)	0.61
BRILLUOIN'S INDEX	HDI (+)	0.38
	Property (-)	0.59
	Stream Gradient (+)	0.68

Significant Spearman's correlation coefficients for macroinvertebrate metrics vs. site factors

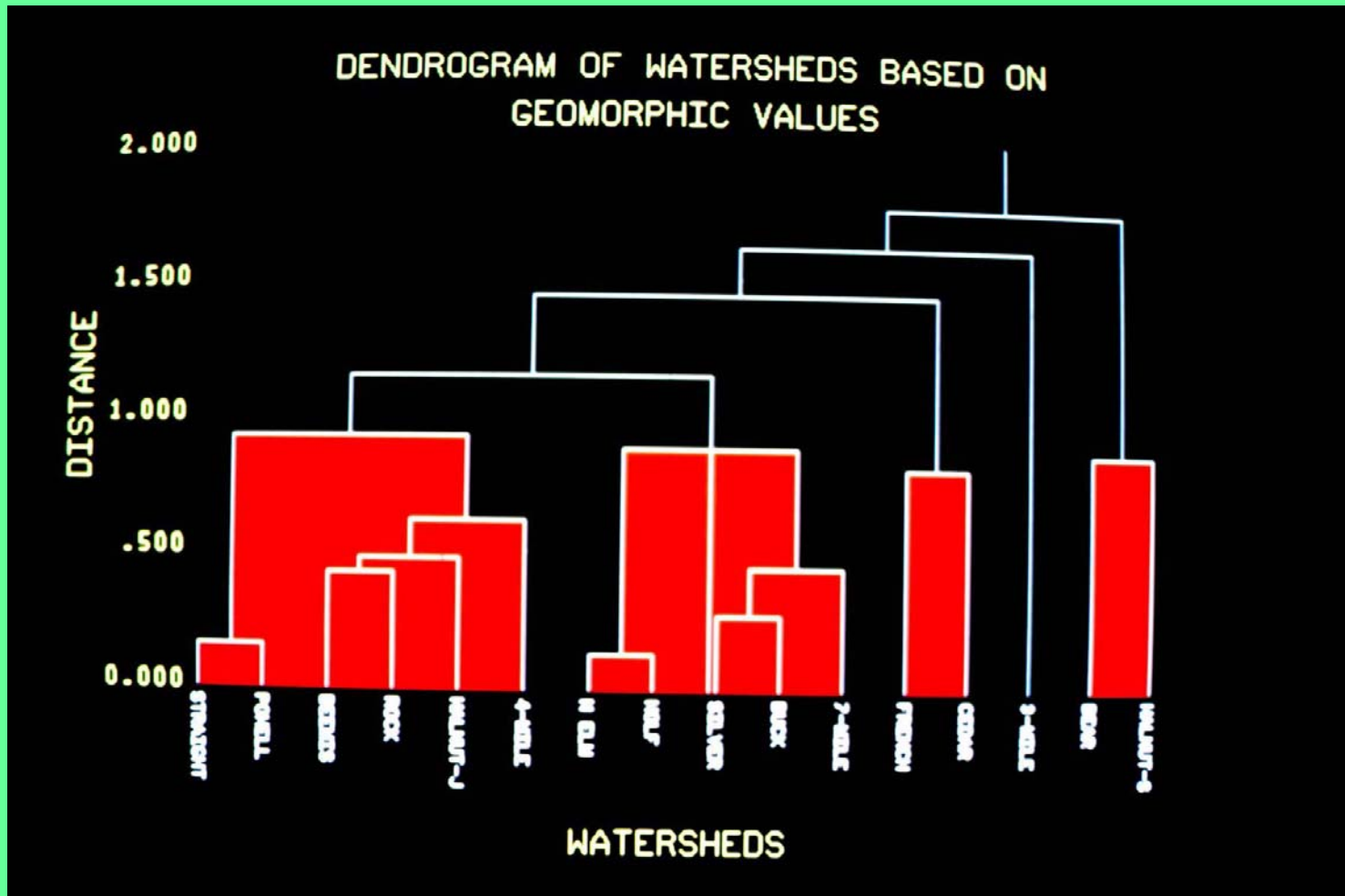
	Avq. HDI	Total N	Inorg N	Total P
Taxa rich.	0.82**	-0.48**	-0.49**	0.47**
Sensitive taxa	0.76**	-0.69**	-0.70**	0.49**
Diptera rich.	0.71**	ns	ns	0.60**
Mayfly rich.	ns	-0.43**	-0.47**	0.22*
EPT rich.	ns	-0.51**	-0.54**	ns
Insect abun.	0.72**	-0.36**	-0.38**	0.47**
EPT abun.	0.36**	-0.42**	-0.44**	ns
Gleason's	0.79**	-0.45**	-0.44**	0.50**
Margelef's	0.81**	-0.44**	-0.43**	0.52**
Shannon's	0.66**	-0.54**	-0.54**	0.45**
Brillioun's	0.77**	-0.57**	-0.61**	0.51**

*p<0.05

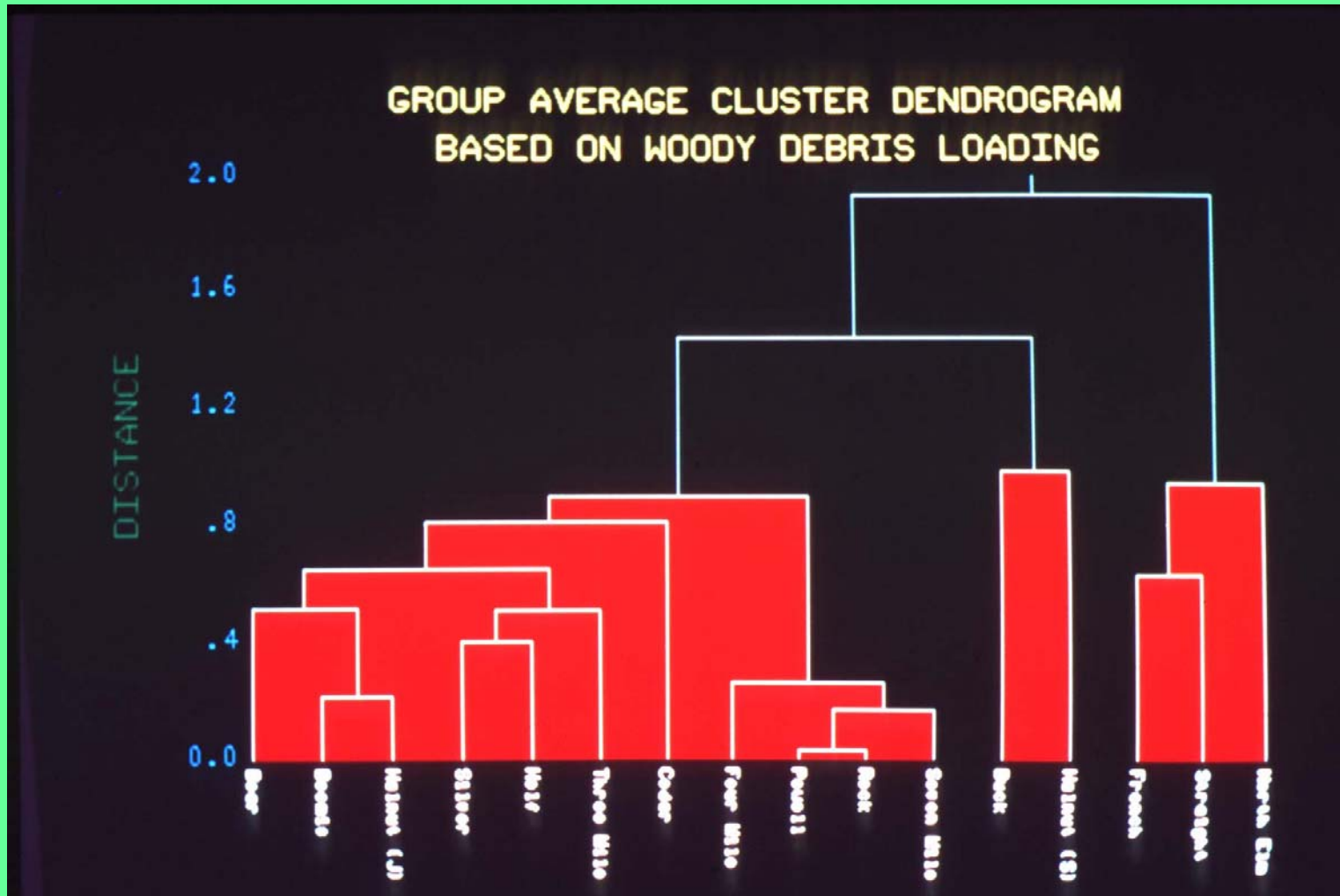
**p<0.001

Single-linkage Cluster Dendrogram Based on Geomorphic Characteristics of the Watersheds

(e.g. basin elongation, drainage density, stream link #, stream gradient)



Single-linkage Cluster Dendrogram of Watersheds Based on Woody Debris Loading in Stream Segments

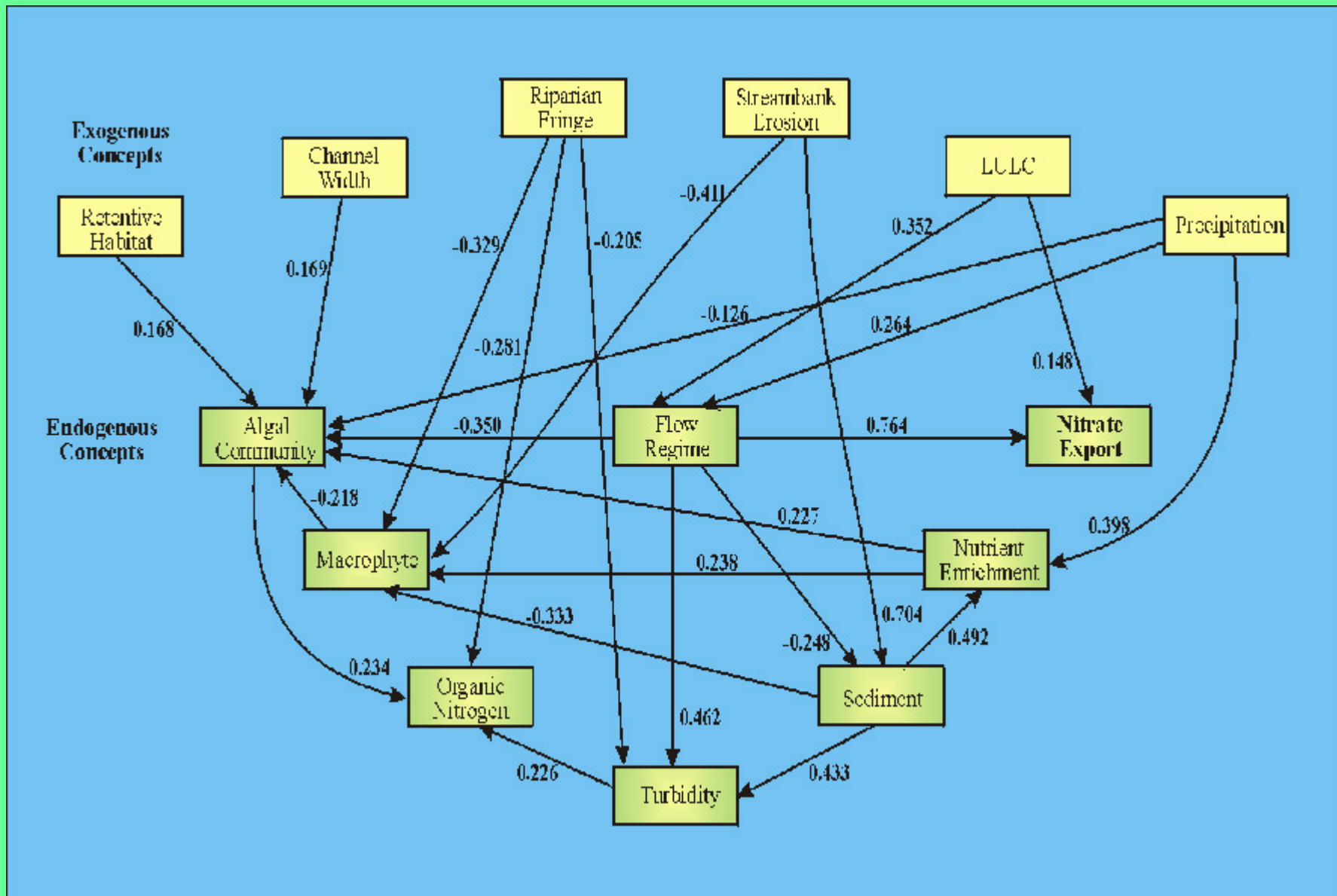


STREAM NITRATE EXPORT MODEL

CONCEPTS & indicators

- **RETENTIVE HABITATS**
- **CHANNEL SIZE**
- **RIPARIAN FRINGE**
- **STREAMBANK EROSION**
- **LULC**
- **PRECIPITATION**
- **ALGAL COMMUNITY**
- **MACROPHYTE**
- **ORGANIC NITROGEN**
- **FLOW REGIME**
- **TURBIDITY**
- **SEDIMENT**
- **NUTRIENT ENRICHMENT**
- **NITRATE EXPORT**
- **% streambed cobble**
- **stream channel width**
- **forest/stream interface**
- **streambank erosion area**
- **land use factor score (PCA)**
- **rainfall record**
- **periphyton chl-*a* concentration**
- **% streambed macrophytes**
- **organic nitrogen concentration**
- **flow rate**
- **NTU**
- **% streambed soft silt**
- **orthophosphate concentration**
- **nitrate load per unit length**

STREAM NITRATE EXPORT MODEL

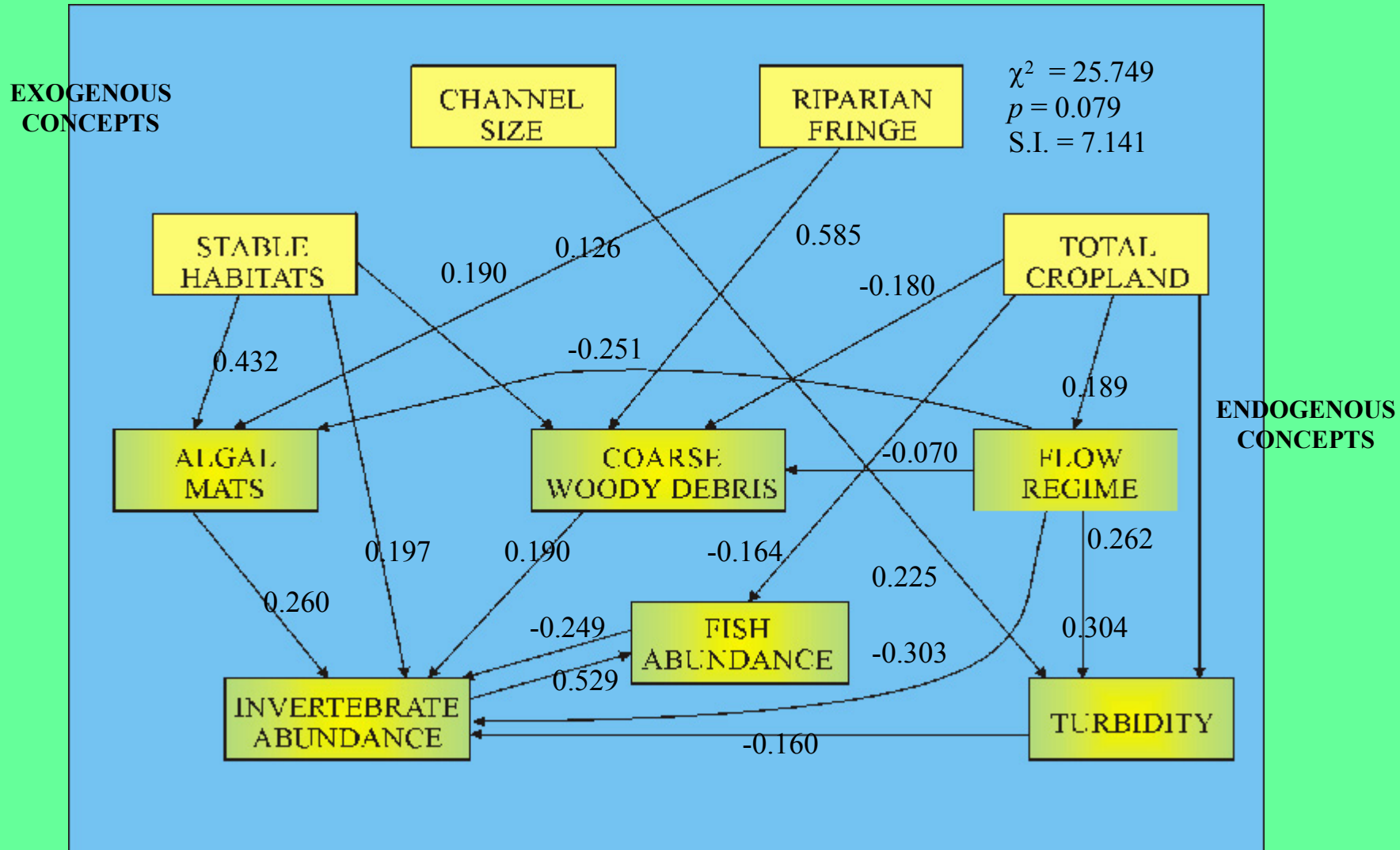


GENERALIZED ECOSYSTEM MODEL

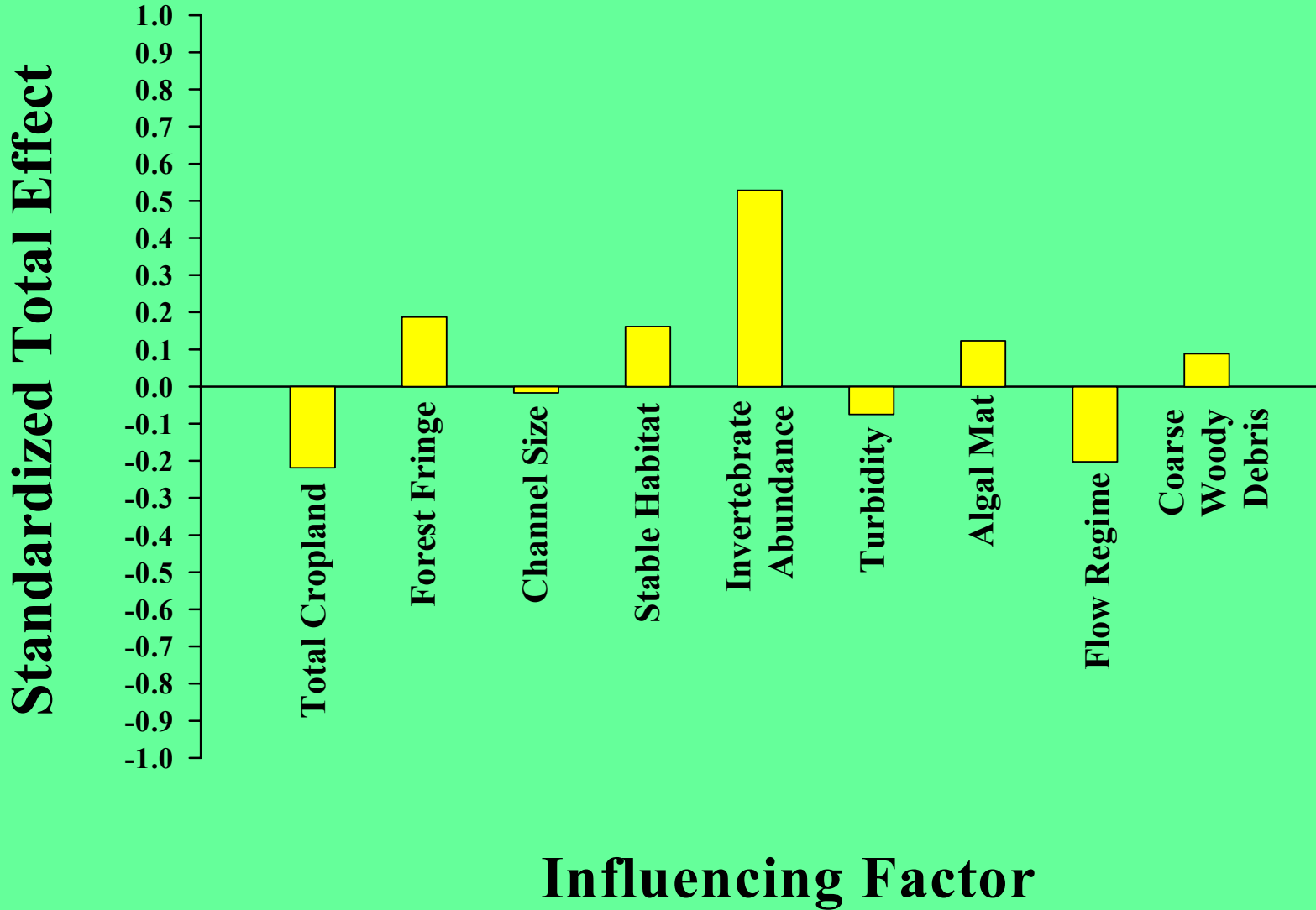
CONCEPTS & indicators

- **STABLE HABITATS**
- **CHANNEL SIZE**
- **RIPARIAN FRINGE**
- **TOTAL CROPLAND**
- **ALGAL MATS**
- **FISH ABUNDANCE**
- **INVERTEBRATE ABUNDANCE**
- **FLOW REGIME**
- **TURBIDITY**
- **COARSE WOODY DEBRIS**
- **% area (cobble)**
- **channel width**
- **% stream length**
- **% area (cropland)**
- **% algal mat area**
- **number/100 m**
- **number/sample**
- **stream discharge**
- **NTU**
- **total length**

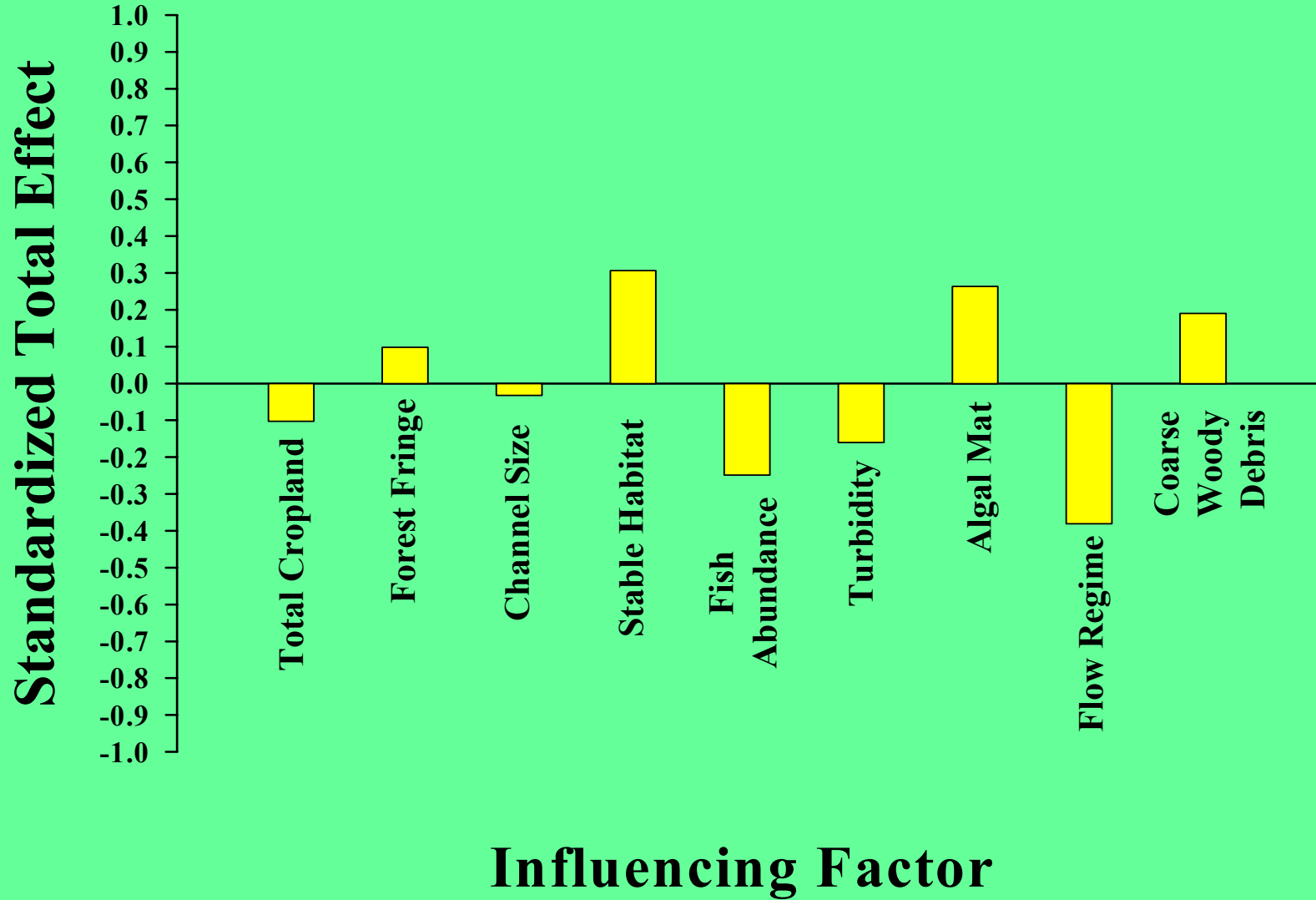
GENERALIZED WATERSHED MODEL



FISH ABUNDANCE



INVERTEBRATE ABUNDANCE



Questions